D6.2

Outreach & Communication Report and First Exploitation Plan

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D6.2 Outreach & Communication Report and First Exploitation Plan

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Executive Summary

The efficient dissemination and exploitation of important research results produced within the project are among the key objectives of the Eur3ka Consortium.

The aim of deliverable D6.2 “Outreach & Communication Report and First Exploitation Plan” is to report on the envisaged dissemination and exploitation activities of the project results. This document includes the plans for the Exploitation and Dissemination of results, summarises the Consortium’s strategy and concrete actions to disseminate, exploit and protect the foreground generated within the project and could serve as a guideline to the Consortium for the dissemination and exploitation (D&E) activities to be carried out in the context of the Eur3ka project.

The deliverable provides an update on the Eur3ka communication and dissemination tools, materials, and channels. These include the project website, different social media channels such as Twitter and LinkedIn, as well as tailored digital materials, which are used in a concerted approach to broadly communicate and disseminate the Eur3ka aims and to transfer knowledge and results of the project to the target stakeholders.

In order to measure the impact of the dissemination and communication activities a list of key performance indicators has been defined in D6.1 “*Outreach & Communication Plan*” and an updated version is reported in this document.

The basis to define a realistic exploitation is the identification of the exploitable assets of the project, technical features, competitors, licensing analysis, etc. all the aspects needed to position the asset in the market context. In addition to the identification of the exploitable assets, a market analysis has been carried out to define the market context of the project as well as the stakeholders, and SWOT analysis.

Finally, individual exploitations strategies have been updated by all the Consortium partners, and different strategies for joint individual exploitation plans have been described.

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Definitions and acronyms

AI	Artificial Intelligence
AIOTI	Alliance for Internet of Things Innovation
AM	Additive Manufacturing
AMHUB	Global Network of Advanced Manufacturing Hubs
AR	Augmented Reality
BDVA	Big Data Value Association
B2B	Business-to-Business
B2C	Business-to-Consumer
CA	Consortium Agreement
CFI	Cluster of Intelligent Factory
DFA	Digital Factory Alliance
DIH	Digital Innovation Hub
DTA	Digital Transformation Accelerator
EDIH	European Digital Innovation Hubs
EFFRA	European Factories of the Future Research Association
EMEA	European Medicines Agency
EU	European Union
ERP	Enterprise resource Planning
FF	Full Face
FDA	Food and Drug Administration
GA	Grant Agreement
GDPR	General Data protection Regulation
HE	Horizon Europe
HTML	HyperText Markup Language
iBPMS	Intelligent Business Process Management Suites
IDSA	International Data Space Association
IoT	Internet of Things
IPR	Intellectual Property Rights
ISO	International Organization for Standardization
KPI	Key Performance Indicator
MaaS	Manufacturing as a Service
MES	Manufacturing Execution Systems (MES)
MGRI	Manufacturing Global Response Initiative
MR	Mixed Reality
MVP	Minimum Viable Product
PoC	Proof of Concept
PPE	Personal Protection Equipment
PPP	Public Private Partnership
P&R	Plug&Response
QaaS	Quality as a Service
QMS	Quality Management Systems
QR	Quick Response Code
RPA	Robotic process automation
RTO	Research Technology Organization
SC	Supply Chain

SEO	Search Engine Optimization
SFW	Smart Factory Web
SME	Small Medium Enterprise
TEFs	European Network of Testing Facilities
UI	User Interface
VR	Virtual Reality
WEF	World Economic Forum
WP	Work Package
ZDM	Zero Defect Manufacturing

1 Introduction

1.1 Scope and objectives of this deliverable

Deliverable D6.2 “Outreach & Communication Report and First Exploitation Plan” will include the plans and strategies to be applied to achieve a high level of visibility of the project outcomes and to transfer knowledge and results.

This document is closely related to the other documents produced by WP6, in particular to *D6.1 “Outreach & Communication Plan”*, submitted in M3 and D6.3 *“Final Outreach, Communication and Exploitation Plans”* that will be submitted at the end of the project.

The European IPR Helpdesk [1] defines **Communication** as “a strategically planned process that starts at the outset of the action and continues throughout its entire lifetime, aimed at promoting the action and its results”, and **Dissemination** as “the public disclosure of the results” and **Exploitation** as “the utilisation of results in further research activities […], or in developing, creating and marketing a product or process, or in creating and providing a service, or in standardisation activities”.

Following these guidelines, deliverable D6.2 presents:

- The updated version of the **Dissemination and Communication strategy** including target audiences, communication channels, activities and strategy, key performance indicators, in order to raise awareness, share knowledge and attract potential users.
- **Exploitation** approach for Eur3ka project which combines both the overall project expected impact and the individual exploitation perspectives of each partner.

1.2 Structure of the document

The document is set up and covers the following topics:

- **Chapter 1** provides a general introduction, purpose, and scope.
- **Chapter 2** presents an update of the communication and dissemination strategy, outlining the target audiences and groups, dissemination media and channels used in the project and communication timeline and activities.
- **Chapter 3** illustrates the Key Performance Indicators (KPIs) used to monitor the implementation of the dissemination strategy.
- **Chapter 4** introduces and describes the Digital Factory Alliance (DFA)
- **Chapter 5** provides an initial market and SWOT analysis with a special focus on COVID-19 impacts.
- **Chapter 6** shows the partners’ preliminary exploitation interests and intentions at this stage of the project. Moreover, the joint exploitation strategies are presented in this section
- **Chapter 7** draws conclusions and next steps planning.

2 Changes in Dissemination and Communication Strategy

2.1 Changes and Updates in Communication & Dissemination Plan

Since the beginning of the project, the Consortium holds monthly meetings for discussing WP6 activities, in order to align them with other work packages and make decisions. Based on these discussions some changes have been made on communication activities and **KPIs** that are associated with them.

Main changes:

- **Press releases** targeting major stakeholders on supply/demand sides was replanned for the second year of the project, as it would be more accurate to communicate after having some project outcomes completed.
- Secondly, it was decided to intensify the number of **newsletters** in the second year, to be able to communicate project outputs with the relevant industry stakeholders. These efforts will serve as a channel to disseminate and communicate the outputs of the project.
- In addition to the news from the project and the partners, an ongoing **content scanning operation** has been initiated by IDSA, to locate more content to be listed on the project website. This operation involves finding content from around the world on manufacturing repurposing, healthcare manufacturing, industry 4.0 and any other stuff that is relevant to the project's scope. This effort already started to contribute to the search engine visibility of the website. It also functions as a tool to keep all parties (project partners and other visitors) informed about the news from the global industry.

Other than the ones listed, there is no other significant change in the communication and dissemination plan of the project.

2.2 Updates on Communication Channels

The only notable update in terms of communication channels was the partnership in the **PREPARE cluster**. All projects in this cluster meet on a quarterly basis to discuss the collaboration opportunities in dissemination and communication activities. Activities are already being carried out, by all projects to support each other on social media (via shares, likes and tags) in order to increase each other's visibility.

2.2.1 Updates on Event Planning

To increase the collaboration among the members of the **PREPARE cluste**r, it was also decided to collect information about all projects' activities and events in a single shared file, so that all project consortia in the cluster can be aware of the events organized by other members. The information on this spreadsheet document is being shared with the project partners regularly.

2.2.2 Social Media

As mentioned on 2.1, scanning for content is an ongoing activity realised by IDSA. The found content is being shared both on the website and via social media channels. The content is found based on the set of criteria listed below:

- Updates from Eur3ka partners' social media accounts that might be relevant to the project's scope
- Updates and achievements from other projects of PREPARE cluster
- General news from relevant industries such as healthcare, manufacturing
- Global news around hashtags: #healthcare, #euhealth, #digitalfactory, #additivemanufacturing, #supplynetworks, #dataecosystem, #industry40, #repurposing, #digitaltwins, #EUHealthResearch, #ResearchImpactEU.

2.3 Risk Assessment

As mentioned in Chapter 2.7 of the *D6.1 "Communication and Outreach Plan",* some risks were previously identified along with their probability and potential impacts. There are no changes in these risks. In other words, no new risks were identified but a short evaluation is available next to each item.

Risk number	Description	Probability (low, medium, high)	Impact (low, medium, high)	Mitigation action	Evaluation
1	Due to Covid-19 travel restrictions, there is a chance it would not be possible to organize any physical events (for the first half of 2021, or even the entire year)	High	Medium	This risk was already discussed by the project Consortium. As a result of that, every partner is prepared and have the technical capabilities and equipment to organize online versions of each planned event.	As of M12, this risk is still valid, at least for the majority of the project partners' countries. The situation for the second year will be evaluated within the project Consortium.
2	Project partners will not be able to attend any external events due to restrictions caused by the COVID-19 pandemic	High	Low	In such a case, the project partners have a plan to focus more on participating in online events and to work more on online	The same situation as the previous risk item applies here as well.

Risk number	Description	Probability (low, medium, high)	Impact (low, medium, high)	Mitigation action	Evaluation
				advertisement activities.	
3	Low participation in Eur3ka online events	Medium	High	Eur3ka partners are aware that engaging people in online activities is much harder than getting them to participate in physical events, especially for events of more than 1 day. We will strive to be innovative in our approaches, contents and tools in order to keep high levels of engagement. We will also make sure to limit the duration of our events to what is necessary and avoid unnecessary long workshops and webinars. Indeed the kind of dissemination events currently planned has estimated durations between 1-3 hours.	Until M12, this risk item did not have any significant impact on communication & dissemination activities.
4	The number of social media followers remains low (under 200)	Low	Medium	Although the project will leverage social media reach of all its members, there is always a risk of not gaining enough traction. If this becomes the case, we will discuss it internally and find ways to get our content more	This is not a threat at this time of the project. However, new communication and dissemination strategies will be applied in the second year, to

Risk number	Description	Probability (low, medium, high)	Impact (low, medium, high)	Mitigation action	Evaluation
				engaging for the targeted audiences, enriching them with hashtags and interactive elements such as polls and forms.	promote the project results.
5	Some communication channels not performing well enough (e.g., website statistics are low, or blog posts are not read by enough people)	Medium	Medium	The project's dissemination strategy relies on the success of multiple communication channels. In case if one channel does not have enough traction, the Consortium members will discuss this internally (at the end of the first year) and more efforts will be focused on successful channels. There is also a chance that some emerging channels (such as podcasts) may be identified and start being used.	Same as the item above.
6	Difficulty to reach the regional/local communities through communications in English	Medium	Medium	Communication materials targeting regional stakeholders will be shared via the relevant project partner in the respective country and they will be asked to have them translated into the	This risk item had no significant effect on communication and dissemination activities until M12.

Risk number	Description	Probability (low, medium, high)	Impact (low, medium, high)	Mitigation action	Evaluation
				local language, when necessary.	

Table 1: Risk Assessment for Communication & Dissemination Activities

3 Tracking progress and Main Results in Dissemination & Communication Activities

3.1 KPI Measurement

The KPIs reported in D6.1 can be found on Table 2 below. This table also reflects the changes made upon the communication & dissemination strategy, as well as the achievements since the beginning of the project.

The discrepancy and general changes in the communication & dissemination plan have been provided in Chapter 2.

Measure	Driver	Action	KPI	Current Stats
Monthly Web content	Regular information updates with SEO-driven approach	Identify and publish new content on a regular basis.	YR1: min. 2/month; YR2: min: 3/month	24 news[1]
In-house newsletters	Different stakeholders are properly informed in a timely manner	Produce and circulate biannual newsletters	YR 2: min 2	6 newsletters[2]
Promotional material, including video content	Specific audiences receive tailored and timely messages	Produce focused material (for stakeholders/events)	YR1: min 3; YR2: min. 6;	3 booth presentations [3]
Press releases targeting major stakeholders on supply/demand sides	Raise interest and recruit demand actors, supply side actors & healthcare providers	Produce press releases targeting different media channels and audiences	YR2: min 2 for IT audiences; min 1/major stakeholder category	Envisaged for the second year of the project.
Press releases for general public	Raise interest amongst nonspecialized audiences	Lightweight blog for nonspecialized channels	≥ 2 press clippings	Envisaged for the second year of the project.

[1] 20 news published on Eur3ka.eu website and 4 news were produced and shared via DFA website.

[2] 3 monthly newsletters, in which the events organized by the DFA with Eur3ka partners and also marketing events (European R&I Days, IDSA summit) were announced. 2 newsletters to announce two of the events organized by the DFA and one newsletter published by SQS in its monthly magazine (in June 2021).

[3] These were presentations (slide shows) converted into video format, consisting of a general overview about the project, providing information about its context, objectives, approach, breakout path, alignment with EU, G20, World Economic Forum and the project's network as well as providing contact details for the interested parties.

Measure	Driver	Action	KPI	Current Stats
Visibility of Eureka in channels used by different stakeholder categories	Ensure back-links/branding recognition to website through synergies and social media; General brand recognition is demonstrated	Liaise and engage with initiatives with journalists and LinkedIn groups; produce a survey for brand recognition	≥20 back-links across major stakeholders ≥ 50 responders identified Eur3ka (questionnaire)	105 backlinks
Social media content: Twitter	Grow community; Regular stakeholder engagement gives important insights into interests/concerns	Publish tweets, including SMART based campaigns & monitor outcomes	YR1: min 8/month YR2: min 24/month	128 tweets
Social media content: LinkedIn	Grow community Regular stakeholder engagement gives important insights into interests/concerns	Publish posts, make relevant tweets, including SMART-based campaigns & monitor outcomes	YR1: min 1 post/month; YR2: min. 4 posts/month; Direct engagement is also envisaged	50 posts
Stakeholder database	Early identification of prospective marketplace and service stakeholders	Develop a database of contacts for community development and stakeholder engagement	300 profiled stakeholders by M12; >600 by M24	342 stakeholders were identified and classified on a database.
Exhibitions/workshops with free access,	Ensure outreach to external audiences and even non-specialized ones, making use of channels such as the DFA	Show Eur3ka use cases to visitors in lively, lightweight and virtual environment provided to a wider audience.	≥ 1 Digital Factory Trial ≥ 20 external attendees	Envisaged for the second year of the project.
Online networking events and	To gain, spread and foster technological	Through the DFA, events are being scheduled based	≥ 3 online sessions	4 online events

Measure	Driver	Action	KPI	Current Stats
technological conferences	knowledge sharing, best practices and lessons learnt on manufacturing resiliency leadership for future industrial collaboration.	on the manufacturing Global Response Initiative that it is fostering. Eur3ka partners will be able to join/participate in these events.	≥ 50 external attendees	realized with DFA
Online and/or F2F training sessions	Ensure general public is "educated" about the need to advanced research to address their needs	Provide a service for non IT savvy to show what the new service means for them	≥ 1 online session ≥ 50 non-specialized attendees	Envisaged for the second year of the project.
F2F interactions with local people	Ensure engagement with "real people" at the local level	Work with use case partners to co-host an open day or similar, including media presence	≥ 1 local events ≥ 3 appearance in local media	Not realized due to the pandemic
Free trials for general public	Facilitate and drive uptake through early trial testing	Organize free trials after having reached a predefined maturity level	≥ 5 testers	Envisaged for the second year of the project.
Marketing events, e.g., trade fairs/exhibitions	Ensure direct engagement with major stakeholders	Stand decked with demos, videos, informative material	Min. 1 in YR1 and 2 in YR2	2 online events (European R&I Days, IDSA Summit)

Table 2: KPIs for General Communication Activities, Stakeholders and Community Engagement

3.2 Dissemination reporting

This section will contain a detailed report of all activities carried out from M3 to M12 to maximize the impact of the project

3.2.1 Social Media

Eur3ka keeps using the two social media channels: **Twitter** (https://twitter.com/Eur3ka_eu) and **LinkedIn** (https://www.linkedin.com/company/Eur3ka -eu/) to communicate information on project activities and outcomes. Both channels' performance between M7-M12 can be found below (Table 3) along with a comparison to the previous period and the target KPIs.

Eur3ka Social Media Channels	**Followers (Dec '20 – May '21)**	**Followers (Jun – Dec '21)**	**Increase vs previous period**	**KPIs**	**Activities Dec 2020 – Dec 2021**
Twitter	76	126	+50	# of tweets: 96 (1st Year) (8 per month)	# of Tweets: 168[4]
LinkedIn	81	137	+56	# of posts: 12 (1st Year) 1/ month	# of Posts: 80[5]

Table 3: Social Media Performance

The social media posts that were shared over 176 days period (between June 1st and Nov 26th) reached 12058 impressions in total (5200 impressions via Twitter and 7058 impressions for LinkedIn posts). The number of followers has a good organic growth rate on both channels, and it is expected to grow at a faster speed in the forthcoming period, with the release and promotion of project outcomes.

3.2.2 Website

During this period, majority of the traffic to the Eur3ka website has originated from direct users 56% (that was 66% in the previous period), which indicates that the majority of the traffic is originated from the users who directly type the website address into their browsers. On the other hand, the percentage of users arriving at the website via search engines reached 24% (which was 12% in the first six months). This shows that the SEO (Search Engine Optimization) work on the website worked well and attracted some new visitors via search engines. The rest of the traffic (20%) is originated from the referring websites (back-links) and social media (LinkedIn and Twitter). The average duration of a session is 3

[4] 128 tweets were shared via project's account and 40 tweets shared via DFA Twitter account, to announce project events
[5] 50 posts were shared via project's account and 30 posts shared via DFA's LinkedIn page.

minutes, which is above the industry benchmark (2-3 mins) as mentioned by digital marketing experts[6].

The peaks during business days and office hours, as well as the drops during weekends, give an indication of the target audience. More KPIs such as the number of blog posts will be evaluated in the forthcoming periods of the project, after having more posts available on the website.

Criteria	KPI (project duration)	Statistics (M1-M7)	Statistics (M7-M12)	Total
Number of visits	Not defined	479	442	921
Number of unique visitors	3000	206	222	428
Number of back-links to the website	20	11	94	105

Table 4: Website Performance

As seen on the table the number of backlinks increased dramatically. The majority of these were sourced by social media posts and website referrals that were provided by Digital Factory Alliance and other members of the **Prepare Cluster**[7]. This helped to increase the visibility of Eur3ka, as well as constitutes a robust baseline for the future dissemination activities. However, the total number of website visitors did not increase by this rate. In order to increase this number in the forthcoming months, we plan to include content (that is more interesting) on the website and disseminate it through various channels (social media, communication networks of project partners, etc.).

3.2.3 Events

As reported previously in the M6 interim report, 3 events have been organized during the first 6 months of the project. In the second period (M7-M12) of the project, the events listed below were organised/participated by Consortium partners. As expected, the number and frequency of project events will intensify in the second year of the project.

Event Name	Organizing/ Participating Partner(s)	Date	Place/Venue	Link	Statistics
EuroMA Conference 2021	ETHZ	Jul 21	Switzerland	https://www.euroma21.org/	N/A

[6] https://www.spinutech.com/digital-marketing/analytics/analysis/7-website-analytics-that-matter-most/#:~:text=For%20a%20good%20average%20session,sessions%20indicate%20more%20engaged%20visits.
[7] https://www.eur3ka.eu/prepare-cluster

AM Summit	AM Hub	Aug 19	Denmark	https://amsummit.dk/	420 participants
Webinar on sustainable product development	AM Hub	Sep 15	Denmark	https://www.addifab.com/event-details/form	25 (physical) participants
Kick-off leading group of Manufacturing SMEs in order to progress development of SCSN and Resilience	BRAIN (TNO, participating partner)	Sep 20	Netherlands		20 participants
Continuation of Leading Group of Manufacturing SMEs	BRAIN (TNO, participating partner)	Nov 29	Netherlands		20 participants
Increase testing capacity through Automation Intelligence to tweak production of FF masks	DFA Event (SEAC, STAM)	Nov 25	Italy	https://digitalfactoryalliance.eu/event/increase-testing-capacity-through-automation-intelligence-to-tweak-production-of-ff-masks/	N/A
Next Generation IIoT for Resilient and Sustainable Manufacturing (IoTWeek 2021)	INTELLIMECH, POLIMI, ENG, INNO	Sep 3	Dublin (Online)	https://digitalfactoryalliance.eu/event/next-generation-iiot-for-resilient-and-sustainable-manufacturing-iotweek-2021/	N/A

Table 5: List of Events Participated/Organized by Project Partners

3.2.4 Publications

In the first year of the project, the publications on the table below were reported (four scientific publications and one position paper).

Partner(s)	Author(s)	Title	Details
UiO	F. Psarommatis and D. Kiritsis	Comparison Between Product and Process Oriented Zero-Defect Manufacturing (ZDM) Approaches,"	pp. 105–112, Sep. 2021, doi: 10.1007/978-3-030-85874-2_11
UiO	F. Psarommatis, J. Sousa, P. Mendonça, D. Kiritsis, and J. P. Mendonça	Zero-defect manufacturing the approach for higher manufacturing sustainability in the era of industry 4.0: a position paper	Int. J. Prod. Res., 2021, doi: 10.1080/00207543.2021.1987551
UiO	F. Psarommatis, G. May, and D. Kiritsis	Predictive maintenance key control parameters for achieving efficient Zero Defect Manufacturing	Procedia CIRP 104C (2021) pp. 79-83
IDSA	Oliver Hillermeier, (SAP SE), Matthijs Punter (TNO), Dr. Karsten Schweichhart, (Deutsche Telekom) Dr.-Ing. Thomas Usländer (Fraunhofer IOSB), Simon	Data Sovereignty – Critical Success Factor for the Manufacturing Industry (Position Paper)	Available via: https://www.eur3ka.eu/publications/position-papers

	Dalmolen (TNO), Jörg Langkau, (Nicos AG), Robin Schwarz, (ISTOS GmbH)		
UiO	F. Psarommatis, D. Kiritsis, Oscar Lazaro (O. Meyer and F. Fraile not Eur3ka partners)	Proposed and running a journal special issue (Frontiers Manufacturing technology) for publishing Eur3ka results and not only, special issue link: https://www.frontiersin.org/research-topics/27428/zero-defect-manufacturing-in-the-era-of-industry-40-for-achieving-sustainable-and-resilient-manufact	

Table 6: List of Publications

4 Alliance and Community building

4.1 Methodology to Build and Maintain a Stakeholder Network for Eur3ka

One of the main objectives of Eur3ka is to create a European Trusted Manufacturing Network through the **Manufacturing Global Response Initiative (MGRI)**, with the aim of building a common framework between all stakeholders from the digital and manufacturing industry, pooling resources and experts, to coordinate in an effective and trusted manner, to be better prepared and collectively respond to a crisis.

In case of an emergency, manufacturing companies may need to repurpose their manufacturing lines or their equipment to comply with production requirements, according to the sudden demand of the market, or coordinate with others to produce and bring to market new products. They also need to be compliant with the regulations, and therefore, they need to certificate and validate all their assets and services before they come out to the market.

For this reason, the stakeholders that are aimed to be part of the network need to go through a 4-stages pathway in Eur3ka´s platform. This process is further developed in deliverable D2.2, but here is highlighted the main purpose of each stage to build and maintain the network.

Figure 1: 4-stages pathway to build and maintain the network

First stage: Company and assets registry

The initial stage begins with the **Sign-up process** in Eur3ka Platform, which can be done **through the DFA.** The companies will have the opportunity to register as:

- **End user** looking for solutions, assistance or any kind of support
- **Provider** of services, products or repurposing capabilities

Once the companies are registered, they need to **register their assets**, to categorize, certificate and validate them.

Particularly, the assets will be classified into **4 main groups,** after gathering and analyzing the information of each asset: medical equipment, sites, management systems and manufacturing equipment.

Then, the **validation/certification process** will be carried out by SQS, supported by other entities (such as regulatory authorities, standardization organization, etc.), in order to establish a validation roadmap and to specify the requirements, medical standards and normative rules associated with each type of entity that can contribute to the Eur3ka platform in the provision of these four main assets. Once the asset is validated and certified, it is incorporated into the Eur3ka platform.

If the **asset does not reach the requirements for validation**, the Eur3ka platform will provide a **transversal step** (adaptation), that will be supported by the **consultancy body of the platform,** and will be composed of 4 extra steps, in order to improve, modernize, or adapt a certain asset to make it repurposing certified and validated.

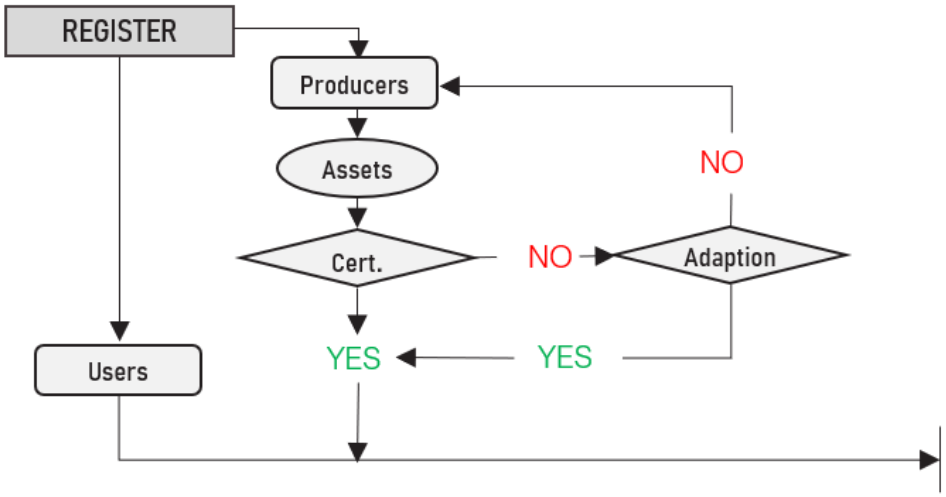

Figure 2: Transversal step for the assets that do not reach the requirements for validation

At this point, there will be different pathways depending on the existing scenarios. In this manner, for the first stage, the company and assets registry will be deployed in the two existing scenarios:

- **Before Crisis Scenario:** to prepare for future situations of high demand. It will be important to modernize the platform, by modernizing the current technologies, transforming and digitalizing the production processes, capabilities and current technologies methods and tools, in accordance with a standard framework that encompasses quality inspection, management and certification of the modernized technologies and medical devices as well as products that showcase potential to generate value to the network.
- **During Crisis Scenario:** for situations that require medical equipment in an urgent manner. All the efforts should be addressed to the certification & adaptation processes of the manufacturing capabilities.

Second Stage: Supplier / Manufacturer Engine search

At this stage the asset capability and capacity are defined.

- The **asset capability** comes as a result of the validation and certification process and means that the company has the **capability** and the necessary resources for the asset to be repurposed when needed.
- The **asset capacity** depends not only on the asset capability, but also on the asset's **availability**. The companies need to be available to produce whenever needed.

These two concepts will take an important role in the **searching process**, which will have two different approaches.

- **Static search** will be used to filter assets according to their capabilities (permanent characteristics determined through the certification process).
- **Dynamic search** will only present the available assets for repurposing, the ones which fulfil the requirements.

Ultimately, a search engine will be needed for the **matchmaking process** between the **capable assets** and the **available ones**.

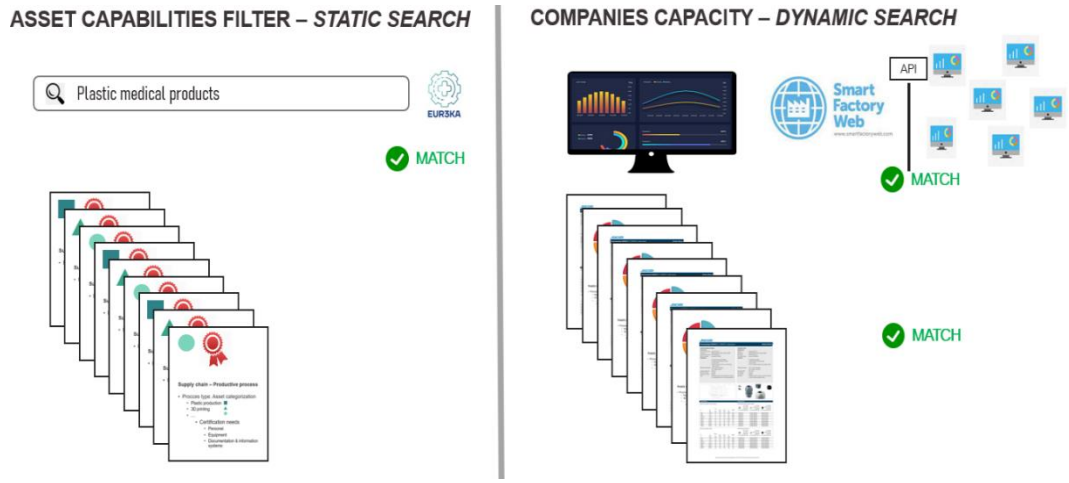

Figure 3: Asset capabilities & Static search vs. Companies capacities & Dynamic Search

For this reason, the Eur3ka network pretends to assess in depth the coverage of the assets, from its repurposing capabilities to its on-demand availability, being able to identify those assets that are certified, as well as available for repurposing, according to the established requirements by the production needs.

Third stage: Purchasing process

This stage encompasses all the purchasing process between user and provider.

Users and providers are in contact for the purchasing process, which includes access to the offer requesting process, the establishment of the purchase conditions and the payment method. In this way, once the purchase order is accepted, another registry process is needed to manage and store all the transaction invoices.

This task will be carried out by a platform able to collect all the order information regarding the customer organization and will be able to support the same customer in the management and monitoring of the business process.

Fourth stage: Trusted Manufacturing Response and Reliable Logistic Coordination

The fourth stage is relative to the repurposing manufacturing process and Logistic coordination.

With the purchasing conditions fixed, it is established a data exchange framework, for a trusted and secure data transferring, in which data sovereignty is fully guaranteed. The additional value provided by the Eur3ka platform is apparent and must lay in the production process monitoring within a safe and trusted data sharing space in order to share production information between the customer and the manufacturer. Likewise, the Eur3ka solution must provide manufacturer-customer collaborative platforms to manage the production planning, to discuss and co-design the final products, and to transfer the technical requirements and quality reports, as well as the order status, among other functionalities. The customer and the manufacturer will collaborate tightly throughout the entire supply chain, from design to product distribution and by being connected in real-time.

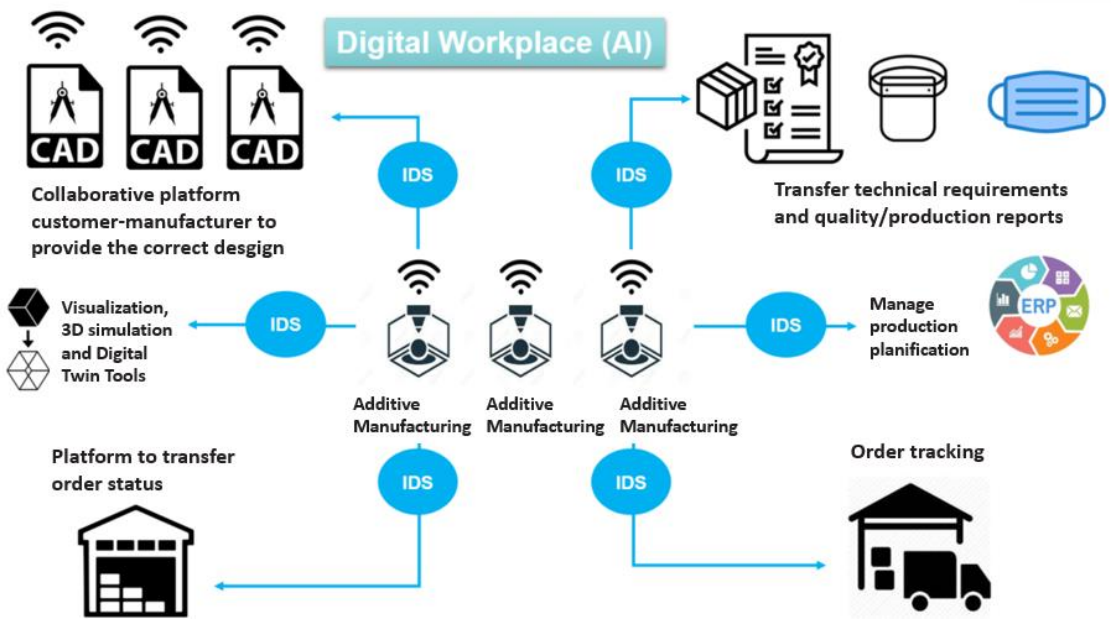

Figure 4: Digital Workplace for the "in-real-time" design to product data distribution

For this purpose, it is necessary to establish a **data exchange framework** and for terms and conditions to be shared in a transparent manner since data sovereignty has to be ensured in that exchange through connectors that provide privacy in a framework compliant with the General Data protection Regulation (GDPR). This solution will be carried on based on IDSA standards for trusted data exchange and governance models, which ensures harmonization between entities through common design principles for data spaces. Additional partners will participate in the network as certification authorities and will support the process of certifying the IDS solutions acquired or developed by the Eur3ka platform

members. Four different types of connectors will exist within the network, depending on the type of role of the partner in the platform.

Finally, the **logistic and reliable coordination** as a prolongation of the previous stage and is based on the supply chain. Once the product is manufactured, approved and certified, logistics plays a very important role. It will be essential to manage the logistic activities successfully, in order to meet the procurement deadlines. Therefore, Eur3ka utilities must provide platforms for supply chain management and monitoring, as well as smart logistics coordination and consultancy support. Here the Smart Factory Web, as an Information Management System, will play an important role for enabling the modelling and visualization of supply chains.

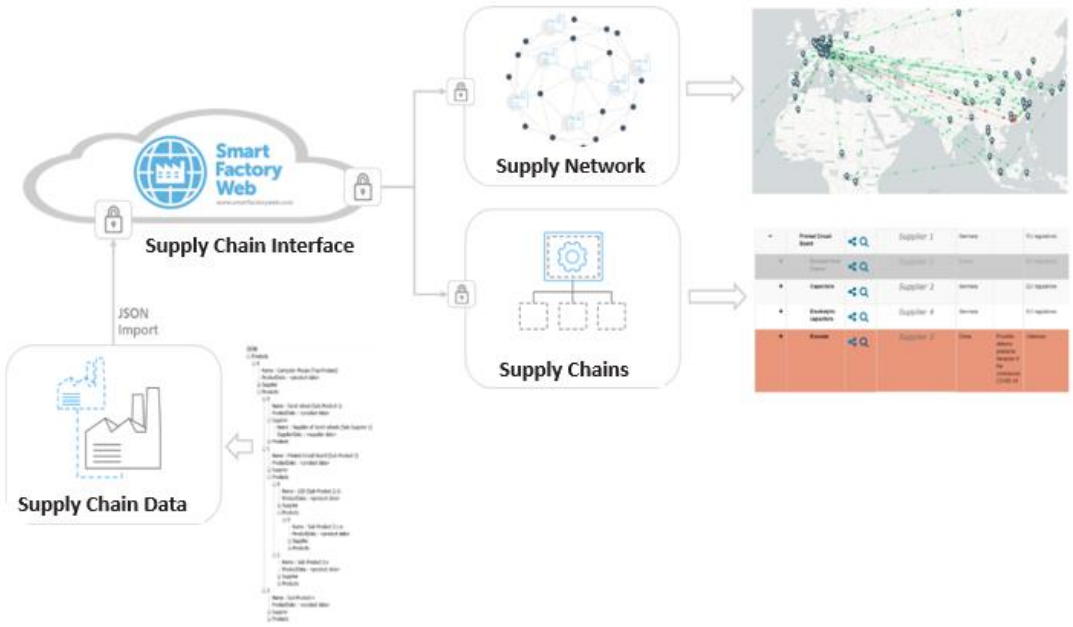

Figure 5: Supply Chain Management

In the following section it is described in detail the DFA, which, as mentioned above, will serve as the gateway to the Manufacturing Global Response Initiative (MGRI), supporting the signing process to access the Eur3ka community.

Figure 6: Signing process

4.2 The Digital Factory Alliance

4.2.1 DFA in a nutshell

The DFA is aimed at creating an International Trusted Community, to foster knowledge sharing and industrial collaboration, and speed up data driven digital transformation of the manufacturing industry. The main goal is to accelerate the early adoption of digital technologies, increasing the level of automation, improving the quality control and management, optimizing the resource utilization and Supply Chain integration and resilience, or maximizing assets utilization, which would be reflected in the magnitude of the business growth.

Among others, the scope of the mission of the DFA includes the **Manufacturing Global Response Initiative (MGRI)**[8], which is focused on encouraging private companies of all sizes in the digital and manufacturing sector, as well as public authorities, to join forces for better collaboration. The COVID-19 outbreak made evident the lack of public-private coordination, and also between private manufacturing stakeholders. Therefore, the goal is to engage SMEs and Mid-Caps, Large Enterprises, FabLabs, Digital Innovation Hubs (DIHs), Universities and Research Centers, and Governments and Associations, in order to synchronize all the necessary mechanisms to be better prepared in case of an emergency.

Additionally, the DFA is developing new methodologies, technologies and tools to master manufacturing digital autonomy for **Rapid Smart Response** at factory, with the objective of being better prepared to address future crises that may lead to disruptions in the supply chains, which should be tackled with quick repurposing actions.

In this context, DFA´s MGRI expects to foster trusted and connected production, advance the intelligence level of the Factories of the Future, redefine supply chain innovation, improve manufacturing system engineering and commissioning for resilience, or consider digital workplaces for maintaining business continuity.

4.2.2 Main business drivers

The DFA is fully driven by its members, European SMEs, large companies, and Research Centres to develop and scale-up all the initiatives of the alliance, engage more members and all in all, drive the data-driven digital transformation of the manufacturing sector.

Additionally, the **Digital Innovation Hubs (DIH) partner programme** intends to incorporate to the DFA network DIHs with expertise in specific Industry 4.0 areas. The objective is to engage DIHs that function as a service provider and to successfully implement the DFA tools and methodological assets within local SME ecosystems.

The alliance also is working on a **Certification Service** to ensure that the digital solutions of the DFA comply with the digital services integration model an autonomy level requirement. The aim is to cooperate with regulatory entities to provide technical and regulatory compliance validation and decertification activities.

[8] https://digitalfactoryalliance.eu/manufacturing-resiliency-manufacturing-global-response-initiative/

The alliance is open to cooperating with other manufacturing networks to build common operational frameworks, formalizing common and open repurposing procedures and strategies to harmonize approaches.

4.2.3 Market potential

The manufacturing industry is a strong asset for the European economy and an important driver of employment and prosperity. It also plays a key role in research and innovation, being responsible for 64% of private sector research development expenditure and 49% of innovation expenditure in Europe.

The sector accounts for:

- 2 million enterprises
- €2,078 billion in gross value added
- 32.1 million jobs in 2019 in manufacturing in the EU 27 (including 14.5 million jobs in advanced manufacturing)

Currently, the manufacturing sector is facing two main challenges: **digital transformation** and a shift towards **more environmentally sustainable** production. Therefore, deploying new digital technologies is necessary to foster the growth of Europe's manufacturing sector, and thus, the **DFA plays a key role in the digital transformation of manufacturing industry**.

In this context, public-private partnerships between industry and the European Commission help tackle societal and environmental challenges. It has strategic importance for the European industry, having an impact on its global technical lead, as well as on the economic growth and creation of new high-skilled jobs in Europe.

The DFA is intended to become a **reference point to tackle the challenges that manufacturers face when repurposing**, since:

- Repurposing is expensive and manufacturers may be reluctant to share their intellectual property with competitors or enter a new market full of uncertainties.
- Companies must develop preliminary design concepts and assess their feasibility, and designing critical items requires specific knowledge, technologies and specialized skills that the companies may lack.
- New relationships need to be established with suppliers for the adapted/new products. Additionally, sudden spikes in demand for inputs normally led to price increases.
- Products 'quality needs to be verified and then validated and certified according to standards that vary across regions.
- Scaling-up production is not simply a technological challenge, but requires new organizational capabilities – from product design and manufacture to supply chain governance to regulation and testing. For this reason, repurposing remains challenging, even for technologically less complex items.

Therefore, the DFA aims to become a **trusted manufacturing and digital community**, to be better prepared when repurposing actions are required and support the resiliency process of the companies in the sector. The alliance pursues a better collaboration between

stakeholders, based on trusted information sharing and knowledge transfer, to enhance cooperation and face any barrier that may prevent companies from beginning their repurposing journey.

All in all, the alliance calls for SMEs and Mid-Caps, Large Enterprises, FabLabs, Digital Innovation Hubs (DIHs), Universities and Research Centres, and Governments and Associations, to collaborate and synchronize all the necessary mechanisms to guarantee the readiness of the manufacturing sector in case of an emergency. Depending on the type of future crisis, the demand can be completely different, and therefore, it is important that the greatest number of companies in the manufacturing sector are ready to cooperate and participate in the alliance.

5 Market Analysis

5.1 Manufacturing Market trends

5.1.1 Introduction

The manufacturing industry has seen quite some disturbances in recent years. COVID-19 is one of the main examples of disruptions that are out of our control. This chapter will state the current manufacturing market trends for 2021 in 3 dimensions: Socio-economic trends, industry demand trends, and technology trends.

These trends show what is currently happening in the manufacturing market. The Eur3ka project focuses on providing a better answer to a pandemic such as COVID-19 and by using these trends, it is possible to better determine which current developments can already offer a (partial) solution to the current problem. Thus, these trends help to outline the possibilities that are already emerging in the market and how we within Eur3ka can connect to them. Connecting well with the needs of the market is essential for creating support for the solutions that are devised and developed in the project. This is why this overview of trends is a good aid for developing specific solutions for current market needs and can be used as a guide to connecting to already emerging innovation.

5.1.2 Socio-Economic Trends

Apart from the impact of COVID-19 the following Socio-economic trends have been identified.

Sustainability Trends

Corporate social responsibility is increasingly important for manufacturers. Deloitte identifies more than one-fourth of manufacturers as “Social Supers”—manufacturers who express a genuine commitment to improving the world. They believe societal initiatives are fundamental to their business model and contribute toward profitability [2]. Commitment is shown through taking operational steps (like carbon reduction) to improve the environmental impact of their business and sourcing a significant percentage of their electricity from renewable resources over the next five years.

Figure 7: Ethical Initiatives that would convince Consumers to pay more

The ethical supply chain is gaining traction. Traceability and accountability in relation to materials, resources and sourcing are becoming increasingly important to customers. Worldwide stricter environmental regulations to force sustainability. With a new administration that prioritizes science and the environment, expect that efforts to make manufacturing more sustainable through more efficient factories will focus on creating green jobs and cutting back on the industry's high volume of waste[9]

Shifting focus from B2B to B2C

In recent years, many manufacturers have opted to transition from a traditional business-to-business (B2B) model to a business-to-consumer (B2C) model. The B2C model boasts a number of appealing benefits such as increased profits, faster time to market, brand control and better customer data[10].

Figure 8: Shifting focus from B2B to B2C

[9] https://www.manufacturingglobal.com/lean-manufacturing/2021-five-predictions-manufacturing-industry

[10] https://www.business2community.com/strategy/trends-that-will-drive-growth-for-engineering-and-manufacturing-companies-in-2021-02372908

In the future distinction between B2B and B2C is likely to become less clear. In today's digital world, it is more and more about the end consumer (or user). The overall customer experience will be determined by how seamless and effective the experience is across the entire value chain[11].

According to Manufacturing Global[12] the following trends to follow for manufacturers: Customer service needs higher standards (*Prioritize personalized experiences, provide radical transparency and enforce rapid response)*, digital enablement must be a top priority, channel strategy (*Manufacturers need to offer online options to customers, partners, and distributors)*.

5.1.3 Industry demand trends

Next to COVID-19 induced regionalization, there are many other reasons to revisit the globalized, highly interconnected supply chains. For example: Potential new trade wars/tariffs and stricter government policies, labour restrictions, increasing resiliency, faster time to market, lower working capital. Therefore, the de-globalization focus for manufacturers is the new normal. Manufacturers need to consider suppliers from other (nearby) countries and optimize existing plants to squeeze every ounce of current capacity. Redraw global manufacturing and supply chain footprint and reconsider alliances and strategic partnerships that provide regional, technical and skill-set agility. Organizations also tend to assess transfer pricing approaches to offset international taxes and diversify into adjacent products or segments that are either countercyclical or have a demand-supply gap [2].

According to Forrester [13] manufacturers need to shift their engineering workforce to include people with more technological expertise to bridge the digital gap: more software and IoT trained people versus mechanical and electrical engineers. In order to close the digital gap within the industry demand, manufacturers need to hire more software and IoT engineers and data scientists while training the wider workforce in digital skills. By introducing manufacturing and process innovations, manufacturers can transform the workplace and workers' perceptions about their roles.

Additionally, leading manufacturers will define a clear manufacturing process data strategy and aggressively invest in technologies such as unstructured content analytics, digital worker analytics, knowledge management solutions, industrial knowledge graphs, and reinforcement learning to enhance skills and encourage continuous learning, scaling industrial good practice, and fostering more innovation. However, there is currently a global shortage of workers needed to make those new technologies a reality for manufacturing companies.

Cloud takes centre stage in pandemic recovery

The workplace impact of the global pandemic reinforced the tremendous value and necessity of cloud computing to the world's economy and workforce. The impact of the

[11] 2016 Deloitte – The Deloitte Consumer Review

[12] https://www.manufacturingglobal.com/lean-manufacturing/2021-five-predictions-manufacturing-industry

[13] https://www.forrester.com/predictions/predictions-2021/

pandemic on Cloud adoption at manufacturers was substantial. Cloud offers manufacturers the opportunity to be able to send millions of workers to home using cloud apps, tools and services. Next to that it helped maintain the global supply chains and shifted entire industry business models in a matter of weeks. In 2021 manufacturers got the opportunity to fully commit to the cloud and its possibilities. Transitioning to cloud-based systems is about agility, speed, nimbleness, and gaining a 360-degree perspective on factory operations in real-time. Something necessary during the impending crisis. Today's cloud-based manufacturing execution systems (MES) and quality management systems (QMS) have both the depth to tailor to individual machines and roles [14].

Supply chains will become collaborative networks

Forrester also predicts that in 2021 and 2022 supply chains will have become more resilient by manufacturers pooling data, businesses investing in logistics operation centres, the rise of industry marketplaces, and the proliferation of supplier trust networks. Manufacturing leaders must learn to federate data and distribute trust to collaborate with customers and suppliers in multi-enterprise supply networks.

Figure 9: Supply Chains as Collaborative Networks

5.1.4 Technology Trends

The following technology trends have been identified with the help of sources from Deloitte[15] and Gartner[16]. Manufacturing technology trends tend to have a longer runtime than the previous dimensions and therefore a timeframe for multiple years has been used.

[14] https://www2.deloitte.com/nl/nl/pages/enterprise-technology-and-performance/articles/technology-trends.html
[15] https://www2.deloitte.com/nl/nl/pages/energy-resources-industrials/articles/manufacturing-industry-outlook.html
[16] https://www.gartner.com/en/documents/3904266/the-2019-top-supply-chain-technology-trends-you-can-t-ig

5.1.4.1 Digital Twins

A digital twin is a digital representation of a real-world entity or system. The digital supply chain twin is a digital representation of the physical (often multi-enterprise) supply chain. It is a dynamic, real-time and time-phased representation of the various associations between the data objects that ultimately make up how the physical supply chain operates. It is the basis for local and end-to-end decision making for the supply chain that ensures that this decision making is aligned horizontally and vertically throughout the supply chain. The digital supply chain twin is derived from all the relevant data across the supply chain and its operating environment. It creates the ability to enable the flexibility and ability that manufacturers may need to respond to the unknowns of the constantly shifting "new normal".

*Deloitte's postelection poll of manufacturing executives identified that **24%** of executives who plan to invest in digital technologies believe **digital twin technology will be the most important technology** in which their company will invest in 2021.*

Manufacturers should examine early opportunities to add digital supply chain twin like capabilities to their existing technology landscape. This involves pairing up the new capability with existing supply chain visibility and/or planning solutions. Choose those that can automatically ingest and correlate source system data (both internal and external). Also look for those that leverage advanced analytics, AI and machine learning and can make recommendations using both human decision-maker-derived learning and prescriptive analytics.

5.1.4.2 Internet of Things

The Internet of Things is the network of physical objects that contain embedded technology to communicate and sense or interact with their internal states or the external environment. Manufacturers provide more dynamic inventory tracking by using IoT technology to increase visibility within an organization's retail supply chain. By using IoT technology alerts can be received when parts on a machine need attention or replacement, and also automatically sending an alert to the company's channel partners, letting them know when to deliver the replacement part. Next to that IoT helps monitor environmental conditions while shipments are in transit (such as for ''cold chain'' requirements). And the last trend within IoT is the rise of cargo security monitoring.

5.1.4.3 Artificial Intelligence

Artificial intelligence (AI) in the supply chain consists of technologies that seek to emulate human performance. Typically, it does so by learning, coming to its own conclusions, appearing to understand complex content, engaging in natural dialogues with people, enhancing human cognitive performance or replacing people in the execution of nonroutine tasks. AI can be deployed to improve supply chain function cross-functional performance.

Trends to follow for manufacturers:

- Experiment with AI in low-order supply chain processes to span data harmonization, error detection and correction, and business process automation
- Engaging directly with vendors to understand the role AI currently plays in their business and how it could fit within the future product roadmap
- Focus on specific use cases where AI is believed to present the highest potential and start with small pilots.
- Focus on cultural changes to ensure that the supply chain organization is open to the benefits that can be achieved using AI, and minimize resistance to adopting these technologies.

5.1.4.4 Advanced Analytics

Advanced analytics have traditionally targeted problems in the strategic and tactical time horizon. Increasingly, advanced analytics are deployed in real-time or near real-time in areas such as dynamic pricing, product quality testing and dynamic replenishment. The availability of supply chain data — such as Internet of Things (IoT) data, dynamic sales data and weather patterns — provides the ability to extrapolate the current environment to better understand future scenarios and make profitable recommendations.

Trends to follow for manufacturers:

- Build a foundation of descriptive and diagnostic analytics using visibility as a foundational capability and prerequisite
- Identify the supply chain processes that can benefit from predictive and prescriptive analytics
- Ensure the availability and readiness for the data required to conduct predictive and prescriptive analytics
- Ensure that organizational structure and governance will enable the company to implement and maintain functional as well as cross-functional predictive and prescriptive analytics recommendations

5.1.4.5 Robotic Process Automation

Robotic process automation (RPA) tools perform “if, then, else” statements on structured data, typically using a combination of User Interface (UI) interactions or by connecting to APIs to drive client servers, mainframes or HTML code.

Trends to follow for manufacturers:

- Find and catalog unautomated processes where people are keying in or moving data between systems for manual, repetitive, rule-based activities.

- Evaluate RPA against myriad other automation options. Investigate why intelligent business process management suites (iBPMSs), APIs, and dedicated software tools are not already in use or could not be used.
- Learn from the RPA use cases outside of your industry and in functional areas outside the SC, and assess their applicability in the SC.
- Investigate where RPA tools, specialized software or fully managed services could quickly support key corporate initiatives, such as improving client service, working capital or auditability for compliance.

5.1.4.6 VR, AR & MR

The immersive experience combines the following technologies. A conversational system is a high-level design model in which user and machine interactions occur, mainly in the user's spoken or written natural language, and typically are informal and bidirectional. Virtual Reality (VR) provides a computer-generated 3D environment that surrounds a user and responds to an individual's actions in a natural way. Augmented Reality (AR) is the real-time use of information in the form of text, graphics, video and other virtual enhancements integrated with real-world objects. Mixed Reality (MR) then enables people to interact with virtual objects.

Figure 10: VR, AR & MR

Manufacturer use-case example:

- Using AR along with QR codes to speed up changeovers in locations, such as equipment changeovers in factories, within global supply chains.

Trends to follow for manufacturers:

- Plan for a postweb and postbrowser UI world where conversational systems will be the primary interface to many of the apps and services in use today and to some yet to be developed.

- Engage employees in the process of defining interactions with devices to ensure their buy-in.

5.1.4.7 Rethinking ERP

Enterprise Resource Planning (ERP) has always been a cornerstone of manufacturing. But the way manufacturers use their ERP has changed. The need for the ability to quickly respond and pivot requires an ERP with the agility to keep up with the pace of change. It needs to be configured to support the emerging future of applications and ever-changing experiences. Manufacturers can look to tools that will allow them to quickly, easily, and cost-effectively build apps for specific processes or tasks that integrate with ERP systems, reducing the need for major customizations that take too much time and money—without requiring any modifications to the ERP system.[17]

ERP's Fourth Era – Enterprise Business Capabilities – coincides with what Gartner[18] is describing as the Future of Applications. Future application experiences will be built from composable business capabilities that can quickly enable new business scenarios.

5.1.4.8 Blockchain

A blockchain is an expanding list of cryptographically signed, irrevocable transactional records shared by all participants in a network. Each record contains a time stamp and reference links to previous transactions. With this information, anyone with access rights can trace back a transactional event, at any point in its history, belonging to any participant. A blockchain is one architectural design of the broader concept of distributed ledgers. Blockchain technology can play a role in the increasing need for secure, collaborative working models across extended groups of trading partners. Blockchain can potentially address key pain points, which include monitoring supply chains, counterfeit detection, asset tracking, quality assurance and regulatory compliance.

*Gartner predicts that **by 2023, 90%** of blockchain-based supply chain initiatives will suffer **blockchain fatigue** for lack of strong use cases. Blockchain remains a popular topic, but supply chain leaders are failing to find suitable use cases in the industry. Only about 19% of respondents saw blockchain as a very important technology, and only about 9% have invested.*

[17] https://www.archerpoint.com/blog/Posts/manufacturing-trends-2021
[18] https://blogs.gartner.com/debbie_wilson/2020/01/27/erp-future-applications-composable-enterprise-mike-guay/

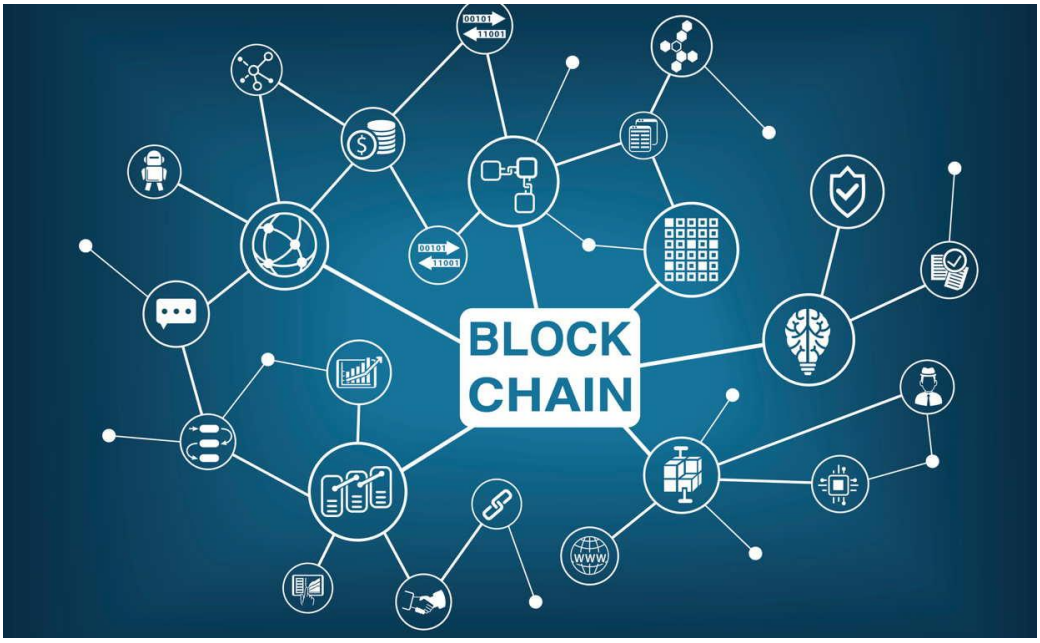

Figure 11: Blockchain

5.1.4.9 The rise of 5G

5G is the next generation of mobile broadband and cellular standard. It is projected to quickly replace (and/or augment) existing 4G and Wi-Fi services. Planned network rollouts represent massive leaps from previous generations' more incremental upgrades, such as 2G to 3G or 3G to 4G. Recent reports on pilots and testing have identified that 5G can be up to 1,000 times faster than 4G. The increased speed and throughput of data is just one of a range of new enablers that can be released across the supply chain through 5G-enabled technologies and devices.

Use Case Examples:

- Factory-in-a-box concept: The "mobile factory" reflects the market trend of exploring innovative future factory concepts to support **localized, agile production**. These factories can be packed into a container, transported, and put into service at a fraction of the cost of conventional factories. The remote production would reply on the usage of 5G networks.
- Robust asset-to-asset communications optimization for enhanced governance, tracking and visibility in "real" real-time — for example, high-value reusable packaging and transportation asset routing and return cycles.

5.2 COVID-19 Impact on the Manufacturing Market

The ongoing COVID-19 pandemic has caused disruptions in economies and markets. It has caused severe disruptions within and throughout (critical) supply chains and has forced companies and entire industries to rethink about and adapt their supply chain models. Many manufacturing companies have halted their production, which has collaterally damaged the supply chain and the industry. Many SMEs and large manufacturing plants have

halted/postponed any new technology upgrade in their factories in order to recover from the losses caused by the lockdown and economic slowdown. According to Global AI in Manufacturing Market Trends, the market is projected to reach $16.7 billion by 2026[19], registering a CAGR of 57.2% during the forecast period[20].

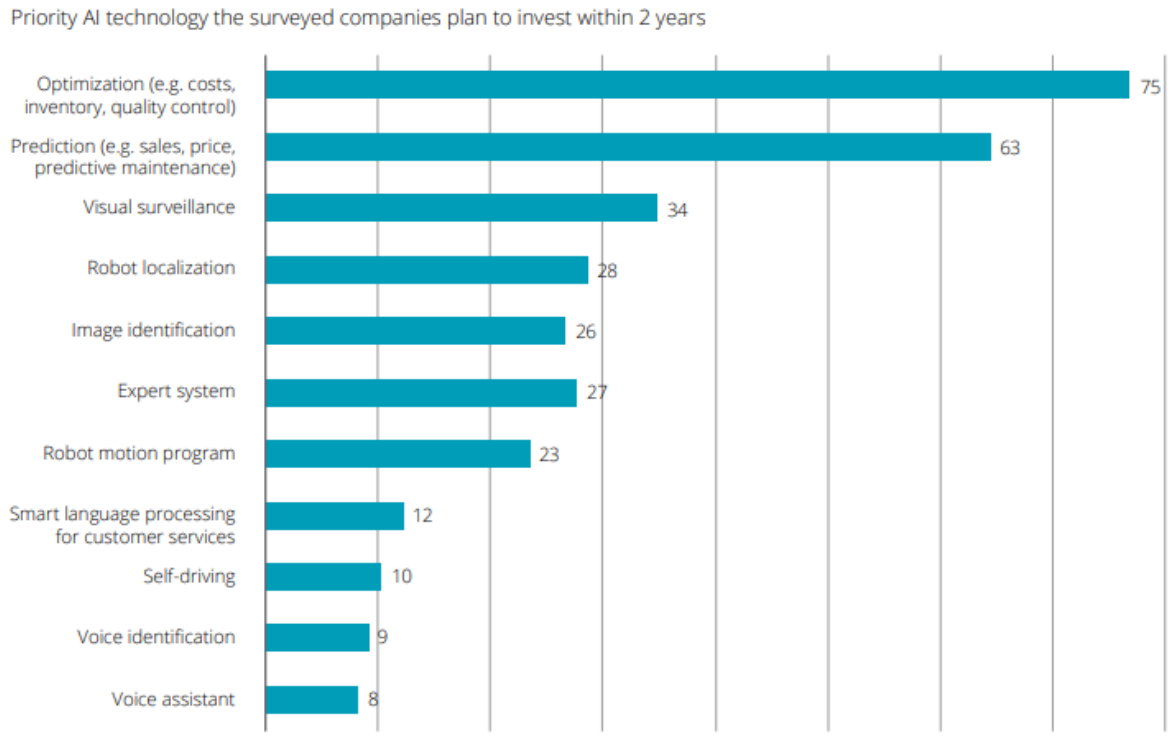

Figure 12: AI Adoption in Manufacturing

Source: 2019 Deloitte survey on AI Adoption in Manufacturing

The growth in the adoption of AI solutions is completely dependent on the growth of manufacturing units. The image above shows the willingness to invest in AI just before the COVID-19 pandemic. However, in the current situation, manufacturing ecosystems have been disrupted, and thus, the growth of AI solutions will also get affected negatively in such industries. Many factors have contributed to the disruptions in manufacturing industries. Broadly, three major factors are disrupting the manufacturing industries, namely, supply chain disruption, shutdown of manufacturing units, and decrease in demand amidst lockdown in many countries.

COVID-19 is however a warning to developing better systems for navigating these disruptions. Visibility will become the most critical capability for most of the Manufacturing industry. Manufacturers experiencing a surge in demand need to increase visibility across their supply network as this ramps up production and detects bottlenecks. Manufacturers experiencing a slowdown in demand need to increase visibility into their operations to focus

[19] https://www.marketsandmarkets.com/Market-Reports/artificial-intelligence-manufacturing-market-72679105.html?gclid=Cj0KCQjwxdSHBhCdARIsAG6zhlWNS_6Dcfq04hV4DbSgbI4v_m_skoX0ZU6DFoPUPzCJwGE_g3tzS1caAm3qEALw_wcB

[20] For the creation of this paragraph the author utilized available information from SME and renowned public sources , including the Deloitte, Gartner & Google Cloud Research Desks.

on cost-cutting opportunities [2]. The global pandemic has forced manufacturers to critically evaluate their supply constraints and build agility in their supply chains, which shows in the need for regionalization (like the Eur3ka project aims to do). Localized production due to supply chain disruptions and an increased desire to source raw materials from domestic suppliers. Paired with this comes the need for real-time understanding of activity across a supply chain network by developing inventory strategy based on data and insights rather than on history or hunches.21 Manufacturers are seeking ways to rearchitect work, the workforce, and the workplace to manage disruptions and uncertainty. This requires greater agility in cross-functionality in the way manufacturers define roles. Operational job losses during the pandemic will become permanent changes. Because the need for a workforce that's able to manage/interact with robot technologies increases and training & reskilling the existing workforce is one of the ways to tackle the problem.

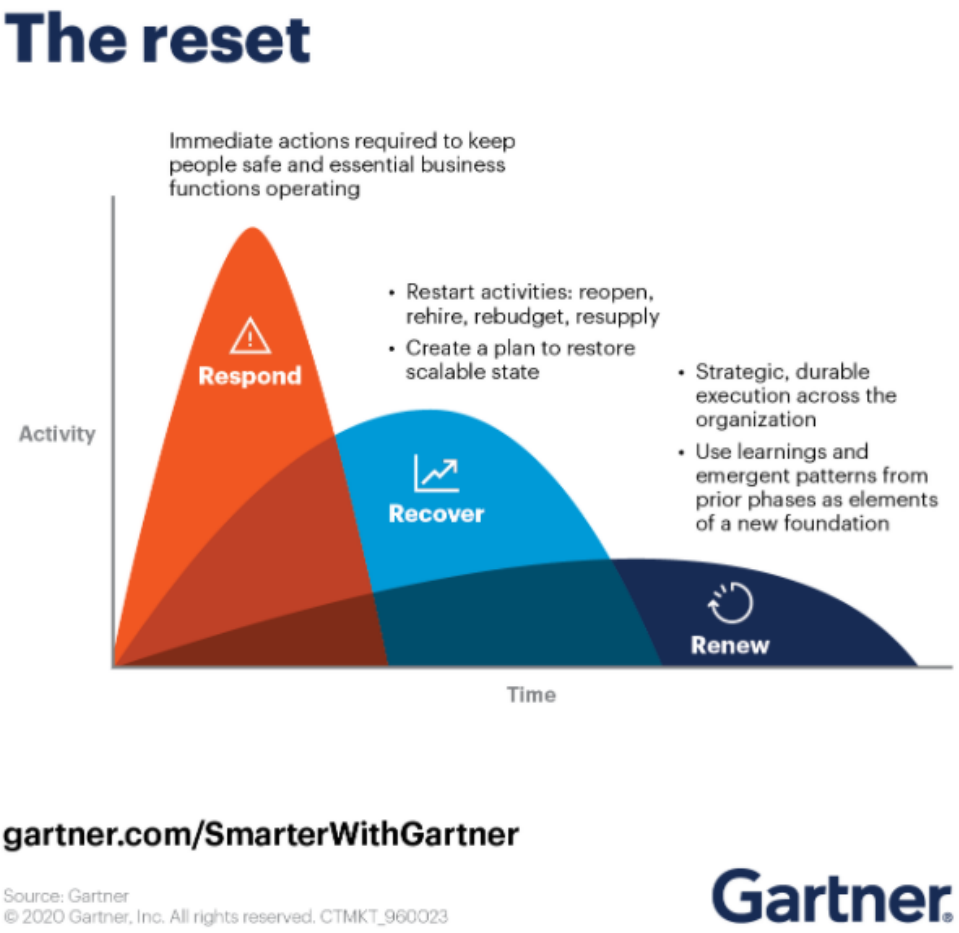

Figure 13: Pandemic Response

According to Gartner[22] the pandemic response will happen in three phases (*see picture above*). The duration of each phase will vary by country, industry and enterprise – and even by business unit, product or service. The following phases have been defined:

[21] https://www.gartner.com/smarterwithgartner/reset-your-business-strategy-in-covid-19-recovery
[22] https://www.gartner.com/smarterwithgartner/reset-your-business-strategy-in-covid-19-recovery

- Phase 1: Respond: Immediate actions required to keep people safe and essential business functions operating.
- Phase 2: Recover: Restart activities: reopen, rehire, re-budget, resupply; create a plan to restore scalable state.
- Phase 3: Renew: Strategic, durable execution across the organization; use learnings and emergent patterns from prior phases as elements of a new foundation.

Next to the impact on the market for manufacturers job markets also remain uncertain. The manufacturing industry is vulnerable given that the bulk of its workforce is employed in on-site jobs that cannot be done remotely. The job market situation will heavily depend on the type of manufacturing industry. Companies producing non-essential goods have seen or will see a significant reduction in staff. Companies producing essential goods must scale up in order to satisfy demand. Manufacturers will continue reevaluating their workforce based on shifts in demand[23].

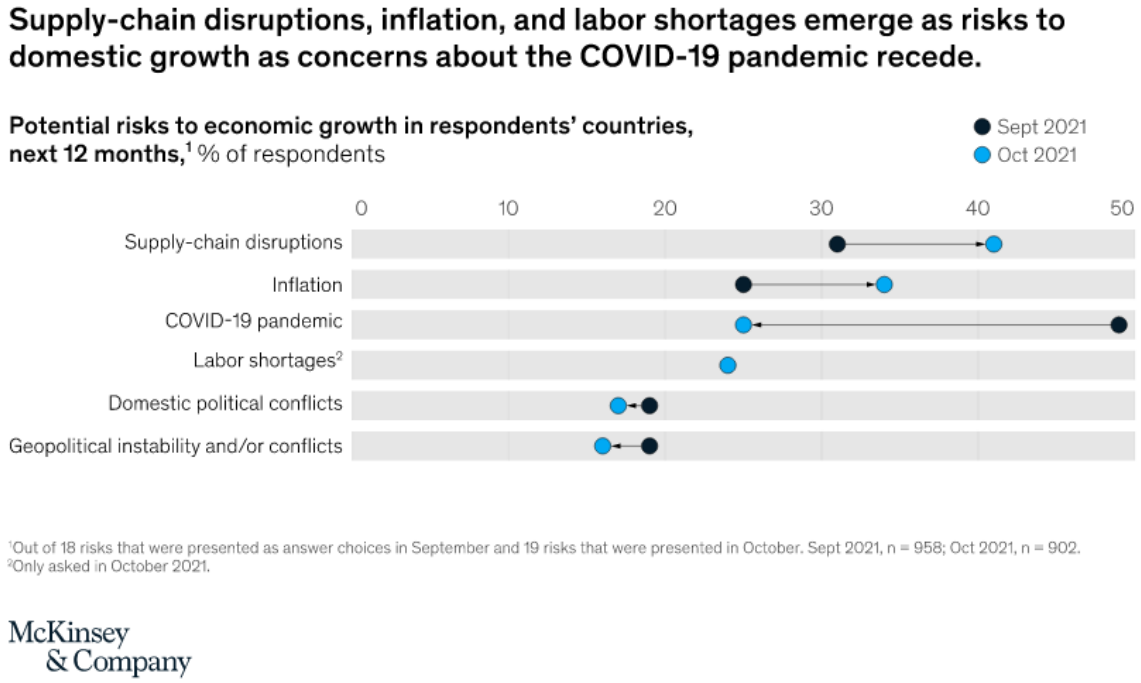

Figure 14: Potential Risks to economic growth

Add onto that the need for employee safety during COVID-19. Manufacturers need to put in place immediate and contingent safety measures for their employees and should decide which functions can be carried remotely, if an outbreak were to occur within their ranks. Organizations will need to continue practising social distancing in the workplace, restrict visitors to facilities, encourage the practice of good hygiene and ensure that employees are healthy and fit to work before allowing them on the job.[24]

[23] https://www.mckinsey.com/business-functions/risk/our-insights/covid-19-implications-for-business#
[24] https://www.pwc.com/us/en/library/covid-19/coronavirus-impacts-industrial-manufacturing.html

5.3 SWOT Analysis

SWOT[25] Analysis is a useful technique for understanding the Strengths and Weaknesses of a technology/product, and for identifying both its Opportunities and the Threats that it faces.

Strengths and weaknesses are frequently internally-related, while opportunities and threats commonly focus on the external environment. The name is an acronym for the four parameters this technique examines:

- **Strengths**: characteristics of the business or project that give it a relative advantage.
- **Weaknesses:** characteristics of the business that place the business or project at a relative disadvantage.
- **Opportunities:** elements in the environment that the business or project could exploit
- **Threats:** elements in the environment that could cause trouble for the business or project.

For Eur3ka outcomes and considering the environment described in the market context, the initial SWOT is as follow.

S - Strengths	• Addressing a key sector in Europe and key challenges, i.e. in Plug & Respond (P&R) repurposing • Strong collaboration with Global Network of Advanced Manufacturing Hubs • Novelty of the Eur3ka solutions in terms of advanced tools and services • Top rank Business and Research partners covering various European countries • Excellent positioning of the partners in different market including EU & global leaders • Strong alignment to EU strategies, policies and challenges • Standardization		**W - Weaknesses**	• Need to achieve convergence for several commercial technologies and strategies to avoid problems and complexity of integration • Project solutions available at the end of the COVID-19 pandemic • Potential immaturity of some assets and project outcomes • Leadership and management of Eur3ka assets

[25] https://m16marketing.com/the-definitive-guide-to-the-swot-analysis/

O - Opportunities	• Support and push the European manufacturing sector towards management of emergency situations • New potential products, services and markets emerging through COVID-19 situation • Assets exploitable as 'stand-alone' • Creation of a rich Business Ecosystem around Eur3ka • Consulting around Eur3ka expertise and services • Further Research and education activities • Address new domains for innovation		**T – Threats**	• Emergence of competing solutions and/or ecosystem • IPR management

Table 7: SWOT Analysis

Eur3ka shows a clear plus by drawing together top rank partners from all over Europe and from both Industrial, Research and Business environments. In fact, Eur3ka is carrying out research and development on the services, methodologies, and tools to face emergencies in the manufacturing domain: a set of activities that most companies don't perform in such an extensive manner involving both healthcare and industry sectors.

Most partners are 'champions' in their sector and are involved in important initiatives (not only at a technical level but also in policy-making) and also have access to important stakeholders who could become customers of products and services related to Eur3ka.

The aims of Eur3ka, the services and the tools it is developing are strongly in line with the policies and challenges identified by the EU and the strategies indicated to tackle COVID-19 pandemic: indeed, Eur3ka has the capability to present itself to potential customers with a very strong 'European Seal'. As was discussed above, the manufacturing sector is still one of the economic 'backbones' of Europe, and the sector of medical equipment is expected to grow in the next future creating a fertile terrain for improvement and application innovation processes, activating collaboration and boosting successful solutions developments.

A possible weakness of Eur3ka, as for any research project, is that not all components may have the same maturity level by end of the project: indeed, this weakness could lead to Eur3ka being superseded by possible existing solutions which constitute a rather well established market Indeed, this weakness can actually be turned into an opportunity where, once the value proposition behind Eur3ka has been marketed to a potential client, partners will be able to offer value-added services in terms of further engineering, customisation etc. With Eur3kaassets being released as Open Source this will also enable to collect technical feedback and testing from a wide expert community contributing to the enhancement of the software.

Additionally, Eur3ka will design and develop a Reference Architecture in the healthcare manufacturing sector which gives it the opportunity to offer single assets (and related

support services) and push different solutions towards different customers segments, keeping in mind the great networking potential the Consortium has, from both a geographical and diversification point of view, opening up the opportunity to create various business and innovation/business ecosystems.

The strong innovation philosophy which partners in Eur3ka naturally have provides many diversified consulting opportunities and the possibility to carry on further research. Of course, there is a risk of partners losing interest in the project, or simply pursuing different paths once the project is over: this risk is mitigated by the aforementioned modularity of Eur3ka and the fact that the platform will be maintained alive, but also by certain strategies implemented, such as the release of certain components as Open Source, thus ensuring that even if a party leaves, its work can be taken up by another one and possibly be further developed, improved, customized.

6 Exploitation Plan

6.1 Exploitation Management

The Eur3ka Exploitation activities aim at transforming the project's outcomes into exploitable assets creating an ecosystem among Global WEF (World Economic Forum) AMHUBs (Global Network of Advanced Manufacturing Hubs) and EU DIHs (Digital Innovation Hub) for cognitive based repurposing manufacturing for pandemic crisis response, which will operate as a powerful and extended distribution channel for innovation services.

The overall Exploitation strategy and objectives are summarized in Figure 15 and have been structured in order to be aligned with the project Work Plan, phases and delivery of results.

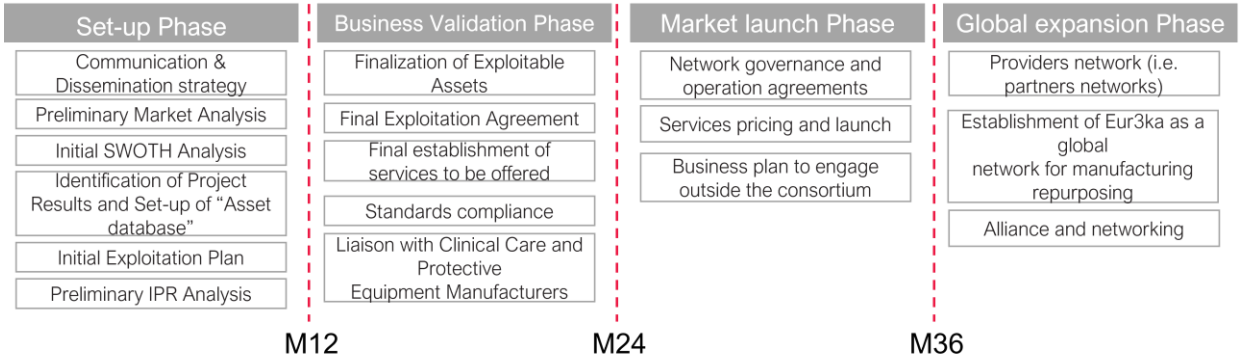

Figure 15: Eur3ka Overall Exploitation Strategy key phases

In the **Set-up Phase** (M1 to M12), the Consortium aims to have an initial results' definition for Eur3ka as well as a preliminary Market and SWOT analysis. In this phase, also the definition of each partner's Individual Exploitation commitments and intentions will be defined. Although the analysis in certain cases may appear as broad or theoretical, it was crucial to bring to all partners a shared understanding of the potential routes opened up with regard to the joint exploitation strategy and the Eur3ka governance. In order to have, already after the first year into the project, a clear view of the potential Eur3ka outcomes and in order to develop concrete Value Propositions and Business Models, the key exploitable assets (described in detail in Section 6.4) will be analyzed and recorded with a focus on their market value and business potential. To make sure the assets will always be up-to-date and in line both with the project evolution and the market and needs, Eur3ka partners have set-up an 'Assets Database' intended to be a live tool easy to update and monitor. The Assets database also serves as a tool to define and monitor the Intellectual Property Rights (IPR) and its management, in the next Exploitation phases.

During the **Business Validation Phase** (M13-M24), the final Exploitation Plans will be updated and Eur3ka results will be validated with the related standardization bodies to achieve the maximum impact on the emerging industry standards. During this phase liaisons with Clinical Care and Protective Equipment Manufacturers will be established to create and enhance business innovation and motivate with clear evidence sectorial transformation.

The **Market Launch Phase** (M25-M36) will start after the end of the project. During this phase, the network governance and operation agreements will be established that will

support the joint exploitation, while at the same time implementing the defined business plan and attracting the first customers (i.e. manufacturers, solution providers) outside the Consortium. Key to this phase will be the proper exploitation of the combined Eur3ka results within the partners' business networks, while also leveraging synergies that will be established with regional, national, European and global networks of Digital Innovation Hubs.

In the **Global Expansion Phase** (M36 - 4 years after the end of the project) Eur3ka will become the reference manufacturing network for the rapid manufacturing repurposing within the EU and later worldwide. As part of this phase, the emphasis will be in global networking expansion of the ecosystem. Moreover, in this phase, the network will be opened to attract and accommodate new supply-side participants.

6.2 Initial Exploitation Assets definition and mapping

In this section, an initial presentation of the exploitable Eur3ka assets, reflecting the development stage of the project at Month 12, is provided. For each asset, an 'exploitation-oriented' description that underlines main features is provided together with the most relevant stakeholders and possible exploitation channels. For completeness purposes, interrelations and additional components involved are mentioned and possible competitors in the market are presented. Additionally, for each asset, replicability opportunities are also identified. In order to ensure consistency and a unified approach, the definition of Assets was carried out as a collaborative and distributed process with all partners, through the creation of a live 'Assets Database' and using a shared template. The template is presented (along with descriptions) in Annex II: Asset Database Structure.

6.2.1 Optimized CO2 machine

Asset title	**Optimized CO2 machine**
Description	The machine will be automatized to speed up the FF mask testing process. This will increase the productivity of SEAC personnel in this stage of product life cycle. Moreover, the testing machine will be rent to SEAC's competitors for their tests.
Lead partner (point of reference) and other partners	SEAC
Eur3ka results and components involved	Automation + to be defined
Type(s) of asset	Service+Demonstrator+Component
Relevant stakeholders	Direct Suppliers

Exploitation channel(s)	Service to third companies; optimized production cycle; training
Possible competitors	-
Replicability in other domains and ecosystems	The optimized machine will be used for FF masks in diving sector too.
Action plan / status	Tech scouting for best sensors and components, integration of components, software development, HMI development, preliminary test campaign in real scenario, results assessment
Market Potential and Value Proposition	-
Maturity level of Innovation/Asset	This asset will be "Market Ready" after the end of the project+

Table 8: Optimized CO2 machine

6.2.2 Optimized ANSTI Machine

Asset title	**Optimized ANSTI Machine**
Description	As per CO2 machine.
Lead partner (point of reference) and other partners	SEAC
Eur3ka results and components involved	Automation + to be defined
Type(s) of asset	Service+Demonstrator+Component
Relevant stakeholders	Direct Suppliers
Exploitation channel(s)	Service to third companies; optimized production cycle; training
Possible competitors	-
Replicability in other domains and ecosystems	The optimized machine will be used for FF (Full Face) masks in diving sector too.
Action plan / status	Integration of output data with a centralized system with data creation in a pre-defined data model, preliminary test campaign in real scenario, results assessment

Market Potential and Value Proposition	-
Maturity level of Innovation/Asset	This asset will be "Market Ready" after the end of the project+

Table 9: Optimized ANSTI Machine

6.2.3 Test Data

Asset title	**Test Data**
Description	A database will be populated thanks to the digitalization of the testing process in SEAC. The data can be exploited commercially, to allow standardisation bodies to define new standards on this kind of product for both medical and diving markets.
Lead partner (point of reference) and other partners	SEAC
Eur3ka results and components involved	automation + to be defined
Type(s) of asset	Service
Relevant stakeholders	-
Exploitation channel(s)	Consulting, report and DB selling
Possible competitors	-
Replicability in other domains and ecosystems	The data can be produced referring to FF masks for diving sector too.
Action plan / status	Market assessment to identify the detailed needs for FF mask-related data; assessment on data consistency; population of a database of historical data.
Market Potential and Value Proposition	-
Maturity level of Innovation/Asset	This asset will be "Market Ready" after the end of the project+

Table 10: Test Data

6.2.4 Measuring Machine Automation Service

Asset title	**Measuring Machine Automation Service**
Description	STAM will improve its know-how in sensorizing and integrating complex measuring and testing machines. This service will be sold to manufacturing companies and test laboratories.
Lead partner (point of reference) and other partners	STAM
Eur3ka results and components involved	Automation
Type(s) of asset	Service
Relevant stakeholders	Direct Customers
Exploitation channel(s)	Consulting, Customization
Possible competitors	Main automation big companies
Replicability in other domains and ecosystems	Any automated machine dealing with real time measuring and data generation can be associated to this service
Action plan / status	Optimization of a design and development methodology to reduce effort for future automation services, working in a modular way with Open Source based digital platforms
Market Potential and Value Proposition	Any manufacturing company can be interested in getting this kind of service. Basing on STAM's size and current business volume, the company can focus on a market share of 1 Million Euro per year.
Maturity level of Innovation/Asset	This asset is between "Market ready" and "Tech ready" levels; some steps need to be done towards the full marketability, but technical capabilities are ready.

Table 11: Measuring Machine Automation Service

6.2.5 Context-Awareness Dashboard

Asset title	**Context-Awareness Dashboard**
Description	The Context- Awareness Dashboard is a suite for business analytics that combines traditional data and big data sources into valuable and meaningful information. A full set of features, such as data federation, mash-up, data/text mining and advanced data visualization, enable special focus on data-driven analytics processes. This solution is able to manage and process large volumes of data, to provide reports and general-purpose dashboards allowing to scale users and provide them with the information they need at the right time. Exploiting different data sources, or owned by different organizations, the system provides security functionalities based on end-user roles and data sovereignty principles.
Lead partner (point of reference) and other partners	ENG
Eur3ka results and components involved	In Eur3ka project, different dashboards will be realized in Pilot Family #2
Type(s) of asset	Product and Services
Relevant stakeholders	All technical stakeholders in Eur3ka including from pilots; all technology providers involved in Eur3ka and other research activities
Exploitation channel(s)	Eur3ka Consortium; Digital Factory Alliance Company Networks; Direct Customers, Research Activities
Possible competitors	Advanced analytics platforms provided by big IT players such as Siemens, IBM, Microsoft, Bosch.
Replicability in other domains and ecosystems	The software solution could be used in several business domains satisfying a wide range of needs due to its general-purpose nature.

Action plan / status	Update of software functionalities, especially related to the adherence to data sovereignty principles.
Market Potential and Value Proposition	The target market consists of manufacturing companies and factories. The global smart manufacturing market size was valued at USD 236.12 billion in 2020 and is expected to expand at a compound annual growth rate (CAGR) of 12.4% from 2021 to 2028. Context- Awareness Dashboard is a software platform, modular and scalable that can be adopted by different manufacturing companies all around the world. It can be marketed under two different kinds of licence, Community and Enterprise and it can be provided in PaaS (Platform as a Service) and SaaS (Software as a Service) mode. This makes the platform easily scalable, making it accessible to a multitude of potential clients for which the high cost of the traditional installations is an insurmountable barrier.
Maturity level of Innovation/Asset	Tech Ready, Business Ready and Market Ready

Table 12: Context-Awareness Dashboard

6.2.6 IDSA Testbed

Asset title	**IDSA Testbed**
Description	Use of IDSA Testbed by project partners is expected to increase the widespread use, as well as accelerate the adoption rate of IDS Certification and IDS Open Source project.
Lead partner (point of reference) and other partners	IDSA
Eur3ka results and components involved	Eur3ka results are expected to be involved in this asset.
Type(s) of asset	Product
Relevant stakeholders	Direct adopters

Exploitation channel(s)	Eur3ka Consortium, Digital Factory Alliance, Partner Networks, IDSA Members Network
Possible competitors	-
Replicability in other domains and ecosystems	The testbed solution aims to be used in any experiment that involves data spaces from any industry/domain.
Action plan / status	IDSA Testbed is under development and is expected to be publicly available in Q1 2022. Following the launch, project partners will be invited to use it, with the purpose of testing of their data space experiments.
Market Potential and Value Proposition	The widespread use of the testbed is expected to foster and facilitate the experiments with data spaces.
Maturity level of Innovation/Asset	Exploring

Table 13: IDSA Testbed

6.2.7 Reference Architecture Model (RAM) v3.0

Asset title	**Reference Architecture Model (RAM) v3.0**
Description	Implementation and adoption of RAM by project partners and stakeholders in their ecosystem. This is expected to increase the adoption of IDS RAM, thus contribute to the dissemination of IDS standard.
Lead partner (point of reference) and other partners	IDSA
Eur3ka results and components involved	Eur3ka results are indirectly involved in this asset.
Type(s) of asset	Methodology
Relevant stakeholders	Direct adopters
Exploitation channel(s)	Adoption
Possible competitors	Not applicable
Replicability in other domains and ecosystems	Not applicable

Action plan / status	The project partners' experiments will serve as a feedback for the next version of RAM.
Market Potential and Value Proposition	The project will provide important feedback that will improve and enhance the quality of IDS Reference Architecture Model, that is expected to be updated in Q2 2022.
Maturity level of Innovation/Asset	Tech Ready

Table 14: Reference Architecture Model (RAM) v3.0

6.2.8 Dataspace Connector

Asset title	**Dataspace Connector**
Description	Implementation of IDS-compliant dataspace connector by project partners and stakeholders in their ecosystem. This is expected to increase the technical maturity level of IDS components, as well as will contribute to the dissemination of IDS standard.
Lead partner (point of reference) and other partners	IDSA
Eur3ka results and components involved	Main Eur3ka results involved in this asset (connectors)
Type(s) of asset	Component
Relevant stakeholders	Direct adopters
Exploitation channel(s)	Adoption
Possible competitors	N/A
Replicability in other domains and ecosystems	N/A
Action plan / status	Alongside the connector, the other IDS components (developed during the project) will also be invited to join the Open Source Landscape of IDSA, to increase their visibility within the IDSA community. We will also continue promotional activities for these components.

Market Potential and Value Proposition	The various implementations of the IDS-compliant dataspace connector will increase, facilitate the adoption of the IDS standard. As all implementations will reflect different perspectives and approaches, this will increase the diversity and quality of the available IDS-compliant components.
Maturity level of Innovation/Asset	Tech Ready

Table 15: Dataspace Connector

6.2.9 Manufacturing Repurposing Best Practices

Asset title	**Manufacturing Repurposing Best Practices**
Description	Development of a framework and matrix for best practices for manufacturing repurposing based on case studies
Lead partner (point of reference) and other partners	ETHZ
Eur3ka results and components involved	Eur3ka results are expected to be involved in this asset.
Type(s) of asset	Framework
Relevant stakeholders	Direct adopters
Exploitation channel(s)	Eur3ka Consortium, Adoption
Possible competitors	Consultancy firms
Replicability in other domains and ecosystems	This framework could be applied by practitioners or researchers for repurposing manufacturing
Action plan / status	Optimization of the design of the framework after testing with Eur3ka's pilot for a more robust framework.
Market Potential and Value Proposition	The application of this framework and best practices by researchers and practitioners when applying manufacturing repurposing
Maturity level of Innovation/Asset	This asset will be "Market Ready" after the end of the project

Table 16: Manufacturing Repurposing Best Practices

6.2.10 Intrasoft COVID-19 Shift Allocation Service

Asset title	**INTRASOFT COVID-19 Shift Allocation Service**
Description	Shifts allocation/optimization service that considers COVID-19 related constraints and restrictions, e.g., infected or quarantined employees
Lead partner (point of reference) and other partners	INTRASOFT
Eur3ka results and components involved	Mostly developed in Eur3ka
Type(s) of asset	Product/Service
Relevant stakeholders	Manufacturers, Industrial Solution Integrators
Exploitation channel(s)	DFA; EFFRA; INTRASOFT's Sales and Marketing Channels
Possible competitors	Vendors of Shift Scheduling Products
Replicability in other domains and ecosystems	Other Industrial Sectors involving Shifts e.g., Critical Infrastructures Production Sites
Action plan / status	Under development and validation in the SEAC Trials. Plans for demonstrating the assets to relevant stakeholders (including potential customers during the project)
Market Potential and Value Proposition	Support manufacturers in allocating shifts during the pandemic or in the context of similar healthcare crises
Maturity level of Innovation/Asset	Tech Ready in 2022; Market Ready after the end of the project

Table 17: INTRASOFT COVID-19 Shift Allocation Service

6.2.11 Smart Matching and Mediation App

Asset title	**Smart Matching and Mediation App**
Description	Smart Matching and Mediation App extends the standard search functionality of a marketplace to include not only static information such as capabilities, but also

	dynamic data such as price, availability, risks, etc.
Lead partner (point of reference) and other partners	Fraunhofer IOSB
Eur3ka results and components involved	No other Eur3ka components will be involved
Type(s) of asset	Service
Relevant stakeholders	Marketplace owners and users
Exploitation channel(s)	Eur3ka Consortium; IDS-Industrial community; SFW community; Company Networks; Research Activities
Possible competitors	-
Replicability in other domains and ecosystems	It could be used in all domains where the search function of a marketplace could be extended to include sensitive data
Action plan / status	In development
Market Potential and Value Proposition	Any marketplace can be interested in getting this kind of service.
Maturity level of Innovation/Asset	Research prototype

Table 18: Smart Matching and Mediation App

6.2.12 Manufacturing Repurposing Best Practices

Asset title	**Manufacturing Repurposing Best Practices**
Description	Development of a framework and matrix for best practices for manufacturing repurposing based on case studies
Lead partner (point of reference) and other partners	ETHZ
Eur3ka results and components involved	Eur3ka results are expected to be involved in this asset.
Type(s) of asset	Framework

Relevant stakeholders	Direct adopters
Exploitation channel(s)	Eur3ka Consortium, Adoption
Possible competitors	Consultancy firms
Replicability in other domains and ecosystems	This framework could be applied by practitioners or researchers for repurposing manufacturing
Action plan / status	Optimization of the design of the framework after testing with Eur3ka's pilot for a more robust framework.
Market Potential and Value Proposition	The application of this framework and best practices by researchers and practitioners when applying manufacturing repurposing
Maturity level of Innovation/Asset	This asset will be "Market Ready" after the end of the project

Table 19: Manufacturing Repurposing Best Practices

6.2.13 Digital Quality Management Platform

Asset title	**Digital Quality Management Platform**
Description	Upgrade the Innovalia Metrology M3 Workspace platform for quality and data analysis, thriving new versions with new functionalities, in order to manage in an efficient way, the information sharing with the clients
Lead partner (point of reference) and other partners	INNO
Eur3ka results and components involved	Eur3ka results are expected to be involved in this asset.
Type(s) of asset	Product/Service
Relevant stakeholders	Manufacturing sector SMEs
Exploitation channel(s)	Innovalia Metrology current clients
Possible competitors	Metrology service companies like MetroLog, Hexagon, Renishaw, Nikon
Replicability in other domains and ecosystems	It could be used in all domains where quality management in manufacturing is needed

Action plan / status	Optimization of the design of the platform after knowledge of Eur3ka project outcomes and assets, like the IDS connector for M3
Market Potential and Value Proposition	-
Maturity level of Innovation/Asset	Research prototype

Table 20: Digital Quality Management Platform

6.2.14 Digital Factory Alliance Services and MGRI implementation

Asset title	**Digital Factory Alliance Services and MGRI implementation**
Description	Through the DFA, INNO will reinforce and expand its services and its opportunities in the market. The DFA becomes a way to effectively set-up and coordinate the Manufacturing Global Response Initiative
Lead partner (point of reference) and other partners	INNO
Eur3ka results and components involved	Eur3ka results are expected to be involved in this asset.
Type(s) of asset	Service
Relevant stakeholders	Manufacturing sector SMEs
Exploitation channel(s)	Eur3ka Consortium; Digital Factory Alliance; Company Networks; Direct Customers; Research Activities
Possible competitors	
Replicability in other domains and ecosystems	
Action plan / status	To gain new members on the DFA and to coordinate efforts with similar initiatives in order to gain visibility and increase interest in the manufacturing sector. Coordinating and giving support to manufacturing DIH network to increase visibility among SMEs, enlarge the offered services, give support and knowledge transfers.

Market Potential and Value Proposition	Give support and favour a Smart Rapid Response in the factories in the case of an outbreak or any kind of emergency situation/ crisis that may lead to the disruption of the supply chains, in order to guarantee resiliency, adapting their shopfloors or cooperating with other manufacturers to restore their production capacity
Maturity level of Innovation/Asset	Asset is ready

Table 21: Digital Factory Alliance Services and MGRI implementation

6.2.15 SCSN - Smart Connected Supplier Network

Asset title	**SCSN - Smart Connected Supplier Network**
Description	SCSN is an open initiative that uses and adheres to existing industry standards as much as possible. SCSN consists of two solutions: a message standard that agrees on what information will be shared in what format, and a technical infrastructure that agrees on how to share the information in a secure and controlled way with all SCSN partners.
Lead partner (point of reference) and other partners	BRAIN
Eur3ka results and components involved	Eur3ka results are expected to be involved in this asset.
Type(s) of asset	Product / Service
Relevant stakeholders	Manufacturing sector SMEs
Exploitation channel(s)	Eur3ka Consortium; Brainport Industries members and other SME network organizations in the Netherlands
Possible competitors	-
Replicability in other domains and ecosystems	If applicable might be interesting in several other domains for optimization of data sharing and standardization
Action plan / status	Ready to use, continuous development

Market Potential and Value Proposition	Optimization of data and information sharing which will have a positive impact on business operations.
Maturity level of Innovation/Asset	Asset is already being used

Table 22: SCSN - Smart Connected Supplier Network

6.2.16 Knowledge Sharing - Supply Chain Resilience & Resilience Thinking

Asset title	**Knowledge Sharing - Supply Chain Resilience & Resilience Thinking**
Description	Knowledge sessions by experts on Resilient Supply Chains, Resilience Thinking and impact on current supply chains.
Lead partner (point of reference) and other partners	BRAIN / TNO
Eur3ka results and components involved	No other Eur3ka components will be involved
Type(s) of asset	Service
Relevant stakeholders	Manufacturing sector SMEs
Exploitation channel(s)	Eur3ka Consortium; Digital Factory Alliance; Brainport Industries members
Possible competitors	-
Replicability in other domains and ecosystems	Applicable in all kind of Supply Chains
Action plan / status	In development
Market Potential and Value Proposition	Knowledge sharing and know-how for a better resilient supply chain in the future.
Maturity level of Innovation/Asset	Exploring and Developing

Table 23: Knowledge Sharing - Supply Chain Resilience & Resilience Thinking

6.2.17 Component Recommendation Engine

Asset title	**Component Recommendation Engine**

Description	Tool to allow marketplace users to use the results of Eur3ka project to help them to composes their own solutions for their specific problems.
Lead partner (point of reference) and other partners	UNPARALLEL
Eur3ka results and components involved	All Eur3ka components metadata
Type(s) of asset	Service
Relevant stakeholders	Marketplace users
Exploitation channel(s)	Digital Factory Alliance
Possible competitors	N/A
Replicability in other domains and ecosystems	Applicable to any marketplace
Action plan / status	In development
Market Potential and Value Proposition	This will bring a dynamic level over marketplace static information. Provides and added value to the user, because it translates the marketplace information in their specific needs.
Maturity level of Innovation/Asset	This asset will be "Market Ready" after the end of the project

Table 24: Component Recommendation Engine

6.2.18 Risk Assessment Engine

Asset title	**Risk Assessment Engine**
Description	Engine to support risk assessment analysis.
Lead partner (point of reference) and other partners	UNPARALLEL
Eur3ka results and components involved	Eur3ka results are expected to be involved in this asset.
Type(s) of asset	Service

Relevant stakeholders	Manufacturing sector SMEs
Exploitation channel(s)	Eur3ka Consortium; Adoption
Possible competitors	N/A
Replicability in other domains and ecosystems	Applicable in all kinds of factories
Action plan / status	In development
Market Potential and Value Proposition	Risk assessment with specific recommendations will reduce the time to adopt.
Maturity level of Innovation/Asset	This asset will be "Market Ready" after the end of the project

Table 25: Risk Assessment Engine

6.3 IPR Analysis and Management

As for all H2020 projects, Eur3ka is defining and agreeing upon an IPR management strategy to ensure exploitation objectives are met and ownership and intellectual property issues do not hinder after-project developments. It is important to underline, already in this first version of the Eur3ka Exploitation plan, that the Consortium is strongly committed to releasing project results and assets as much as possible as Open Source (in the case of software) and with open/sharable licenses in the case of other types of IP.

Even with the clear 'Open Source objective' regarding IPR, it is important here - in the context of project exploitation plan – to pinpoint some important concepts and baselines related to the topic, to seamlessly integrate a common IP management vision within our Exploitation.

The European Commission establishes basic common criteria for foreground generated in H2020 projects through the Annotated Grant Agreement with the Commission:

"Foreground shall be the property of the beneficiary carrying out the work generating that foreground".

In case of joint work, an agreement is foreseen between partners:

"Where several beneficiaries have jointly carried out work generating foreground and where their respective share of the work cannot be ascertained, they shall have joint ownership of such foreground. They shall establish an agreement regarding the allocation and terms of exercising that joint ownership"

Although apparently clear-cut, establishing IPR for foreground is not necessarily so, especially in the case of software, reason being that software is usually developed in an 'ecosystem' composed of previously developed software (e.g., libraries), platforms, and interactions with other platforms. Furthermore, IT research activities imply continuous updates and fine-tuning which is often impossible to plan ahead of time (e.g., use of certain

libraries which prove to be technically non-satisfactory or use of platforms which do not handle formats required by the project). Therefore, it is important to establish a common understanding of the foreseen licenses for software and the (cross) implications such choices might generate, possibly considering barriers and issues while finding sensible and sustainable solutions.

Eur3ka will establish explicit rules on how to access Pre-Existing Know-How and foreground knowledge and how to ensure the protection of intellectual property. The partners have started work on a Consortium Agreement (CA), which is developed taking into account the following preliminary agreements:

- **Concerning exploitation of the project results**, it is the understanding of the Consortium that knowledge and pre-existing know-how will be made available to the Consortium members in favourable conditions if they are necessary to perform the research and relative work.
- **Foreground knowledge** is owned by the contractor generating such information or result. Each contractor shall make available its foreground knowledge, on a royalty-free basis, to other contractors to the extent that such information is necessary for the production of their own foreground knowledge within Eur3ka. If it is not possible to determine exactly the ownership of that foreground knowledge, i.e. several contractors participated in that specific development ownership will be shared by the pro ratio effort invested by each contractor.
- **Pre-existing know-how and foreground knowledge** will be made available, on a royalty-free basis, to the other project partners for dissemination, research and academic purposes in respect to the intellectual property rights of the partner generating this knowledge.
- **Pre-existing know-how and foreground knowledge** will be made available to the other project partners for exploitation purposes at favourable conditions, with respect to the normal commercial conditions applied by the granting partner.

As for ownership, especially related to software and platforms, there are various possible models for defining it. A 2012 White paper on IT software governance [4] published by the Commission already suggested six major models for determining ownership and agreements.

The models are described in Annex III: Software Ownership Models and, in this section we report a comparative analysis in terms of pros and cons for each one of them.

Model	Pros	Cons
Lines of code	- Objective measurement of effort - Easily quantifiable (also automatically) - Established in software cost assessment	- Can be unfair with respect to programming languages and coding styles - Can be artificially inflated - Only takes into account coding, not other contributions
Technical input	- More comprehensive quantification of technical inputs - Aims at more accurate and fair assessment	- Unclear metrics - Can be a lengthy process - Not always easy to agree on criteria

Contributions agreement	- Defines metrics tailored to the project - Can be perceived as fairer by parties	- Needs negotiations and agreement - Risk of 'bigger' partners having more weight - Certain metrics can still prove unfair (e.g., financial input vs. geography)
Musketeer model	- Flexibility - Potential for higher revenue generation	- Risk of favouring 'leading' parties - Requires further agreements - May result less beneficial for non-commercial partners -
Mutual granting of access rights	- Flexibility (similar to musketeer) - Less bureaucratic overheads	- Unclear responsibility with regards to maintaining the assets - Potential lack of commitment - Can generate dependency to owner partners from non-owners
Joint Ownership	- Easy to assign/agree ownership - Flexibility in offering services based on the assets - Best utilises the possibilities of Open Source - Compatible with having both Open Source and proprietary assets	- May be hard to implement if assets have been created by too many parties together - Needs further agreements on revenue distribution

Table 26: Summary of possible ownership models for IT projects

Currently there is a preliminary discussion within the Consortium and the final decision will only be taken towards the end of the project and presented in the final version of the Final Outreach, Communication and Exploitation Plans due in M24 (September 2022).

6.3.1 Licenses types and strategic analysis

As stated in the GA:

"All Eur3ka reference implementations will be released as Open Source systems. However, the manufacturers of the Consortium will be able to implement proprietary add-on features with a closed license, for the purpose of protecting their business interests. The components comprising the reference implementations will be made available by the project partners based on one permissive and business friendly Open Source license. Relevant provisions reflecting the commitment of partners to providing an Open Source implementation will be included in the CA. Moreover, the platforms, the digital technologies and the digital enhanced machines of the project will expose Open APIs to enable the implementation of applications and extensions over them by third-party developers

In this context**, licensing is a very crucial aspect**: the need of granting certain rights to third parties which will use them, while reserving other ones (effectively restricting certain uses) arises: [5] for example, a license may restrict usage (educational vs. commercial), the number of machines a software can be installed or run on (in case of physical installations) or number of user / API calls / usage volumes / instances allowed (in the case of the as a

Service model). Broadly, the more the license is closed, the more rights are reserved and vice versa. In terms of licenses, two main categories of licenses exist: Open Source and proprietary licences. **Open Source** licenses restrict fewer rights (most notably unrestricted access to the source code of a program) compared to proprietary licenses. The term ***proprietary*** is sometimes confused with *commercial*: actually, both Open Source and proprietary licenses can be commercial or not (an example of proprietary non-commercial licenses is freeware software).

Given the Open Source vocation of the project we provide in Annex IV: Licenses Types an in-depth view of Open Source licenses, their characteristics, advantages and caveats. This will be useful to **inform all partners** and help make a well-pondered decision.

6.3.1.1 Current situation in Eu3ka

IPR matters related to software assets have already been put forward during the collection of the information about key project assets as presented previously. Within software development, major issues concerning IPR might arise for the use of third party (software) libraries and code which is already covered by IPR and in turn may pose constraints on the licensing of the asset itself. As of now, no major issue has been brought to attention by the Eur3ka partners. Additionally, in the next period, in order **to assist technical teams** and support the Eur3ka exploitation strategy and identify potential issues, a more detailed IPR checklist/repository will be developed and completed by the responsible partners of each Software Asset and directly linked to the Assets repository (Section 6.2 Initial Exploitation Assets definition and mapping).

6.4 Exploitation Strategy on Consortium Level

In this section, an initial analysis of a future Join Exploitation Plan will be outlined. Even though the project is in an early stage to define a Joint Exploitation strategy for the exploitation of the project results was elaborated from the beginning, in collaboration with the dissemination and communication planning, to enable the most extensive use of the project outputs and the maximization of the project impacts.

The project's exploitation strategy is based on four complementary paths:

I. **joint exploitation path aimed at ensuring the sustainability and wider uptake of the project's repurposing manufacturing services**, leveraging a vibrant community of interested and committed stakeholders as a high communications priority for Eur3ka with KPIs already defined. This community will encompass **supply side stakeholders**, both large companies and SMEs, as providers of digital manufacturing solutions, vendors of digital technologies**, Research Centres and Universities**, as developers of solutions for the manufacturing sector, ZDM (Zero Defect Manufacturing) and cognitive manufacturing enablers and Industrial Association as a link with the manufacturing companies in Italy, Turkey, Germany, three of the most intensive manufacturing countries in Europe. Moreover, **the connection with the wide ecosystem network composed by the EU network of DIH, WEF Advanced Manuf. AMHUBs, IDSA HUBs will act as a distribution channel in all Europe**, which will enable supply-side stakeholders to provide and exploit their solutions in a commercial basis, while facilitating the demand-side to access and use them.

II. **A path dedicated to the establishment and provision of innovation management services for the knowledge transfer to other industrial sectors** both at regional and national level to create and enhance business innovation and motivate with clear evidence of sectorial transformation. This path will be mainly pursued by European DIH network, IDSA Hubs together with Vanguard and Trilateral Cooperation and the European Network of Testing Facilities (TEFs). Nevertheless, the engagement of other partners will be also possible, as providers of innovation management services.

III. **A path entailing the development of detailed exploitation plans by each individual partner**, in-line with each partner's business and research strategy in the digital manufacturing market. In most cases, these plans concern the improvement of existing products and services of the partners.

IV. **Exploitation of the use cases and pilots of the project, notably the pilot systems that will be used to validate the project's developments**. The pilots will provide early showcases of the project's functionalities, and they will be gradually advanced in terms maturity and market readiness towards a viable route to market. The pilot solutions of the project will be made available through the ecosystem of DIHs. The table below provides an overview of the four exploitation paths, along with related measures.

In order to carry out the Eur3ka Joint Exploitation Plan and reach its objectives, appropriate means for governance will have to be agreed upon.

During the project period, the Consortium is governed by the Consortium Agreement, but once Eur3ka enters its full exploitation phase after the end of the project, partners will have to agree on a shared **governance model**. Such model will essentially be the means to control the Eur3ka Exploitation in the post-project phase ensuring that objectives are pursued and met. The chosen governance model and methods are strongly interrelated to the business models described above. The following factors will have to be considered:

- **Objectives** clearly in line with the exploitation objectives and compatible with the ownership models and IPR strategies.
- **Model** chosen for the governing entity/initiative to pursue the above objectives
- **Roles** partners are willing to undertake. These roles shall be formalised through specific agreements for partners to sign, committing to the defined role(s).
- **Rules** for participation. In particular the Consortium shall have to decide if it wants to pursue a model where only current project partners can join, or where external participation is foreseen.

Additionally, rules and schemes, including fees and revenue sharing, will be clearly set out. In Eur3ka three main models are proposed and will be carefully considered, given the project nature and partners' characteristics, all of which have reportedly been successfully applied in other European IT research projects [9]. The three models are described hereafter, also highlighting the main pros and cons.

6.4.1 New Legal Entity

With this model, a **new legal entity** is created to manage the foreground generated and to pursue both commercial and non-commercial objectives of the Eur3ka exploitation. This

model foresees a strong centralised management (company-like) and typical roles covered by partners who would usually provide staff and resources. The creation of a legal entity tends to face a certain degree of legal and 'bureaucratic' difficulties, thus certainly timing can be long. It enables a strong implementation of the exploitation strategies and, once set-up, would prove rather stable. Partners could join with different roles (as partners, stakeholders, etc.) and various levels of commitment. It should be mentioned that joining a profit-making entity might not always be a viable solution for some partners (e.g., **non-for-profit** and research organizations), however, various solutions exist for their involvement. There exists a risk that creating a new legal entity might result in a too convoluted and resource- and time consuming activity. Additionally, the costs (i.e. overhead) for implementing and maintaining such a monolithic structure should be factored in and their long-term sustainability seriously taken into consideration.

PROS	CONS
- Central, efficient management - Stricter implementation of exploitation strategies - Stability	- Bureaucracy overhead - High monetary initial investment needed - Resource-consuming to run - Not very flexible - May not be viable for some partners

Table 27: New Legal Entity PROs and CONs

6.4.2 Joint Venture approach

Through a **joint venture** new business opportunity could be pursued by Eur3ka partners who would also contribute with resources (financial, assets, skills, staff etc.) and share benefits and risks in the endeavour. In this case, a partnership would be created where shares could vary among partners. While a legal entity doesn't necessarily need to exist, a joint venture could use two partnership models:

- **A new organisation** possibly managed by one of the partners. Participants could contribute with infrastructure, staff and resources and get a stake of the revenues.
- **No organisation** would be created. This model would be like the current collaborative project model, where only staff efforts and resources are devoted to the endeavour. Very clear agreements on revenue sharing must be put forward in this case.

In both cases, a centralised joint venture agreement would be required to establish revenue, risks and liability sharing. This should make clear how decision making is carried out, setting up a board where the strategy and actions are decided. Venture partners should cover roles like those of a legal entity. The most complex part of setting up the joint venture is to agree for all partners on the costs and revenue sharing (who pays what and who cashes what). While more flexible than creating a legal entity, the Eur3ka partners expressed concern that this model also poses the risk of being too constrained. For some partners, it could still be hard to formally engage (and commit) to providing (even non-monetary) resources to the venture and sign such type of agreement. Although lower compared to a legal entity, the costs for management (e.g., board meetings etc.) should be factored into this model.

PROS	CONS

- Shared benefits and risks - Flexibility - Allows for both central and/or shared management - Allows to be widened to non-project entities	- Important changes need everyone's approval (slow) - May be harder to define profit sharing mechanisms - Lengthy process to set up the Venture and agree on revenue and cost models - Some partners (e.g., academia) may not be able to join due to legal constraints and bureaucracy

Table 28: Joint venture approach PROs and CONs

6.4.3 Multilateral collaboration agreements model

This model foresees flexible business agreements, with a series of partners collaborating in the delivery of products and services based on Eur3ka, without a central structure or entity. Therefore, a global agreement is not strictly necessary: in fact, each partner becomes a 'link' in a supply chain and essentially establishes agreements with the other interested partners: clearly agreements between the involved parties *are* required but offer a high degree of flexibility. Typically, this partners' chain will be covered by all or most current Eur3ka partners, who will also be free to establish other business agreements with third parties. This type of governance will usually include at least the following actors/functions: sales, providers, and consultancies.

Adopting this flexible model will ensure that if certain roles cannot be covered by partners, third parties can be added. Partner responsibility will mostly be 'localised' in that partners will be responsible for delivery of their own product/service. Ownership and IPR are easily managed in this model, as each partner owns and manages its share and possible further agreements can be made on a case-by-case basis.

PROS	CONS
- Little bureaucracy - Relatively easy to set-up - Maintains partners' flexibility - All kinds of partners can participate - Fits well with the Virtual Enterprise model - Well suited to exploit modular assets in diverse environments	- Risk of individual objectives clashing - Week global objectives - Might favour some partner over others - Changes in links might disrupt the chain

Table 29: Multilateral collaboration agreements model PROs and CONs

As for IPR Management (Section 6.3) the **Consortium** will evaluate the best strategy to be followed to maintain Eur3ka results running for a period after the project end, and accessible by both Eur3ka partners and possibly interested third parties. The final model will be presented in the final version of the Exploitation Plan due in M24 (November 2022).

6.5 Individual Exploitation Plans

Eur3ka partners have provided their preliminary exploitation interests and intentions for the first period of the project. These plans will evolve during the project lifetime as the technical results develop and in the next sections, partners' exploitation plans are presented.

To describe the Individual Exploitation Plan, a specific template has been provided available in Annex I: Individual Exploitation Template

6.5.1 Engineering Ingegneria Informatica S.p.A. (ENG)

Contribution to the project
With approximately 12,000 professionals in 40+ locations (in Italy, Belgium, Germany, Norway, Serbia, Spain, Switzerland, Sweden, Argentina, Brazil, Mexico and the USA), the Engineering Group designs, develops, and manages innovative solutions for the areas of business where digitalisation generates major change, such as digital finance, smart government & e-health, augmented cities, digital industry, smart energy & utilities, and digital media & communication. The greater performance of Engineering in the Industry and Services segment is due to the ability to combine twenty years' experience with the potential offered by technologies such as Cloud, Artificial Intelligence, Digital Twin, Digital Enabler, IoT, Cybersecurity, and Big Data. As **project coordinato**r, ENG will support all the management activities and will also lead the design of the **Reference Architecture** for **On-demand & Fast Manufacturing Repurposing**. Moreover, ENG will be in charge of driving **Business and Exploitation activities**
Exploitation Actions and Return expected
ENG expects to **increase its capability of offering innovative solutions** to its clients, especially in the manufacturing and healthcare domain, by utilizing Eur3ka results and possibly expanding its current services portfolio. ENG will exploit and promote the **IDS-powered global Plug&Response (P&R) repurposing framework**, built upon upgraded digital manufacturing infrastructures and enhanced on-demand global **manufacturing as a service (MaaS) platform.** Moreover, ENG will use the project outcomes in order to identify and address the new and emerging key clients' needs and to strengthen its

presence in the healthcare sector. In addition to that, ENG is also interested in the potential **re-use and adaptation** of some innovative technologies being researched and developed in Eur3ka. As founding member, ENG will spread Eur3ka platform and services through the **Digital Factory Alliance**, a global initiative with a factory focused mission able to reach manufacturing companies all over Europe.

Internally, ENG will exploit Eur3ka results through its own **innovation pipeline**, where research results are presented internally to relevant **business units** for further development and possible integration in the business portfolio.

Furthermore, ENG will promote and exploit Eur3ka project and outcomes through dedicated commercial activities supported by corporate **marketing** and **communication units**.

Potential risks identified

In this initial phase of the project, ENG sees possible risks for the exploitation of Eur3ka, as for other R&I projects, mainly related to the **maturity level** of the project results, even if this can be mitigated thanks to the long R&D track records and experience of ENG. A further risk that ENG sees is that the results of the project will arrive too late with respect to the end of the COVID-19 emergency, while they still represent an important approach in the manufacturing sector even in the event of future threats where other kind of market disruptions can create new opportunities to exploit Eur3ka assets.

Strategic future plans and commitment

ENG is strongly interested in committing to joint initiatives with other project partners, both ones whom it already collaborates with (e.g., INNOVALIA, IDSA, INTRASOFT, Siemens, Unparallel, Politecnico di Milano, etc.) and 'new' ones met in this project (e.g., SEAC, DTI, …). The idea is to find opportunities to further exploit Eur3ka results in the future.

In the next months, ENG will exploit the use of Eur3ka solutions adoption among its industrial customers. At the same time ENG will exploit and disseminate Eur3ka results among its national and international research community network (e.g., EIT Digital, BDVA, Future Internet PPP initiative, IDSA, ...).

6.5.2 Siemens Industry Software Ltd Israel and Siemens Romania (SIEIL)

Contribution to the project

Siemens' AM (Additive Manufacturing) Network (developed in Siemens Industry Software Ltd Israel) is an online order-to-delivery collaboration platform for the industrial additive manufacturing community. It connects the AM ecosystem, simplifies the collaboration process, and streamlines the AM production process. It enables AM experts, AM service bureaus and end customers to effectively collaborate on a design or production project, leading to quick and successful delivery of industrial AM parts.

In Eur3ka project Siemens' AM Network is used to:

1. Manage the list of qualified suppliers for the medical device industry.
2. Collect requirements and order information from customer organizations and support the customer organization in defining the requirements needed according to the required application.
3. Identify the appropriate suppliers, manage the commercial process and production planning.
4. Enable collaboration / co-creation between the customer organizations to the service providers to provide the appropriate design of the parts needed.
5. Transfer the technical requirements to the supplier and the production quality reports and the order status reports to the customer organizations.

As linked third party, Siemens T (Technology) team (hosted in Siemens Romania) works together with Siemens AM focused on specification and implementation of an on-demand 3DP service network making available of a certified parts catalogue. In addition, Siemens T works towards smart matching and mediation usable to discover best fitted AM suppliers available via Siemens AM Network.

Exploitation Actions and Return expected

Exploitation on Siemens AM Network side:

- Enhancing Siemens' AM Network capabilities in supporting non-AM professional, such as hospital personals. This would make AM technology more accessible for organizations and individuals in their early stage of adapting the AM technology in their products and operations.
- Improve Siemens' AM Network ability to respond to crises resulting in increased demand for quick production, such as natural disasters. In such crises, the response time for providing production solutions is essential. AM Network could improve its ability to connect those at need with the experts and resources that could support quickly and efficiently and deliver fast response to the situation at hand.
- Provide the suppliers registered to AM Network new production orders in crises situation and at routine times.

Exploitation on Siemens T side:

Siemens T team will promote toward the Digitalization business units portfolio key values of the projects. Most prominent areas where project may generate business leads are in the area of connected infrastructures platform extensions where multi-site, multi-application platforms can be safely linked to provide trusted integrated services towards distributed customers. Another example of improvement area is related to threats and security as a service screening of industrial equipment instrumentation and AI based mitigation of potential threats and failures. Both areas may support actively the evolution

of company from an equipment delivery business model to a service model and innovative discovery of opportunity in a digitalized marketplace.

Potential risks identified

Eur3ka represents a challenging exercise facing a unprecedented situation faced by humanity in terms of safety, capacity to provide fitted equipment and correlate distributed providers. This is a strong reason to accelerate various phases like PoC, MVP and productive developments in order to have mature enough systems in place. Also a list of achieved experiences related to how to handle stressing integration and new functions construction/adaptation is set in place. In order to validate technological assumptions Siemens teams integrate mature products, API and development platforms (e.g., Mendix) in order to validate designs assumptions and speed to react in a crisis situation.

Strategic future plans and commitment

Siemens AM Network team aim to integrate lessons learned on the platform in order to provide safe and secure collaboration of AM space roles. More, various technological aspects observed and validated will be considered to open new opportunities and new industries near AM.

Siemens T will use knowledge achieved in order to support various Siemens businesses to better connect with customers data via Data Spaces and trusted connectors and will use experience learned in the area of low code development with Mendix to link it with Knowledge Graph technologies usable to provide semantic description and automated reasoning between products, facilities, offered services and operational tools data.

6.5.3 Atos IT Solution and Services Iberia SL (ATOS)

Contribution to the project

Atos and more specifically the ARI Manufacturing and Retail sector through the research and adoption of ICT technologies in the domains of AI&Robotics, Cybersecurity, Identity&Privacy, HPC&Big Data and Edge Computing, helps organizations to foster and accelerate digital transformation, based on four main pillars: digital platforms, large-scale piloting, ecosystem building, and standardization. Due to the expertise in Digital Platforms for manufacturing and the interoperability of IT systems, i.e. implementing secure and efficient integration layers to connect heterogenous solutions through all the manufacturing value chain, in Eur3ka Atos provides its expertise in the design and implementation of Digital platforms by participating in the design and implementation of the Eur3ka digital solution, covering in particular Data Sharing Spaces.

Exploitation Actions and Return expected

Atos Research & Innovation (ARI) covers several areas of research, set up to meet the innovation demands of the company’s business lines. For Knowledge & Technology Transfer, ARI sets up regular meetings with different business lines within the company

in order to promote the R&D projects results and analyse if they would be o interest to current and/or potential clients.

This is a key distinction in the innovation process: tangible assets developed in research initiatives (integrated tools or platforms, individual components, etc.) are not “enterprise” ready in terms of security, stability and scalability, and are often not designed to become standalone solutions. Particularly for a large company as Atos, the more pragmatic approach is to integrate assets and knowledge towards existing or developing solutions in its portfolio. Hence, such internal meetings with commercial counterparts keeps Atos research interests in check and helps steer further development of the assets to increase probability of post-project exploitation of assets and knowledge gained. For Atos, the healthcare unit is the most interested in offering the solution provided by Eur3ka to current customers, as well as in attracting new customers, offering adaptable solutions for repurposing manufacturing lanes based on the solution and technologies used in Eur3ka.

Potential risks identified

As software integrators and solution providers, the main risk is related to the maturity of the final solution offered by Eur3ka. If the solution is not mature enough, it will not be interesting for customers or to be reused as a basis for future R&D projects.

Strategic future plans and commitment

Atos plans to use the new knowledge to improve the excellence of the company in strategic areas and we also plan to exploit the outcomes of Eur3ka in future R&D projects.

6.5.4 Intrasoft International SA (INTRA)

Contribution to the project

Intrasoft’s contribution to the project is focused on the development of applications and services that boost the business continuity of manufacturing enterprises in the context of production repurposing strategies. In this direction, Intrasoft is developing a COVID-19 aware shifts allocation application, which enables manufacturers to allocate shifts considering constraints and challenges of COVID-19 infections. Furthermore, Intrasoft contributes to the integration of data-driven Eur3ka solutions in the scope of production repurposing pilots such as the SEAC pilot. To this end, Intrasoft contributes its vast experience in the integration of complex digital technologies (e.g., Machine Learning and AI) in industrial use cases.

Exploitation Actions and Return expected

The following table illustrates the main exploitable assets developed by Intrasoft in the context of Eur3ka, along with envisaged markets and licensing schemes.

Asset	Licence	Target Markets
COVID-19 Aware Shift Allocation Service	Proprietary	Manufacturing (Direct), Other Industries (following proper customization)

Plant Risk Assessment Service	Proprietary	Manufacturing (Direct), Other Industries (following proper customization)
Eur3ka Solutions Integration	Proprietary	Manufacturing (Direct), Other Industries (following proper customization)

COVID-19 Aware Shifts Allocation Service

The COVID-19 Aware Shifts Allocation Service will be offered to manufacturers and other industrial enterprises based on a cloud based business model. At this early stage, the following market projections are made:

TAM (Total Available Market): ~2 million Manufacturers in the European Economic Area

SAM (Serviceable Available Market): ~20000s of manufacturers in the countries/regions where INTRASOFT has established sales and marketing channels.

SOM (Serviceable Obtainable Market): ~200 manufacturers i.e. 1% of SAM. Assuming a flat 5000 EUR license per annum, the potential revenues from this application are 1.000.000€

Plant Risk Assessment Service

The plant risk assessment service will be offered as a service to manufacturers and other industrial enterprises. This service will be sold as a "Consulting service" at a list price of 1.000 EUR per assessment. Considering the SOM above, the potential revenues could be up to 200.000 € per annum.

Eur3ka Solutions Integration

This exploitation stream will be shaped following the integration and validation of the Eur3ka trials.

Potential risks identified

Intrasoft foresees the following risks and related mitigation actions:

R1 – Low interest to the applications due to the end of the COVID-19 pandemic and a lowering demand for manufacturing repurposing applications.

- **Mitigation**: Make the application configurable and able to confront other healthcare issues and crises (e.g., flu); Plan a pivot of the application towards supporting other shift allocation rules, while making the application usable/appliable to other industrial sectors (e.g., oil & gas, mining).

R2 – Slow market validation and proof of business delaying revenues and commercialization.

- **Mitigation**: Commerce validation during the project's lifetime as part of the Eur3ka trials; Address other manufacturers from Intrasoft's business network.

Strategic future plans and commitment

The post project exploitation strategy of INTRASOFT aims at boosting the sustainable and wider use of the developed services. To this end, the following actions will be carried out:

- Promotion of the solutions through multiplier channels like the European Factories of the Future Research Association (EFFRA) and the Alliance for Internet of Things Innovation (AIOTI).
- Presentations and demonstrator to target customers via established sales and marketing channels of the company in Belgium, Luxembourg, Denmark and Greece.

Collaborating with Eur3ka partners and forming value chains is essential for the effective exploitation of the project's results. Intrasoft suggests that such an exploitation collaboration is established in the scope of the Digital Factory Alliance (DFA), which is an already established entity with clear participation and governance rules. DFA could facilitate the collaboration with its members (including several Eur3ka partners), while acting as a catalyst for the promotion of Intrasoft's solutions and services developed in Eur3ka.

6.5.5 Svm Automatik A/S (SVM)

SVM involvement, in this first year of Eur3ka project, is still partial because, as production equipment for the pharmaceutical industry provider, the activity level and intensity has increased significant the past 2 years as a result of the pandemic. The company hired a new resource for the digitalization, including the digital twin, starting in February 2022. The updated exploitation plan will be included in Deliverable D6.3.

6.5.6 Brainport Industries Cooperatie UA (BRAIN)

Contribution to the project

Brainport Industries is a Consortium of tier-one, tier-two and tier-three suppliers in the open High-Tech supply chain of the Netherlands. Its members are the actual companies involved in a lot of the supply chains which have been affected by the COVID-19 pandemic and which have shown an adequate response to the rising issues during the pandemic. Therefore, their first hand experiences and their input is very useful for designing the future approach of similar issues. This information is obtained by initiatives like the ''Resilience Leading Group'' and ''Use Cases of Supply Chain Resilience during the COVID-19 pandemic''. Brainport Industries aims at conveying the information and knowledge gained during the Eur3ka project with her members. Additionally, in close collaboration with TNO we aim to progress Supply Chain resilience with the SCSN (Smart Connected Supplier Network) platform. By focussing on the need for optimal data & information sharing.

Exploitation Actions and Return expected

Exploitation & Dissemination

Brainport Industries is involved in the High Tech Manufacturing sector in The Netherlands and we therefore focus on that specific market/sector regarding exploitation and results. The current way of exploitation, by having a large network of aligned SMEs within this sector, will be the expected scenario for future exploitation. Since Brainport Industries is a Consortium of suppliers, we already disseminate the results according to this strategy/scenario. At Brainport Industries we regularly update our members through:

- Monthly newsletters regarding updates across the several European projects we are a part of, including Eur3ka, but also for example GAIA X and MARKET 4.0. With a focus on innovation and market needs.
- Events and knowledge sessions on Resilient Supply Chains and Resilient Thinking
- Guidance for business, technological or company growth innovation
- Leading groups to gather input on market demand but also to disseminate knowledge and know-how

Expected Revenues

The expected revenue we aim to gain by exploiting Eur3ka results is a requirements analysis for the further development of the SCSN Data Space in collaboration with TNO. Not only technological and demand based but also for the growth of the general adoption of SCSN within the manufacturing sector of Europe. SCSN is therefore not only a Data Space, but also a foundation with participating members.

Next to that we tend to educate our members on the necessity of ‘Resilient Thinking’ and ‘Resilient Supply Chains’ by sharing inspiring examples of resiliency and innovation within Europe. The case studies and scenarios used in Eur3ka are good examples of how to repurpose production for the greater good.

Potential risks identified

The following risks is what we’ve perceived as relevant:

Risk #1: A potential risk we have identified is a gap in a connection to market needs regarding ‘Supply Chain Resilience’ and ‘Manufacturing Repurposing’.

Possible Solution/Mitigation: A possible solution would be a clear connection with manufacturing SMEs regarding the two mentioned topics. As Brainport Industries is a Consortium of manufacturing SMEs, our expertise and role can mitigate this risk. We have set up a leading group of manufacturing SMEs within the High Tech market in order to collect input regarding the market demand & needs. This leading group can be used as an echo chamber for potential solutions/scenarios.

Risk #2: Next risk we have identified is the possible mismatch between European projects. We experience a lot of repetition in subjects and work within multiple European projects.

Possible Solution/Mitigation: A central point of attention or a central goal for participation in a European project seems like a possible solution in our eyes. As a way to mitigate the current risk we have been working on SCSN as a central point of attention for all projects we have been involved in.

Strategic future plans and commitment

We believe in the necessity of an overarching organizational structure, like for example: the IDSA, BDVA, etc. We as Brainport Industries are already a part of aforementioned organizations. For us the further development and exploitation of SCSN is key and therefore we focus our efforts on SCSN as a lighthouse project within all European initiatives. We believe SCSN can become the go to Data Space for the manufacturing market. Therefore, SCSN has become a foundation to build upon, for us but also the participating members.

Further development and innovation is something we tend to do within our Brainport Industries Campus. Brainport Industries Campus (BIC) is the face of high-tech manufacturing industry. An international campus development in the heart of Brainport Eindhoven where top technology, education, government and high-quality facilities come together under one roof. It's a place where innovation and manufacturing meet.

We are committed to the EDIH (SOUTH-NL) proposal and future strategic partnerships and collaborations. Possible value chains would be the ability to share knowledge, know-how, and business opportunities between a strategic network of European partners. Our role as a network organization would be that of a matchmaker for our members and partners.

6.5.7 Visual Components OY (VIS)

Contribution to the project

Visual Components as 3D simulation and visualization expert brings to Eur3ka its expertise and solutions to enable and enhance the repurposing of existing manufacturing systems as well as, the development and commissioning of new ones to provide fast and reliable response to situations like the COVID-19 pandemic.

Emergency situations which require fast manufacturing of medical and pharmaceutical products, require that products are produced as fast as possible and keeping product specifications at the maximum standards of quality. By using 3D simulation, the required production system can be fast modelled to accelerate manufacturing deployment. The solutions developed by Visual Components provides the digital continuity, the digital models are reused along the entire deployment process, integrating a seamlessly workflow from concept to operation, and enabling virtual commissioning that reduces ramp up times and avoid costly mistakes.

After the line has been commissioning the digital twin allows the maintenance of the production and reconfiguration when necessary.

Exploitation Actions and Return expected

The main targets in the exploitation of the Eur3ka outcomes are the pharma and medical verticals. Despite both verticals requires a lot of ad hoc development, specific for each area within the verticals the work targeted within Eur3ka gives us the better understanding of the requirements and how to provide solutions to them.

We will reinforce the development of simulation features towards both verticals, and later we will focus the development in the areas where during the project we are discovering bigger potential, such as assembly of devices and packaging of medical and pharma.

During the firsts months of the project, we have discovered that the medical analysis is also an area where our products can offer solutions to deploy fast analysis systems. During the project we are investigating this possibility and in addition to offer the system providers and integrators new possibilities that will be enhanced the development and commissioning of new and improved solutions will accelerate and reduce the costs.

We are planning to go to market with the solutions developed during the project, after the end of the project, we expect to invest initially in the commercial development of the simulation features about half million Euros. This will expand our commercial portfolio and the impact in sales is expected to be in around one million in the first year of commercialization, increasing about 20% in the following 3 years.

Potential risks identified

As previously mentioned, the medical and pharmaceutical industry requires high tailored solutions, this can involve that we require to focus only on certain areas so we will not be able to cover a market as wide as we are expecting initially.

Strategic future plans and commitment

Visual Components has a large number of partners, and we will focus our commercial strategy with the existing ones working in the domain. We are open to new commercial possibilities if commercial partnerships are developed during the project.

6.5.8 Seacub S.p.A. (SEAC)

Contribution to the project

SEAC is setting up a pilot or Use Case Scenario, based on its own testing facilities for Full Face (FF) masks. This product was repurposed from a diving model to an anti-viral version during the first COVID-19 pandemics wave, and it needs to be tested with two different machines. The first one measures two key parameters of the mask:

- CO2 percentage residual inside the mask, after the breathing cycle;
- The sealing of the mask on the user's face.

The second machine measures the breathing effort of the user when wearing the mask. The goal of the use case set up by SEAC is:

- Automatizing the testing procedure to optimize timing and robustness;

- Integrating SEAC's testing machines into the Eur3ka platform, by sending data generated in an automatic way by the machines on the product and its performance;
- Optimizing the product features thanks to test data analysis.

Exploitation Actions and Return expected

SEAC foresees different exploitation routes for Eur3ka assets:

1. Optimizing FF masks features: FF masks will be analyzed after their test, by exploiting AI algorithms developed within the project. A database of structured historical data will be built, thus making it possible a full tracking of performance of these products. Putting in relation performances with key features of the product (e.g., geometries, materials, etc), these features will be tweaked by SEAC in the future batches, even after the end of the project itself. This will make SEAC's products (both diving and anti-COVID-19 FF masks) more effective and will position the company in an advantage position with reference to customization of solutions, increasing its market share;
2. Renting testing facilities: SEAC already rents its own testing machines to competitors, as a part of its business. Thanks to Eur3ka actions on the pilot, the service will become more effective and efficient, thus attracting more companies which can be interested in using the machines. This will increase the turnover of the company in this segment;
3. Selling data: a database will be populated thanks to the digitalization of the testing process in SEAC. The data can be sold to several different entities, such as manufacturing companies interested in FF mask production, design studios, standardisation bodies;
4. Contributing to best practices and standardisation: FF masks used for medical purposes are not regulated by a dedicated standard or regulation. SEAC aims at using the data to allow Eur3ka Consortium to define best practices, where standardization bodies can set up new standards on this kind of product for both medical and diving markets. This can allow companies like SEAC to decrease their product design and life cycle effort, thanks to more precise guidance during the development

Potential risks identified

For each of the 4 exploitation paths identified in the previous paragraph, some risks can be envisaged, like follows:

Exploitation Path	Risk	Mitigation
1	Low acceptability for FF masks	Gathering by the end users the reasons for low acceptability, and including in the data analysis this level of information

2	Automation not performing as planned	Managing step by step the modification of the testing machines, by assessing the performance of each device integrated on them thanks to the expertise of tech providers within the Consortium
3	Low amount of data	Generating data from the very beginning of the pilot operations, and keeping of even after the end of the project, for both diving and anti-viral masks.
4	Too many different standards to deal with	Correlating masks features to performances, to understand which are the key parameters for designing good masks, and proposing them as best practices.

Strategic future plans and commitment

SEAC does not see a potential joint venture or a legal entity (association, company, etc) as the best way to proceed to fully exploit the future improvements of its own product and process. Rather, the company sees some strategic synergy with Eur3ka Consortium partners, in particular technology providers for automation and data analytics, and experts in standards. With these entities, SEAC could consider framework agreements to protect IPR generated in the project and to ensure an advantage position on the market respect to its competitors.

6.5.9 STAM Srl (STAM)

Contribution to the project

STAM is cooperating on the data generation and data modelling side, especially focusing on a pilot or Use Case Scenario of the project. In this context, the company is designing, developing and integrating an automation system to extract data from two testing machines for the assessment of Full Face (FF) masks. The first machine measures two key parameters of the mask:

- CO2 percentage residual inside the mask, after the breathing cycle;
- The sealing of the mask on the user's face.

The second machine measures the breathing effort of the user when wearing the mask. The goal of STAM's technical contribution is integrating the testing machines output into the Eur3ka platform, by sending data generated in an automatic way by the machines on the product and its performance.

Exploitation Actions and Return expected

STAM will be able to benefit from the project thanks to one main exploitation route. The company is setting up a service of automation and integration of existing assets (machines, facilities) to generate and gather data. This service will be offered to several customers in the manufacturing domain, where data-driven applications and decision-support systems are more and more requested to analyse production performances.

Moreover, testing and measuring facilities of companies can be automatised too, in order to build historical databases of products features. STAM already has in its customers portfolio around 40 companies that can be interested in this intangible asset developed by STAM in the project. By selling such a service to each of them, the company can foresee an increased turnover by 1 M€ in 4 years after the end of the project.

Potential risks identified

Risk	Mitigation
Market not interested in automation solutions	Organizing meetings with customers on Industry 4.0 macro-topic, to increase awareness on potentiality of these solutions
Automation design and POC requesting too high effort	Clearly gather functional requirements by the customer at the very beginning of the agreement, and translating them into technical features of the system. By-weekly checkpoints with the customer

Strategic future plans and commitment

As a technology service provider, STAM can be interested in replicating its service on other facilities after the end of the project. This does not include the participation to a joint venture, but a possible collaboration with some of the Eur3ka partners on the medium-long period.

6.5.10 Software Quality Systems SA (SQS)

Contribution to the project

SQS is a private laboratory offering Quality-as-a-Service, guaranteeing the quality and compliance with requirements and standards of automation systems and software products.

It verifies and validates medical devises as well as industrial equipment, and therefore, it will bring to Eur3ka strong background and close collaboration with regulators and certification authorities in the medical and manufacturing domains.

Its main expertise is testing, validation and certification, against the most reliable standards of safety risks embedded systems. The company expertise comprises high technical background in the designing, implementation and management of complex testing environments. SQS has gathered a wide knowledge over the years in standards such as Cenelec, IEEE (Institute of Electrical and Electronics Engineers), ISO (International Organization for Standardization), FDA (Food and Drug Administration) & EMEA (European Medicines Agency), DO etc.

Within the framework of the project, SQS will set up a validation and verification programme and strategy that integrates and supports Eur3ka´s manufacturing network. Hence, SQS will carry out the independent validation and support of the verification of the different pilots that will be developed under the project

Exploitation Actions and Return expected

The results of the project will allow SQS improve and enrich their current tool framework for virtual testing to support more advanced and complex testing environments and capabilities, to extend their portfolio of services, to reach customers in need to carry out the design, development and certification of more and more complex systems in shorter time without reducing quality.

SQS will be able to verify and validate against new standards medical components and/or products. This will speed-up the process of bringing to the market certified and validated key medical products, further strengthening manufacturer's capacity to respond quickly to medical crisis. The certification approach will be rigorous and will minimize risks of shortages while ensuring the high standards of quality, safety and efficacy.

Additionally, SQS's will gain knowledge and experience to improve and optimize three main methodologies/infrastructures of its portfolio of services within this domain of activity. These methodologies are:

- **Q-Digital Automation:** Validation of industrial automation systems.
- **Q-Health:** Validation of healthcare applications
- **Q-IDSA:** Accredited laboratory for component validation of components according to IDS criteria

Thanks to the participation in Eur3ka project, SQS expects to develop tools and mechanisms to increase their validation and verification capacity with new standards in the medical and industrial domain, with the purpose of improving their international position and provide their services to an extend network of international clients.

Potential risks identified

Problem: Changes in the legal framework and regulatory rules related to manufacturing process and medical products

Action: Be aware of the novelties arising from the changing legislation, in order to abide to new regulations.

Strategic future plans and commitment

SQS expects to lead in the future the validation and verification activities that are essential within the medical device domain in case of a medical crisis. It will conitue improving its set of Quality as a Service (QaaS), services offered from their testing infrastructure that allows to provide remote testing and QA services to the customers. These services are offered throughout the entire development cycle of a system, with immediate contracting and availability of the service, controlled costs and perfect alignment and coordination with the company's development teams. These services are available 24*7 and are governed by service level commitments agreed between the parties.

Additionally, SQS is aimed at stablishing a strategic plan to gain international recognition and increase the number of international clients.

6.5.11 Unparallel Innovation LDA (UNP)

Contribution to the project

Unparallel main contribution to the project that are relevant for their individual exploitation are on the risk assessment tool, in which they are responsible for developing the platform with the decision support functionality embedded and the service marketplace tool, the component recommendation engine which will allow marketplace users to use the results of Eur3ka project to help them to composes their own solutions for their specific problems.

Exploitation Actions and Return expected

Main business strategy of Unparallel is the usage of the developments of the project into their own portfolio. The risk assessment engine will be an asset, opening a new path for Unparallel to support new endeavours on the risk assessment topic. The other is in the form of usage of the recommendation engine on the IoT-Catalogue.com which will expand one of its key functionalities, by providing the users a way to use all the results presented in the catalogue to help them to tackle their own cases. Doing this fully automated will be for sure, a big new feature for the platform.

Potential risks identified

Not foreseen.

Strategic future plans and commitment

The main future plan and commitment will be in the sense of the IoT-Catalogue.com which will integrate the recommendation engine developed in the project to expand its capabilities and offers.

6.5.12 Effizienzcluster Management GMBH (ECM)

Contribution to the project

As a Digital Innovation Hub (DIH) in logistics and manufacturing, ECM brings to Eur3ka its network of expertise in supply chain management and smart logistics, as well as its experience in supporting SMEs in the implementation and application of digital technologies and coordinates several tasks in the area of agile manufacturing and supply chain stakeholder engagement. ECM collaborates in the specification of logistics chain optimization strategies and the redesign and rebalancing of global supply chains based on the Digital Hub Logistics platform and in its dissemination and implementation in terms of the test before invest approach. ECM intends to transfer Eur3ka project results the existing DIH services of "Access to Knowledge" and "Access to Technology" within ECM's Start-in-Factory for the target group SME and small midcaps. Furthermore, the results will be added to existing technology transfer activities and will thus broaden the service portfolio of ECM within the Digital Hub Logistics.

Exploitation Actions and Return expected

Exploitation Actions

In the context of our work as DIH, exploitation activities related to Eur3ka can be embedded in the areas of skills & training, test before invest, innovation ecosystem & networking, and support to find investment.

- Low-threshold information workshops for SMEs and multipliers on the tools and assets from the Eur3ka project. (skills & training)
- Presentation of best practice examples of the Eur3ka project to actors of our regional DIH environment (skills & training)
- Hands-on workshops on R3 cognitive Digital Twin services, plug & respond interoperable trusted data connectors and Eur3ka service platform & infrastructure for companies and SMEs from our regional and local DIH ecosystem (test before invest)
- Ongoing information of the Digital Hub Logistics community about use cases and solutions of the developed project outcomes (innovation ecosystem & networking)
- First point of contact for interested parties from our regional ecosystem and match making with relevant partners from the Eur3ka environment. (innovation ecosystem & networking)
- Assist companies in finding appropriate funding to implement MaaS components for implementation of R3 approaches (support to find investment)

Return expected

- Companies and SMEs from our DIH ecosystem know about the Eur3ka toolset.
- Companies and SMEs from our DIH ecosystem that know about the Eur3ka toolset can test the Eur3ka toolset (Plug & respond interoperable trusted data connector, service platform & infrastructure, R3 cognitive digital twins) so that they can make use out of it if circumstances require it
- The strategy and use cases of Eur3ka is positioned in the logistics market while the Digital Hub Logistics community is aware of the Eur3ka toolset and can refer back to the project outcomes if needed.
- Digital Hub Logistics experts broaden their know-how and can provide information on R3 MaaS components

Potential risks identified

A risk for exploitation of relevant project results to SME is the used language. In our experience, if results, MVPs and assets are not available in the respective national language, it is difficult to carry out a targeted and, above all, broad distribution of Eur3ka solutions. SMEs especially in the manufacturing sector are mainly active in their local language. English is often an obstacle in the operational business, so that the benefits and application of the solutions developed in the project are difficult to implement by SMEs. In our work with companies in the field of logistics but also in the manufacturing

industry, we try to create offers that are as low-threshold as possible to sensitize companies, especially SMEs, to these relevant topics. One criterion for success has always been communication that is as comprehensible as possible. Therefore, relevant exploitation material and projects assets should be provided multi-lingual and easy to use and implement.

The probability of the designated risk is high, and the impact on project exploitation is for all DIH in their local and regional ecosystems is also high.

Strategic future plans and commitment

ECM intends to integrate project results into the DIH's competence portfolio and knowledge transfer and also into the communicative work with different target groups (SMEs, mid-caps, start-ups, multipliers, corporates, local RTOs) in order to sensitize them for the demand-oriented application of MaaS. Share application scenarios and best practices by organizing webinars or providing editorial articles in the local innovation ecosystem to increase adoption by companies from logistics and manufacturing especially SME. Collaborate further with partners from the Eur3ka project as part of the European Digital Innovation Hubs (EDIH) network and via cross-border collaboration with the Digital Transformation Accelerator (DTA) to enable knowledge transfer to other hubs. Regular exchange of experience within the Eur3ka community organised through EDIHs on success factors and obstacles that companies from our DIH environment communicate in order to implement improvements in a targeted manner

6.5.13 Politecnico di Milano (POLIMI)

Contribution to the project

Financial impact assessment: Identification of the financial and social indicators to evaluate the resilience of manufacturing companies. In this respect, POLIMI contribution to Eur3ka is related to the identification, development, adoption of socio-technical-business indicators to be used in order to evaluate and to keep under control the resilience of the manufacturing companies referred to a very dynamic market landscape requiring fast, flexible and agile adaptation of the most critical business processes.

Professions and skills development: Analysis of the evolution of new roles and skills in the workforce. In this respect, POLIMI contribution is related to the identification and adoption of new professions and skills in accordance with resilience and new technology trends (e.g., Data Spaces and AI). In particular, at a more strategic levels new Roles and Professions are discussed and defined by their specific competencies and soft skills, so that C-level executives could take the most suitable medium-long term decisions on the basis of the current Digital Maturity. At a more tactical level, digital transformation methodologies such as POLIMI 6Ps and focusing on the People dimension could provide a guidance and a plan of concrete actions for workforce digital transformation. In this methodology by analysing the current (AS-IS) and the expected (TO-BE) situation of enterprises and their experiments, POLIMI is able to identify gaps and propose proper actions (e.g., training courses) to fill such gaps by founded and/or internal projects.

Exploitation Actions and Return expected
Financial impact assessment: thanks to the developed methodology POLIMI is enriching and reinforcing its consultancy capability to drive manufacturing companies' digital transformation. in the new indicators aim to be integrated into our DREAMY Digital Maturity Assessment evaluating enterprises' resilience performances, looking at both economic and social aspects. **Professions and skills development**: At enterprise level, the methods and tools developed by POLIMI are as well enriching our DREAMY Digital Maturity Assessment framework. At experiment level, due to the trend of technology and also during crises such as COVID-19, the return that can be achieved is the provision of advanced skills development services, especially thanks to the hands-on POLIMI experimental facility at MADE Competence Center.
Potential risks identified
N/A
Strategic future plans and commitment
Both POLIMI exploitable assets are good candidate to enrich the bouquet of POLIMI offer around Manufacturing Industry digital maturity models and transformation pathways (DREAMY family). The implementation of the Jobs and Skills methods and tool in physical hands-on testing and experimentation facilities will be more pursued with agreements with the MADE Competence Center.

6.5.14 Fraunhofer Gesellschaft Zur Foerderung Der Angewandten Forschung E.V. (FhG)

Contribution to the project
An important function of a marketplace is to search for factories, factory facilities and supply chains for a desired production process. In addition to the available capabilities, it should also take into account the capacities of the registered factories including their supply chains. Fraunhofer IOSB's main contribution is the Smart Matching and Mediation App (SMMA), which extends the standard search functionality of a marketplace to include not only static information such as capabilities, but also dynamic data such as price, availability, risks, etc. SMMA also sorts the search results according to the user's preferences. As the dynamic information is sensitive, SMMA is embedded in the IDS data space connector to ensure trustworthiness in dynamic marketplace scenarios.
Exploitation Actions and Return expected
Fraunhofer IOSB, in its role as a research institute, aims to develop and extend emerging technologies to create innovative solutions for industry and government and to achieve impact through standardization and technology transfer. Our main exploitation result from the EU3KA project is SMMA for the optimal provision of manufacturing and supply chains. We will make SMMA available to industry and the research community by providing free

access to SMMA and, if feasible and possible, releasing SMMA under an Open Source license. This will strengthen the sustainability of SMMA, foster innovation and allow third parties to be inspired, expand research, maintain and leverage SMMA through adaptation, but without hindering commercialization opportunities. In addition, SMMA has already been integrated into the Smart Factory Web (SFW), our platform that connects smart factories through a manufacturing marketplace. Considering that SFW is a well-known platform used in many settings, it will be used as the main exploitation channel for SMMA. The extension of SFW with SMMA will provide support for dynamic marketplace scenarios.

Our exploitation plan also includes the integration of SMMA into the Fraunhofer IOSB portfolio of consulting services we offer our customers in industrial fields.

Next, results from Eur3ka will provide relevant and beyond the state-of-the-art input for teaching, especially related to ongoing lectures related to (Industrial) Internet of Things platforms. Here, not only well elaborated project tutorials can be used in lectures, but also SMMA for practical exercises.

Finally, an important exploitation opportunity is to define follow-up research projects, which take up and further develop relevant topics, results, and application ideas, or continue work with the project partners.

Potential risks identified

One of the main barriers to the use of SMMA is the fact that companies already have some proprietary solutions to represent information about constraints and are not willing to replace them or enhance them with a new solution. Moreover, the non-functional requirements such as interoperability with external systems are not considered at all.

To mitigate this risk, it would be possible, in addition to SMMA, to provide a template for an Asset Administration Shell sub-model to represent the constraints. It is up to a data provider to fill in this information either manually or by integrating an existing system. In the second case, a mapping tool could be developed to assist data providers in automatically providing data from existing systems.

An additional risk is that companies do not use IDS connectors at all or use a connector other than the dataspace connector. In the first case, a dataspace connector should be configured for each company that wants to participate. In the second case, interoperability with the providers' connectors should be tested

Strategic future plans and commitment

SMMA will be made available as Open Source, extended with new functions as required and used in future research and industrial projects where possible.

6.5.15 Univesitetet I Oslo (UiO)

Contribution to the project

In the context of T2.1 and T3.2 UiO analyzed Eur3ka reference architecture and tool systems that Eur3ka partners will develop or introduce to the project as well as the project's goals and defined a set of vocabulary related to the concepts in the Eur3ka project. Those terms were crosschecked with existing ontologies and initiatives such as BFO ontology and IOF core ontology. The goal with to re-use as much as possible existing terms and not create an entire new vocabulary in order to be able for the Eur3ka ontology to be used from other as well and not only with in Eur3ka Consortium. Many concepts defined initially were replaced by similar semantically concepts but from standardized ontologies. The outcome out of this process is to develop the Eur3ka ontology, a common shared vocabulary that will be used across the entire project.

Exploitation Actions and Return expected

The methodology followed for the Eur3ka ontology development will increase the interoperability of Eur3ka platform, making it possible to be integrated to any system. This way will allow the use of Eur3ka platform not only for the purpose and the goals of the Eur3ka project but for many other domains that require a dynamic resilient manufacturing network.

Potential risks identified

No risks are identified regarding the ontology implementation.

Strategic future plans and commitment

The new terms created specifically for the Eur3ka project will be introduced in the future to the IOF ontologies making them from Eur3ka specific to domain reference terms making Eur3ka platform and tools even more interoperable and resilient.

6.5.16 Eidgenoessische Technische Hochschule Zuerich (ETHZ)

Contribution to the project

ETH Zurich contributes scientific and practical insights in terms of a) the development of a conceptual framework for manufacturing repurposing, b) the identification of best practices for manufacturing repurposing, and c) the assessment of drives and barriers during manufacturing repurposing operations. ETH Zurich conducts several case studies with both Eur3ka partners and other firms to empirically build the constructs of the manufacturing repurposing framework, find the relationships between these constructs and derive best practices, drivers and barriers. The main data collection includes more than 45 interviews with experts from manufacturing industries that were directly or indirectly involved in manufacturing repurposing projects. The contributions of ETH Zurich include scientific reports and assessments to Eur3ka project, conference and journal papers based on the findings from the Eur3ka project, and collaborations with other project partners for the implementation of identified solutions in practice.

Exploitation Actions and Return expected

The framework helps improve future manufacturing repurposing projects from different perspectives. Firstly, it allows managers from manufacturing industries to better prepare the production operations for future disruptions such as pandemics as well as to increase flexibility to produce new-to-the-firm products. Secondly, it provides causal-loop diagrams that can help practitioners to evaluate the causal relationships in manufacturing repurposing activities and therefore better manage future operations. Thirdly, the findings clarify the role of agile product development processes in factories, which can not only help improve current product development activities, but also increases the success rate of future new product development projects.

Potential risks identified

N/A

Strategic future plans and commitment

The manufacturing repurposing framework that is developed by ETH Zurich can be used as a strategic tool for both managers and policy makers to evaluate the underlying mechanisms of manufacturing repurposing activities in the future. In particular, the causal-loop diagrams can visually present the relationships between the building blocks of a manufacturing repurposing project.

6.5.17 Teknologisk Institut (DTI)

Contribution to the project

DTI delivers to the project expert knowledge on Additive Manufacturing in an industrial setting DTI has experienced how the COVID-19 crisis affects the supply chain, how additive manufacturing can be utilized to overcome some of the urgent shortcomings by enabling rapid prototype developing and rapid ramp up of manufacturing. DTI is currently encountered with a customer demand of additively manufactured components on a MedTech certified production line, the same demand vaccine manufacturing lines are met with, and will in this project demonstrate how an industrial additive manufacturing line operating under ISO 9001 quality management system can be transformed to uphold the needed ISO 13485 quality management system. DTI also provides knowledge on product and control specifications for demonstrating how distributed manufacturing can be optimized through the Eur3ka project.

Exploitation Actions and Return expected

Through demonstrating how to go from ISO 9001 to ISO 13485 in an industrial Additive Manufacturing setup, DTI will also prepare the foundation of becoming ISO 1385-certified in the process. This will break down the barriers of manufacturing to the MedTech industry in need of additive manufacturing, such as for ventilator assistance-equipment, pharmaceutical robot grippers and even implants for humans, all which are present costumer demands at DTI. This will lead to increased revenue for DTI, and MedTech costumers, who will gain advantage of additive vs traditional manufacturing.

DTI is also promoting the Eur3ka solution with a collaboration with the European project AMable (grant agreement no 768775). Amable is helping companies on developing 3D printed products, and in the field of production but without any consideration of medical certifications. The project also made a specific call on 3D printed product helping against the pandemic and it will be on that specific area that the link with Eur3ka will be made.

Potential risks identified

A risk of the Eur3ka catalogue (developed by Siemens and connected to AMN) is the lack of usability aspect and how it can be used in real life. While Siemens sets up a very general tool, which can potentially be used for rapid manufacturing and crisis aversion, the aspect of ownership, who can use it in real life, what the business case of using it is and who will benefit from it is not clear and hence poses a risk in terms of not providing value to society. DTI has the expertise and knowledge to propose realistic user scenarios and describe business cases and evaluate usability through discussions with possible stakeholders. One of the points which is important is the approach of certification for those fast produced products. The lack of certification might end in the impossibility of using the produced parts, meaning that we could lose some help to fight against pandemic. One of the approaches that DTI has started is to discuss directly with the national Health organisation for starting discussions about their needs and risks compared to using such product.

Strategic future plans and commitment

Even if the exploitation of the results is extremely important also in the matter of our commercials targets, DTI will measure the proposed direction carefully compared to its status and value to the society. We could see some possibility in:

- Continue collaboration with SQS, who can provide insight into software solutions supporting ISO 13485
- Active participation in Siemens Additive manufacturing Network and connection to developers may lead to increased distributed manufacturing?
- Collaboration with CIR

Should Eur3ka catalogue be widespread and utilized by some actors, DTI see an economic benefit from being a central stakeholder from the beginning. DTI could promote the tool to stakeholders and act as a consultant for pre-certifying components or as a service provider for manufacturing components. However, nu clear direction as to the tool and business case has yet been developed.

6.5.18 International Data Spaces EV (IDSA)

Contribution to the project

IDSA's contributions to the project is about providing its technology and standards (reference architecture model and core components) to be used by the project partners, and to facilitate these adoption processes, where necessary. Majority of the components that form Eur3ka infrastructure consist of IDS-compliant technologies, which gives IDSA

a mission to pursue the development activities I) to check the applicability of IDS standard, II) to gather feedback from the implementation partners to be used to update the standards, when necessary, to ensure that the global standard for data sovereignty is provided. Therefore, adoption of IDS technologies plays an important role and it is the primary success criterion regarding the exploitation activities of IDSA. IDSA expects the project results to be successful so that the organization can promote the results as a reference implementation of sustainable data space, that uses IDSA framework for sovereign data sharing.

Exploitation Actions and Return expected

As a non-profit organization, IDSA aims to exploit the project results primarily via adoption activities of the Consortium members. IDSA Reference Architecture Model, IDSA Testbed and IDS-compliant data space connectors that are being developed and/or used in the project form the basis of the exploitation for IDSA, that leads to dissemination of IDS standard.

For this, IDSA will help the adoption activities of the members when necessary, and will promote IDS Reference Architecture Model, components/projects that are available on IDSA Open Source Landscape1 and IDSA Testbed which is expected to be available on Q1 of 2022.

The return expected as the result of these actions is primarily about raising awareness about IDS standards and documentation, and IDSA also expects to reach more organizations via the project's network, that can potentially become contributors to IDS technology and/or members of the association.

Potential risks identified

Risk number	Description	Probability (low, medium, high)	Impact (low, medium, high)	Mitigation action
1	The number of partners using IDS Testbed remains low.	Medium	Low	If this case occurs, IDSA will look for ways to explain the benefits of the testbed to encourage and increase the use of it.
2	The number of projects joining IDSA Open Source Landscape remains low.	Medium	Low	In such a case, IDSA will continue to support and facilitate the onboarding process of the projects, by explaining the benefits of Open Source for the projects, as well as for organizations.

Strategic future plans and commitment

IDSA expects to provide its technologies after the project, mainly via its hubs and members that are already among the project members. Another aspect of IDSA's future plans will be to invite developed components to join IDSA Open Source Landscape, to increase their visibility, as well as to facilitate the future implementations of sovereign data sharing projects.

6.5.19 Asociacion de Empresa Tecnologica Innovalia (INNO)

Contribution to the project

INNO contributes to the project in the coordination and overall set-up of the European Trusted Manufacturing Network through the Manufacturing Global Response Initiative (MGRI), collecting the overall requirements for the establishment of the constituent platforms. INNO also works on the specifications of MaaS models and on the establishment of the governance models for manufacturing sites to join the MGRI. INNO will interact and coordinate with European and Global (WEF) networks of manufacturing HUBs and 3D Printing platforms for a rapid response.

Additionally, INNO investigates and develops the specifications of a quality data space for zero defect manufacturing (ZDM), widening Boost 4.0 framework and digital twin services for offline programming and assessment of quality control strategies, by means of extending and upgrading the M3 Workspace platform for the quality and information data sharing management, and developing IDSA-compliant data connector as extension to Boost 4.0 data connector.

Exploitation Actions and Return expected

INNO will improve its positioning as a technological centre for manufacturing SMEs, thanks to the wider know-how and acquired knowledge in exploiting Eur3ka project results. Specifically, INNO will use the developed Plug & Respond manufacturing repurposing coordination framework, as well as the specifications of the reference architecture defined within this project, to continuously support and provide improved collaboration services to different national and international SMEs.

On the one hand, INNO, as founder member of the Digital Factory Alliance (DFA), will reinforce and expand its services and its opportunities in the market. The DFA is aimed at providing technological and business support for the implementation and integration of data-driven solutions in the digital factories of manufacturers, to foster their digital transformation thanks to the expertise and experience of all its members, some of whom are also partners of Eur3ka project. The DFA becomes a way to effectively set-up and coordinate the Manufacturing Global Response Initiative (MGRI), a key exploitable asset for INNO.

Particularly, INNO expects to exploit its services through the DFA, by giving support and favouring a Smart Rapid Response in the factories in the case of an outbreak or any kind of emergency/ crisis that may lead to the disruption of the supply chains, in order to guarantee resiliency, adapting their shopfloors or cooperating with other manufacturers to restore their production capacity.

This is how the DFA becomes both a project exploitable asset and exploitation scenario for INNO. This will be a new opportunity for INNO to gain visibility and engage and motivate more companies to be interested in increasing their readiness level to be able to act and adapt to new circumstances, contact suppliers, purchase new assets or new services, join forces with different partners, find certification services, knowledge transfer for reskilling or upskilling of the workforce, etc. All this with the aim of maintaining the

level of quality of products and services, optimizing times to market, increasing the efficiency of the processes, improving relationship with providers, etc.

On the one hand, INNO expects to continue developing and upgrading the M3 Workspace platform for quality and data analysis, thriving new versions with new functionalities, in order to manage in an efficient way, the information shared with the clients. This platform will help to improve the management and exploitation of medical assets in case of an emergency.

Potential risks identified

Problem: difficulties to develop and implement new functionalities in M3 platform.

Action: experts working hard on the development and improvement of the new functionalities, seeking to integrate the know-how of the Eur3ka project to the platform.

Problem: difficulties to integrate the IDS connector to extend the capabilities of the M3 platform.

Action: coordination and knowledge-sharing with partners looking forward to a successful integration.

Problem: lack of engagement of SMEs with the MGRI for disinterest on being prepared for future crisis.

Action: gain new members on the DFA and coordinate efforts with similar initiatives, in order to gain visibility and increase interest in the manufacturing sector. Coordinating and giving support to manufacturing DIH network to increase visibility among SMEs, enlarge the offered services, give support and knowledge transfers.

Problem: limited capacity of SMEs from the manufacturing sector in technological, economic and knowledge terms.

Action: strength and widen the network of the DFA for further support, knowledge sharing and coordination.

Problem: poor visibility of the alliance.

Action: strengthen communication, marketing, events and dissemination actions in social networks and interest groups, HUBs, initiatives at an international level.

Strategic future plans and commitment

INNO is fully compromised with the development, maintenance, and exploitation of the MGRI of the DFA, as a valuable and key result and join venture initiative, which already has prospect partnerships and internal collaborations. The future strategy goes through the evolution of the DFA.

On the other hand, INNO will continue its commercial strategies to increase its client portfolio of M3 Platform, especially focusing on the companies in the manufacturing sector that may be interested to be ready in the case of a crisis or an emergency, and expects to cooperate to offer its services and do repurposing of its products and services.

6.5.20 Associazione Fabbrica Intelligente Lombardia (AFIL)

Contribution to the project

Being involved in T5.5. and WP6, AFIL – Associazione Fabbrica Intelligente Lombardia will disseminate the activities and outcomes of Eur3ka within its stakeholders' network – including institutional stakeholders – in Lombardy region. Particular focus will be put on SMEs in order to make them aware of the use-cases developed in the framework of the Eur3ka Project. Further, thanks to its direct involvement in the "Industry of the Future" Working Group of Four Motors for Europe Initiative and the coordination of Efficient and Sustainable Pilot within Vanguard Initiative, AFIL will disseminate Eur3ka also at European level.

In comprehensive way, AFIL will contribute to spread the outcomes of the project also at international level being the coordinator of the Lombardy Advanced Manufacturing Hub an initiative promoted by the World Economic Forum in the framework of the Global Advanced Manufacturing Hub initiative. Dissemination will be also carried out at Italian level through the collaboration with National Cluster of Intelligent Factory (CFI).

Exploitation Actions and Return expected

Advanced Manufacturing is a relevant industry for the Lombardy economy being the region the first one in Italy and the second in EU for number of Employees.

In order to promote resilience among manufacturing companies, a strong dissemination of Eur3ka project outcomes will be performed linking the activities developed in the framework of the project with events, info-days, Innovation Labs and webinars, etc. in order to strength the Lombardy Manufacturing Ecosystem.

The involved stakeholders will be representative of the quadruple helix (i.e., RTOs, SMEs, policy makers and end-users) and will be directly reunited to favour the collaboration and the development of a network also to foster the setting up future of collaborative projects.

The activities carried out in the framework of the Eur3ka will be also channelled through the AFIL "Strategic Community" i.e., heterogeneous community of regional stakeholders focused on specific priority topics to foster cooperation and R&I projects such as circular economy, artificial intelligence, additive manufacturing and sustainable food manufacturing.

Being AFIL a non-profit association, whose mission is to facilitate R&I in manufacturing sector and develop Lombardy production system leadership and competitiveness, economic benefits is estimated for its associates, as well as for the overall Lombardy ecosystem. According to this, the main expected revenues are: i) the increase of AFIL associates to better represent the complexity and the variety of Lombardy ecosystem,

ensuring strong collaborations among all the significant actors (e.g., technology providers, research centres, end-users, etc.), ii) the identification of funding opportunities and the successful submission of projects (HE, Interreg) involving SMEs in order to create long-lasting collaborative relationships, iii) the strengthening of Lombardy ecosystem also at European level, promoting the innovation and maintaining its leadership position, facing future challenges and increasing resilience.

Potential risks identified

N/A

Strategic future plans and commitment

After the project, AFIL will continuously work in identifying relevant initiatives and opportunities on advanced manufacturing leveraging on its networks (e.g., Four Motors, Vanguards), then reporting these outcomes to local companies and all the interested stakeholders.

AFIL will be strongly engaged in create an ecosystem through dissemination activities and events in order to share best practices that can be use as useful methodologies and references to promote the resilience of the Lombardy manufacturing companies.

6.5.21 Consorzio Intellimech (IMECH)

Contribution to the project

Consorzio Intellimech is a consortium of 42 high-tech enterprises dedicated to interdisciplinary research in the Mechatronics field, including the application of advanced electronics, ICT systems, mechanical design, data analytics, artificial intelligence, robotics and human-robot interaction for a wide range of applications in the industrial sector. Thus, IMECH represents a valuable technological partner for industry 4.0 projects aimed at promoting the spread of digital integration and innovation as well as factory and process automation. This is of crucial importance, especially in light of the recent pandemic that has demonstrated the need to improve the responsiveness and flexibility of manufacturing enterprises acting in an ecosystem characterized by high complexity, dynamic production conditions and volatile markets. Moreover, the collaborative nature of IMECH affords excellent visibility on the current industrial needs and trends, connecting research centres, technology providers and end-users from several industrial fields. Finally, IMECH represents a virtuous example of shared innovation.

Exploitation Actions and Return expected

By the end of this project, IMECH expects to have obtained the knowledge and technical expertise needed to bring innovation into the companies it is consulting with, supporting the improvement of the technological level of the private Italian industries, with an increased consciousness in facing disruptive events ensuring business continuity and the supply of critical items. IMECH will exploit the results both at a consulting level and as a

research centre. Finally, participation in a relevant European project allows IMECH to establish a trusted network with research and industrial entities.

Indirectly, the greatest impact will be on the industrial companies that are members of the Consortium. In fact, the project will act as a multiplier as it will demonstrate the effectiveness of certain technologies. In particular, the case studies are of crucial importance in order to allow other companies to see the applications in practice and thus encourage them to invest more. Basically, the exploitation plan will be based on meeting with our members, interviews with interested companies to identify specific needs and consulting activities to support digitalization and flexibility strategies implementation.

Potential risks identified

The COVID-19 pandemic has stressed the need to speed up the industrial transformation improving the flexibility and resilience of the manufacturing system. Eur3ka project should define valuable strategies to face such disruptive events. However, the application in industrial environments of the identified approaches may be hindered by:

- Cultural barriers, especially concerning SMEs;
- Lack of internal competencies or resources (financial, physical assets, skills, workforce, etc.);
- Lack of knowledge of standards and legislation.

To overcome these risks, IMECH, on its side, will commit itself to:

- Disseminate the project outcomes and related benefits;
- Support companies providing the needed expertise to manage innovation activities, identify technology providers and funding opportunities;
- Connect enterprises with policy stakeholders and institutional entities.

In this context, it is crucial to keep in mind that the response to a disruptive event requires significant endeavour to achieve results in very tight timing. Thus, previously defined strategies may significantly support companies in facing such challenges. However, these approaches, which in the Eur3ka context will be defined starting from the COVID-19 pandemic, have to be generalized to serve the manufacturing ecosystem in the response to future unpredictable disruptive events. Moreover, to provide real advantages to companies, the strategy definition has to consider the business and market sustainability both in the short and long term.

Strategic future plans and commitment

The strategy consists of exploring the IMECH network to disseminate Eur3ka results. Indeed, IMECH has many links with research centres, technology providers and end-users from several industrial fields. Thus, it represents a strategic means to reach the key players of the manufacturing ecosystem and maximise the impact of the Eur3ka outcomes.

Moreover, IMECH will rely on local Digital Innovation Hubs (DIHs), namely Associazione Fabbrica Intelligente Lombardia (AFIL), DIH Lombardia and Cluster Tecnologico

Nazionale “Fabbrica Intelligente” (CFI), to further extend the destination entities and assists companies beyond the Intellimech members.

Finally, Intellimech aims at creating strong relationships with European partners thanks to its participation in the Eur3ka project. In this way, it will be possible to establish a trusted network with research and industrial entities to promote future partnerships and collaborations so as to foster innovation and the overall European manufacturing ecosystem integration.

6.5.22 Nederlandes Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek (TNO)

Contribution to the project

TNO is a Dutch independent not-for-profit research institute with the mission to connect people and knowledge to create innovations that boost the sustainable competitive strength of industry and the well-being of society. TNO contributes to the innovation capacity of businesses and government. The organization is involved in many international research projects.

In the Eur3ka project TNO actively collaborates with Brainport Industries on knowledge development on interoperability, scalable framework solutions and communication standards, for example vocabularies for supply chain management and logistics optimization.

Together with Brainport Industries TNO is organizing a series of workshops on the topic of resilience in manufacturing networks and supply chain organizations in order to engage the (high-tech) manufacturing industry partners.

TNO works on the specification of a service for the smart matching that can be applied in ecosystems in various industrial domains such as Industry 4.0, automotive and medical supply chains. For this, TNO aligns with the contributions in other projects such as H2020 MARKET 4.0 and DIH SCSN. TNO exploits the valuable verification of the applicability and scalability of these project while integrating the experiences it into Eur3ka .

Exploitation Actions and Return expected

TNO and Brainport Industries founded the data ecosystem for the manufacturing industry called Smart Connected Supplier Networks (SCSN). The network currently consists of ten service providers and more than 300 SMEs. By the end of the Eur3ka project, TNO expects to have obtained the knowledge and technical expertise needed to extend and further exploit their Smart Connected Supply Chain, positioning it as a Resilient Connected Smart Supply Chain, therefore using the not-for-profit Foundation SCSN as sustainable ecosystem to build upon the results of the Eur3ka project.

Together with TNO’s dataspace efforts and data sovereignty mechanisms for logistic planning, TNO expects to have extended their framework solutions with resilience, re-planning and re-schedule services. The topic of resilience is considered a major important element, following up earlier focus elements on security, interoperability and sovereignty.

The realization of framework for resilient networks, while focusing on repurposing and re-planning, enables network organizations in various domains, such as manufacturing networks, medical equipment networks and supply chains, to continue their business in turbulent situations.

Both of these types of developed knowledge will be part of the TNO Knowledge Roadmaps on Digital Innovation and Smart Industry, therefore becoming part of a larger portfolio of knowledge. Our ambition is to further develop this knowledge as part of these roadmaps.

Potential risks identified

The start of the project has been made in a time when the turbulence of the COVID-19 was strongly present. Society has now more than a year experience with the devastating effects of the crisis. It could be that the results of the project will be too narrow, i.e. addressing individual, isolated use-cases stated in the beginning of the project (when the project members were living in a situation characterized by turbulence).

This could be identified as potential risk. In order to mitigate this, it is important to verify the state of the use cases and keep a broad eye on applications in a broad area of application. We therefore ask for more in-depth partner sessions to better algin our efforts in the project.

Strategic future plans and commitment

The strategy consists of bringing the results of TNOs experiences on data sharing, standardization and resilience in Eureka and, vice versa, extending the existing SCSN network with the results of the Eur3ka project.

Moreover, as previously mentioned, the developed knowledge will be part of the TNO Knowledge Roadmaps on Digital Innovation and Smart Industry, therefore becoming part of a larger portfolio of knowledge. Our ambition is to further develop this knowledge as part of these roadmaps.

6.5.23 Fonden AM Lab Danmark (AM-HUB)

Contribution to the project

Danish AM Hub has supported the Eur3ka agenda with several activities beyond the general communication activity in press releases, social media updates (and support for project partners social media activity) and posts in newsletters and on website); in our annual AM Report 2020 distributed to our Danish AM community and at our AM Summit 2021 (Scandinavia's biggest AM conference), in a webinar with America Makes addressing how AM has the potential to lead the Rebound of American Manufacturing caused by Covid-19 and by mentions in conversations with partners and at events (AM Summit 2021, LCA injection moulding seminar).

Exploitation Actions and Return expected

The remaining activities from our side will be to focus on developing a Danish use case that can feed into the Eur3ka project. The case will be on a Danish Medical Doctor and his crisis response to COVID-19, where he developed protective equipment with mounting a 3D printed filter adapter on a snorkel mask. This shows the need for being

ready for change as a company and as individual actors in regards to crisis response. The case shows an example of a crisis response solution, where the Danish Government regulations was the main obstacle thus highlighting the need for being ready to change at a higher political level. Also the projects results will be disseminated and communicated in the end of the period.

Potential risks identified

There can be identified a risk in the exploitation getting too past-minded and narrow, and we therefore see it as extremely relevant to also address how the Eur3ka results are valid in looking at future crises response for not only pandemics such as COVID-19. We need to focus on keeping the results and exploitation as relevant and present as possible when distributed the collected and joints results.

6.5.24 Create IT Real APS (CIR)

Contribution to the project

CIR key contribution is on making sure that the theoretical concepts of the project are made available to the maker community, who is the most reactive to crisis (like 48 hours response). At the end of the project the makers should be better armed to any type of crisis with lessons learned from the partners of Eur3ka when it comes to repurposing production. Makers have “toys 3D printer” but very capable of producing real part in a decentralized way. CIR will ensure that the lessons learned in Eur3ka will benefit this community.

Exploitation Actions and Return expected

Providing useful technology and methods to the Maker community is of strategic interest to CIR as we aim to up-sale peripheral products to them. CIR will provide a certain level of free service but would invite the makers toward some premium products such as our premium online slicer with advance functionalities. We expect to sale to individuals as well as SMEs.

Potential risks identified

Biggest risk identified is the lack of ease of use around the solutions developed in Eur3ka, therefore CIR focus is on a very practical and easy to use solution that bring immediate value. As well as promoting collaboration with other relevant projects such as the AMable platform.

Strategic future plans and commitment

This project should get us closer to makers, bringing them value free of charge but with the intention to convert a smaller percentage of them towards out premium offering.

7 Conclusions and Future Outlook

The current document presents and analyses the Eur3ka Plan for the exploitation and dissemination of project results of all partners.

During this first annuity of the project, most effort has been focused on communication activities, aimed at raising awareness about the project and promoting its actions and results. Contents have been made available in the public domain, through social media, events and publications, thus demonstrating the added value and positive impact of the project on the European Union.

The context identification together with the initial SWOT analysis provided to the partnership the initial scenario for the possible exploitation of projects results. The document includes a first analysis of joint exploitation strategies and the agreement for the exploitation of jointly owned results will be included in the next version of the document.

Overall, the next steps for exploitation and dissemination activities will be focused on:

- Continuous update of the Eur3ka exploitable assets database including information on the OS license, IP route and exploitation paths
- Organization of dedicated surveys, questionnaires and workshops to define the joint exploitation strategy.
- Development of the individual exploitation plans focusing on joint exploitation opportunities between partners
- Joint exploitation of Eur3ka outcomes
- Promotion of project outcomes

The final deliverable regarding exploitation, D6.3 “Final Outreach, Communication and Exploitation Plans (M24) will report the outcomes of the activities planned within the Eur3ka exploitation and dissemination strategies and the achieved Eur3ka joint exploitation.

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Annex I: Individual Exploitation Template

Please fill in the following sections related to the **Eur3ka** Individual Exploitation.

Main goals of the template are to:

- *Demonstrate how each partner is committed to the exploitation of* **Eur3ka**
- *Have a consistent description of each partners' exploitation plan and strategy*
- *Provide a plan which is uniform and shows equal interest, commitment and engagement for all partners*
- *Focus on how each partner's strengths within the project*
- *Provide insight on the returns expected with a 'business/strategic mindset'*
- *Show how* **Eur3ka** *is relevant to each partner's strategic activities/business development*
- *Understand strategic future commitment (esp. post-project)*

Contribution to the project

Explain in ***max. 150*** *words your key contributions to the* **Eur3ka** *project.*

Please try to focus on what makes your participation to this project ***a real asset*** *and significant for the exploitation, why you 'make a difference' towards successful exploitation of* **Eur3ka** *.*

Do not copy-paste from proposal: use an exploitation point of view.

Exploitation Actions and Return expected

This is the ***core part*** *of your individual exploitation plan. It must show your* ***concrete involvement*** *in exploiting* **Eur3ka.** *When filling the section, please try to keep a '****business/strategic mindset'*** *and to highlight which* ***project outcomes/assets****, from your point of view, will help gain such results.*

Your description should provide an overview of your possible ***exploitation markets/sectors****, your exploitation* ***scenarios*** *(i.e. how you intend to reach such markets) and the* ***expected revenues****. Please consider that 'revenues' shouldn't necessarily be (only) economic. They can also be for example: revenues in terms of positioning strategy into the market, new opportunities, company growth, wider know-how and knowledge acquired through the project etc.*

Potential risks identified

Explain, if any, potential risks you see in exploiting **Eur3ka** *from your point of view.*

*For risks identified try to explain **possible solutions/corrections**, especially keeping in mind/highlighting how **your expertise** and role in the project can help **mitigate** such risks. If relevant, provide examples of actions already put forward in this direction.*

Strategic future plans and commitment

*Outline briefly your **vision** about how you would commit to a future exploitation strategy **after** the project.*

*Please specify if you would be interested to join a 'legal entity' or **Joint Venture** initiative after the project, and also mention **prospect partnerships** and **collaborations**, internal and **external**, possible value chains, strategic agreements etc. highlighting **your role** and commitment in such initiative(s).*

Annex II: Asset Database Structure

Asset title	*'Business' name for the asset*
Description	*A description of the asset: Focus on the main value proposition(s), selling points*
Lead partner (point of reference) and other partners	*Lead partner (point of reference) and other IPR sharing partners*
Eur3ka results and components involved	*Example one or more of the following results: Main Eur3ka results / components involved in this Asset*
Type(s) of asset	*Examples (multiple possible): Product, Service, Demonstrator, Methodology, Component*
Relevant stakeholders	*Stakeholders involved in the use of the asset. This should include parties already contacted / involved in Eur3ka and exploitation already put forward, for example by direct contact, presentation, take-up of the component. Example:* *- Direct customers* *- Direct suppliers* *- Suppliers of complementary products*
Exploitation channel(s)	*The main exploitation channels for the asset. E.g. Support, Training, Consulting, Extension/Customization. More than one channel is possible for an asset also depending on the partners involved*
Possible competitors	*Possible key competitors in the market offering similar / competing value propositions*
Replicability in other domains and ecosystems	*Replication capabilities in different domains. They should be as much as possible concrete and based on bottom-up capability of the partners*
Action plan / status	*Concrete action (plans) for pushing the asset to the market: i.e. so that it is concrete and not just theory*

Market Potential and Value Proposition	*Market potential relates to the demand and supply side of an innovation/asset.* *Demand side: it concerns the prospective size of the market for a product and the chances of its successful commercialisation. Its aim is to assess how the product satisfies a 12 market sector and to indicate that there is potential customer base.* *Supply side: it aims to assess whether there are potential barriers, e.g., regulatory frameworks or existing IPR issues, which could weaken the commercial exploitation of an innovation/asset.*
Maturity level of Innovation/Asset	*Four maturity levels:* *Market Ready: This category includes innovations outperforming in innovation management and innovation readiness. These innovations are technologically mature and show high commitment of the project Consortium to bring them to the market.* *Tech Ready: This category includes innovations progressing on technology development process (e.g., pilots, prototypes, demonstration). In order to capitalise on the potential of these innovations, the management team needs to focus on transforming a novel technology or research results into a marketable product or service and to prepare its commercialisation.* *Business ready: This category includes innovations for which concrete market-oriented ideas have been put together (e.g., market studies, business plans, end-user engagement). They are considered 'Advanced on market preparation'. Their commercialisation depends on progressing on technology development.* *Exploring: This category includes innovations, which actively explore value creation opportunities. They are considered 'Getting things started'. These innovations are in the early phases of technological readiness, but already show high commitment levels from the organisations developing them. Their commercialisation requires efforts in transforming technology into marketable products. Alternatively, this*

category includes concrete market-oriented ideas, which depend on further progressing on technology development process.

Annex III: Software Ownership Models

1. Lines of code produced

This method (also known as SLOC - Source lines of code) is straightforward as it defines a metric where lines of code produced are counted and ownership is assigned to the partner who produced those lines of code. This enables the use of a quantifiable measure of the effort involved in development which can easily be verified at a very detailed level. The main disadvantage of this method is that lines of code are not necessarily an accurate measurement of effort, favouring more terse developers and languages, resulting unfair to efficient coders, and possibly leading to artificial inflation.

2. Technical input provided

This approach attempts to quantify technical input, such as design ideas, requirements, testing, etc., that each party provided beyond the stark measuring of code lines, aiming at a more accurate and fair assessment of the effort and importance of the contributions. However, this approach suffers from difficulties related to the objective measurement of input. In fact, there are no established criteria to determine how certain activities contributed to the technical advancements of the project, and what their weight was. Practically, this means that each project should define its own agreed metrics and ensure accurate and fair measurement of such scores.

3. Agree on contributions

Because determining ownership based on lines of code or technical input can prove to be unfair or overly complex, the Consortium can agree on defining metrics and proxies for technical input, such as financial effort (cost, funding, own input), manpower (hours, men months), responsibility (e.g., different weights for task leaders). Such a method still poses a certain risk of unfairness and subjectivity, depending on many factors such as seniority of employers working on the project, geographical differences, etc. However, it leaves a margin for negotiation and reasoning, and is thus foreseeable in Consortiums where agreement between parties can easily be reached.

4. Musketeer model

This model, pioneered by the FP7 Aladin AAL project, envisages all partners becoming joint owners (‘one for all’) of assets regardless of individual contributions. Essentially any partner is allowed to act as a single owner. The model requires signing a further agreement which establishes under what conditions results can be used. The main advantages of this model are flexibility and potential higher revenues for the single partners exploiting results. The musketeer model presents a risk of unfairness towards ‘leading’ partners as well as certain partners who have less capacity (due to the nature of their organisation) to exploit results, and thus needs a clear understanding of the expected results for each partner.

5. Mutual granting of access rights

This model foresees that partners grant each other access rights to the assets they produced and own while weaving rights to financial compensation deriving from those assets. Essentially in this model ownership is not transferred but use of results for commercial use is permitted. The scenario is somewhat like the one created in the musketeer approach, with less bureaucratic overheads, enabling easier and possibly more profitable exploitation of the results. In this model, there is a potential risk for unclear responsibility and commitment in the maintenance and further development of the software (e.g., the owner decides to cease development); additionally, non-owner partners may sometimes become dependent on the owning partner, e.g., concerning licensing, re-selling and rights granting.

6. Joint Ownership

This model is particularly adequate when one or both of the following conditions apply:

a) One partner has the main ownership/lead and maintains the package, with other partners only providing minor testing/integration contributions
b) One or more software packages are released with Open Source licenses

It is evident that when condition (a.) is true, it is easy to agree on- and assign ownership of the package to the single partner developing and maintaining it, thus the overall ownership of the platform is joint.

The Open Source model foresees licensing of software with selected Open Source licenses, effectively allowing partners to use project results (or certain components) they do not directly own. Additionally, this potentially opens the possibility for external parties to access to the software given the rights established in the license. This model ensures easy access and use of assets to partners but also adds diffusion potential, community building and enlargement of the ecosystem. Depending on the selected licenses, ownership will carry different implications (weaker with permissive licenses, stronger with more restrictive ones), and a clear map shall have to be defined.

Annex IV: Licenses Types

Open Source

It is useful to observe that Open Source licenses often come in the form of *bare licenses* in that they do not imply a contract. Generally, a (bare) license, unlike a contract, doesn't imply two parties signing (and thus agreeing) to – and about – the terms: the licensee usually accepts and must comply with the terms of the license, or else an infringement occurs. For a license to be a contract, there must be an *offer, acceptance* and *consideration* [6]. These are legal terms with a precise meaning. An *offer* means "an expression of willingness to contract on certain terms, made with the intention that it shall become binding as soon as it is accepted by the person to whom it is addressed" [7]. In terms of Open Source software this usually means making the software source code available on a public repository with an indicated license. *Acceptance* means that the licensee accepts to create a contract, in turn accepting the license. In traditional contracts, a written agreement is usually signed. In the case of software, acceptance occurs when a user clicks on the "ACCEPT" button or simply unseals the box containing the software (so-called 'shrink-wrap'). In the case of online distribution, there should be an explicit acceptance of the license. *Consideration* is a rather complex aspect to define for Open Source software licenses, as it implies the exchange of value (usually, but not necessarily a payment) within a contract. In this view, one should argue that Open Source licenses, where software is offered for free - i.e. *gratis* – offer no *consideration*. Actually, some interpretations consider mere use of the software and acceptance of the license as substitutes for *consideration.* [6] Nevertheless where a licensor wants the license to also be a contract all three qualities (*promise, acceptance* and consideration) should be covered as best as possible.

While there are dozens of approved Open Source licenses, for the scope of this document we shall group them into three main categories: Academic, Reciprocal and Context licenses.

- **Academic licenses** (so called because historically originated from Academic bodies, such as universities) are the most liberal type of license, essentially allowing licensees to use the code without any restriction whatsoever, apart from authorship recognition. Among these licenses, the Apache license (in particular the 2.0 version) is one of the most popular 'business-friendly' ones and will be considered for the Assets where possible. Other popular licenses with the same characteristics are the MIT, Eclipse and BSD licenses. The obvious advantage of using Academic style licenses in complex research projects such as Eur3ka is their openness, which enables wide dissemination of results without imposing restrictions or obligations on the licensee.
- **Reciprocal licenses**, as the name suggests, include licenses which allow free use, modification and distribution of derivate works as long as such works are themselves released with the same license. These licenses are also defined as copyleft in that they intentionally hinder exclusive rights restrictions based on copyright. This mechanism ensures that the initial developer of the code is guaranteed use of the same license in derivate works thus avoiding 'cannibalisation' of code. It is evident that reciprocal licenses impose very strong obligations on the licensee, and should be carefully pondered in multi-partner

projects, especially where commercial entities are involved. Prominent examples of reciprocal licenses are the GPL v3 and the EUPL v1.1, a license created and recognized by the European Commission. [8]

- **Context licenses**, stand in the middle of the former two. They are basically reciprocal licenses, but reciprocity can be waived under certain technical conditions. For example, if the code is used “as is” and not modified, context licenses allow for distribution in binary packages like in Academic licenses. However, if the code was actually modified, reciprocity rules apply, and the code must be distributed. The L-GPL is the most prominent example of a context license: it is a modified version of the GPL. While context licenses are often compatible with other licenses, they can create a very high risk of generating uncertainty and a ‘grey area’ for acceptable use: in fact it is not always easy to technically determine if and how a work is allowed to include binaries or if it is required to comply with reciprocity obligations.

Proprietary

As for other licenses, it is not easy to compile a taxonomy of licenses which are often included in commercial offerings and are hard to find in the public domain. Here, we shall provide an overview of certain widespread features of- and market practices related to proprietary licenses as well as indications relevant to Eur3ka in the possible application and use of these licenses for Eur3ka components and solutions, should there be a need. As already explained, with proprietary licenses the licensor maintains certain exclusive rights and exercises those rights in the license with a series of provisions and limitations. Most widespread limitations used in proprietary licenses are:

- **Number of machines** a software can be installed on. Depending on the commercial agreements these can be fixed numbers or thresholds (e.g., up to 50 seats).
- **Technical restrictions on software capabilities**: this means the licensee implements a series of technical devices (e.g., license key, hardware lock, limited functionality) which regulate the functionalities of the software and may be subject to commercial agreements, pricing schemes etc., for example a ‘personal’ version of the software distributed for free with limitations on functionality, or a software which only works if a hardware key is attached to the machine.
- **Context of use**. This usually differentiates three main categories: personal/non-commercial, educational/academic, commercial. The former two categories are often offered more convenient economic conditions paired with specific versions of the software.
- **Availability of source code**. Proprietary licenses usually do not foresee distribution of the source code but may allow source code delivery when it is required to run the software (namely web applications) or for inspection by government agencies. Access by licensees to the source code is usually regulated by additional non-disclosure agreements.

In **as a Service (aaS) cloud** business and operational contexts, the above limitations are still relevant but have been transposed to 'virtual' and online domains rather than physical. The **number of machines** becomes the number of instances and the 'seats' become the **number of users**. **Technical restrictions** (e.g., personal vs enterprise version), are embedded within the functionality of the provided aaS software (e.g., limited storage space, memory, compute time, data volumes for a personal accounts) and, similarly, **context of use** can determine the provided level of service and pricing strategy. In terms of **availability of the source code**, in the case of proprietary licenses in an aaS context, the situation is similar, with the only difference that for certain technologies (e.g., JavaScript which is run on users' clients), the exposure of part of the source code is unavoidable. However, the client code exposed is usually not the key technology/code for the software and therefore exposing it does not pose a threat to the core IP involved.

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