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# Flexible Assembly Manufacturing with Human-Robot Collaboration and Digital Twin Models

FELICE

## Dissemination, Exploitation, and Communication Plan

**Abstract**: This deliverable presents the Dissemination, Communication, and Exploitation plan (DECP) and describes the main activities performed in the period after deliverable 9.1 up to month six. The outlined activities will ensure that the FELICE project receives a high level of visibility, accessibility, and promotion to ensure the highest possible impact of FELICE on the targeted shareholders. Furthermore, this document will give an overview about the exploitable assets that have been defined so far. The DECP will be a reference framework for evaluation of the impact of communication, exploitation, and dissemination activities.

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## The *FELICE* Consortium

| Participant No. | Participant Organisation Name | Part. Short Name | Country |
|---|---|---|---|
| 1 (Coordinator) | Institute of Communication & Computer Systems | *ICCS* | Greece |
| 2 | Centro Ricerche FIAT S.C.p.a. | *CRF* | Italy |
| 3 | FH OÖ Forschungs & Entwicklungs GmbH | *FHOOE* | Austria |
| 4 | AEGIS IT RESEARCH GmbH | *AEGIS* | Germany |
| 5 | Leibnitz Research Centre for Working Environment and Human Factors | *IFADO* | Germany |
| 6 | Foundation for Research and Technology – Hellas | *FORTH* | Greece |
| 7 | CAL-TEK S.r.l. | *CALTEK* | Italy |
| 8 | Technical University Darmstadt | *TUD* | Germany |
| 9 | University of Salerno | *UNISA* | Italy |
| 10 | Fraunhofer-Gesellschaft zur Foerderung der Angewandten Forschung e.v. | *Fraunhofer* | Germany |
| 11 | ACCREA Engineering | *ACC* | Poland |
| 12 | PROFACTOR GmbH | *PRO* | Austria |
| 13 | Eunomia Ltd | *EUN* | Ireland |

## Document Revisions

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## List of Abbreviations

| | |
|---|---|
| AR | Augmented Reality |
| BMC | Business Model Canvas |
| DIH | Digital Innovation Hubs |
| DECP | Dissemination, Communication, and Exploitation plan |
| HR | Human Resources |
| HMI | Human-Machine Interface |
| HRI | Human-Robot Interaction |
| ICT | Information and Communications Technology |
| IoT | Internet of Things |
| KPI | Key Performance Indicator |
| MES | Manufacturing Execution System |
| PPP | Public Private Partnerships |
| R&D | Research and Development |
| TRL | Technology Readiness Level |
| WP | Work Package |
| WORM | Workflow Modeler |
| WCM | World Class Manufacturing |

## Executive Summary

This document outlines the Dissemination, Communication, and Exploitation plan (DECP) and related strategies of the FELICE project. It lists the planned types of activities related to Dissemination, Exploitation, and Communication as planned by month six of the project and provides an overview of channels and tools available to FELICE consortium members and exploitable assets (hard- and software) to achieve the goals of the DECP.

The plan will provide the framework to evaluate FELICE communication, dissemination & exploitation efforts according to stakeholder requirements and key performance indicators (KPIs) to ensure that information about the project is made accessible to all stakeholders through appropriate methods at all phases of the project.

The deliverable includes the following sections:

- Section 1 presents an introduction to this deliverable and the phases of the communication, dissemination and exploitation activities
- Section 2 presents the planned dissemination activities of the project and information collected from all consortium members to give an overview of each partner's dissemination capabilities. Dissemination activities will ensure that the FELICE results are made publicly available, stakeholders are engaged properly, and results are exploited.
- Section 3 presents the planned communication activities and technical tools at disposal with emphasis on the FELICE Website and social media channels. Communication activities will ensure that the FELICE actions, events, and results are promoted.
- Section 4 presents the exploitation strategy, FELICE assets, and planned activities. Exploitation activities will ensure that the FELICE results are being used for innovation, economy, and society.

# 1 Introduction

## 1.1 Purpose of the document

The purpose of this document is to give an overview of the *FELICE* Dissemination, Communication, and Exploitation strategies and to work out the Dissemination, Communication, and Exploitation plan (DECP).

The goal of the strategies is to set up and maintain an active community from the targeted stakeholder groups defined in chapter 2.3 and 3.3, that will support the validation of the project outcomes and their innovation and business potential.

*FELICE* considers dissemination, communication, and exploitation activities as a tightly bound grid, which carries the potentially exploitable project results to the stakeholders in the industry, the society, and the market. As shown in Figure 1 dissemination and communication activities are used to engage various stakeholders. The stakeholders are an important asset to evaluate and discuss the project results and assets after the project and while the project matures. Technology Readiness Level four (TRL 4) is expected after two and a half years through the development of the FELICE technologies. Validation and consolidation (TLR 5) is expected after three and a half years. The exploitation of assets (TLR 7) is continued after the project.

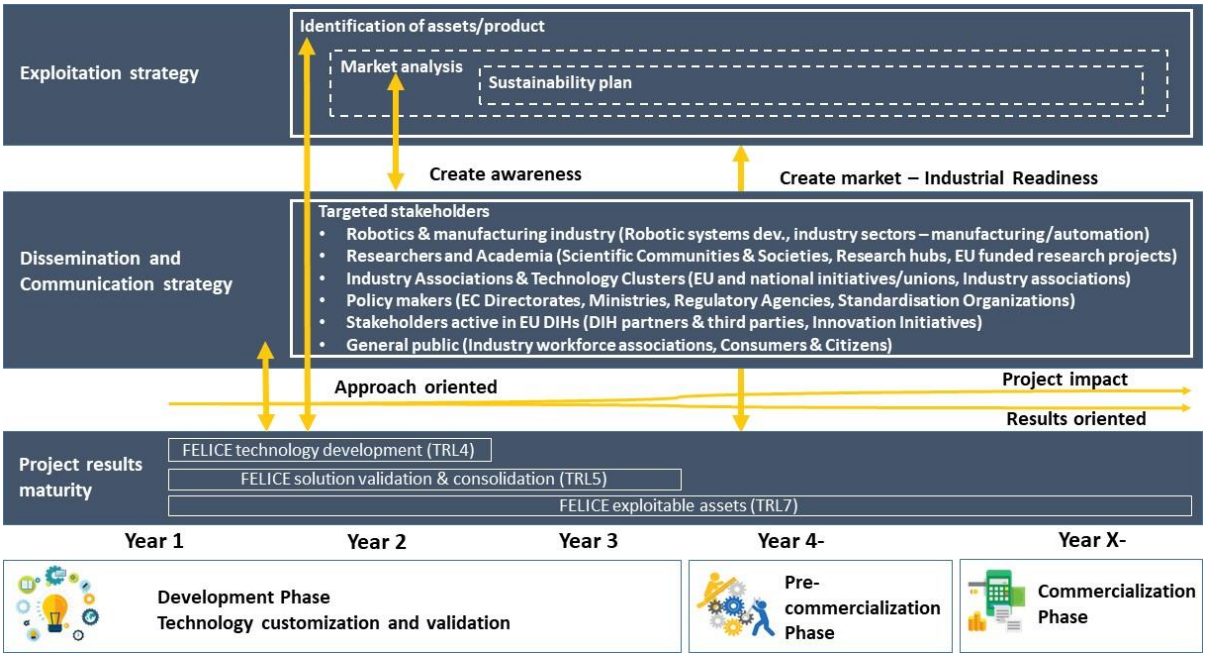


*Figure 1: Dissemination, Communication and Exploitation strategies of FELICE*

The DECP builds upon a wide set of communication and dissemination tools available to *FELICE* consortium members. The roadmap of *FELICE* Dissemination and Communication activities features three phases throughout the project as depicted in Table 1. Each phase emphasizes different target groups from the stakeholders, as well as different types of

information, and output channels. As the project evolves, the outreach activities will become more intensive and their orientation will shift from awareness creation to market creation and lastly creation of industrial readiness.

*Table 1: Phases of communication and dissemination activities*

| Phase | Project Month | Goals / Types of Information | Main target audiences | Key dissemination & communication Channels |
|---|---|---|---|---|
| **I** | **M1-22** | ❖ Create awareness and greater visibility<br>❖ Approach-oriented content<br>❖ Project presentation<br>❖ Objectives and expected results | ❖ Robotics and manufacturing industry<br>❖ Scientific community<br>❖ DIHs | ❖ Project Website<br>❖ Social media<br>❖ e-newsletters<br>❖ scientific publications |
| **II** | **M22-36** | ❖ Result-oriented content; Project intermediate and final results<br>❖ Inform targeted industry stakeholders and early adopters in the project activities | ❖ Robotics and manufacturing industry<br>❖ scientific community<br>❖ DIHs and PPPs<br>❖ standardization bodies<br>❖ open source communities | ❖ Exhibitions<br>❖ Info days<br>❖ Focused publications<br>❖ Conferences |
| **III** | **M36-42** | ❖ Result-oriented content; Project final results<br>❖ Integrated platform, all pilot showcases, and lessons learned<br>❖ Long-term sustainability and potential commercialization | ❖ Robotics and manufacturing industry<br>❖ scientific community<br>❖ industry associations<br>❖ DIH<br>❖ policymakers<br>❖ open source communities<br>❖ general public | ❖ Exhibitions<br>❖ Info days,<br>❖ Partner announcements<br>❖ press releases<br>❖ publications |

## 1.2 Intended readership

D9.2 is a public document (PU) and is therefore intended for the European Commission, the FELICE Project Officer, members of other H2020- funded projects, and a broad range of other target audiences including workers, employers, industrial networks and associations, other related national and EU-funded projects, Commission staff, media, and the wider public.

## 1.3 Relationship with other FELICE deliverables

The DECP is a key document presented as part of work package 9 (WP9). Created for deliverable 9.2 “dissemination and exploitation plan” due in Month 6 (M6). This document will provide a complete picture of the responsibilities and activities outlined in D1.1 “quality assurance plan”. The exploitation activities and assets described in this deliverable will be key for the upcoming deliverables 9.3 and 9.4, in which the business model is developed. The collected information from all technical work packages will play an important role in the development of the business model as well.

# 2 Dissemination strategy and plan

## 2.1 Objectives of the dissemination activities

Dissemination activities will support all Work Packages (WPs) ensuring maximum visibility, accessibility, and impact of the project activities and project results to different target stakeholders.

**The objectives of dissemination activities are:**

- Promoting the project, its results, and assessments
- Informing, inspiring & educating all stakeholders by making the project results available to all
- Engaging with stakeholders to discuss the results, to receive input/feedback, and to form collaborations
- Exploiting the results and maximizing its impact
- Sustaining the results after the end of the project & contributing to science

## 2.2 Dissemination players

TUD/IAD will oversee the dissemination efforts as part of Task 9.1 "Dissemination & Communication activities" in WP9 until the end of the project by:

- Reviewing the consortium members dissemination capabilities
- Ensuring that all consortium members contribute to dissemination activities
- Assessing the results

Consortium members may lead (organize and plan) or contribute to dissemination activities as seen in table 2:

*Table 2: Dissemination actions and players*

| **Dissemination activities<br>L = Leaders<br>C = Contributors** | **ICCS** | **CRF** | **FHOOE** | **AEGIS** | **IFADO** | **FORTH** | **CALTEK** | **TUD** | **UNISA** | **Fraunhofer** | **ACC** | **PRO** | **EUN** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PUBLICATIONS** | | | | | | | | | | | | | |
| Journal publications | L/C | | L/C | | L/C | L | C | L/C | L/C | C | C | L | |
| Conference publications | L/C | | L/C | C | L/C | C | C | L/C | L/C | C | C | L | |
| Magazine articles | L/C | | L/C | | | | | L/C | | C | | C | |
| **COLLABORATIONS** | | | | | | | | | | | | | |
| Standardization groups | | | | | | | C | L | | | | | |
| Initiatives and communities e.g. EC-ICT community / DIHs / PPPs… | C | | | | | | C | C | | L | L/C | | |
| **EVENTS** | | | | | | | | | | | | | |
| Workshops and Presentations | L/C | | C | | C | C | C | C | C | C | L/C | C | |
| Organization of 3 “Info Days” (~M22/M36/M42) | | L | L | | | | L | | | | L/C | | |
| Tech event / FELICE demonstration (M36-M42) | C | | C | C | | C | C | C | C | C | C | C | |
| **GOVERNMENT/POLICYMAKER INTERACTIONS** | | | | | | | | | | | | | |
| EU commission & Regulatory sessions | L | | | | | | | C | | | | | |
| Standardization sessions* | | | C | | C | | | L | | | | C | |
| **L = Leaders<br>C = Contributors<br>*(ISO/TC 299, CEN 1005, ISO/TC 159)** | **ICCS** | **CRF** | **FHOOE** | **AEGIS** | **IFADO** | **FORTH** | **CALTEK** | **TUD** | **UNISA** | **Fraunhofer** | **ACC** | **PRO** | **EUN** |

## 2.3 Dissemination target audiences

Target stakeholders were identified in the project's proposal based on the experience from previous projects. Targeted stakeholders of the dissemination activities include:

- Robotics & manufacturing industry (Robotic system dev., industry sectors – manufacturing/automation)
- Researchers and academia (Scientific Communities & Societies, Research hubs, EU funded research projects)
- Industry Associations & Technology Clusters (EU and national initiatives/unions, industry associations)
- Policymakers (EU Directorates, Ministries, Regulatory Agencies, Standardisation Organisations)
- Stakeholders active in EU DIHs (DIH partners & third parties, Innovation Initiatives)
- General public & society (consumers, citizens, employers, industry workforce associations)

FELICE stakeholders serve different roles in the FELICE dissemination strategy. They will improve visibility, create awareness or provide feedback and inputs. Furthermore, they support exploitation of the projects assets, standardization efforts or improve the industrial readiness as depicted in Table 3:

*Table 3: Roles of stakeholders*

| | Industry | Researchers & academia | Ind. Associations/ Techn. Clusters | Policymakers | EU DIHs | Public |
|---|---|---|---|---|---|---|
| Enhance project visibility & promote FELICE | | X | X | | X | X |
| Create awareness about the benefits of HRC & FELICE technologies | | X | X | | X | X |
| Give feedback on results/activities | X | X | X | | | |
| Provide inputs for tools/technologies/methods | X | X | | | | |
| Strengthen Innovation/ Exploit results | X | X | X | X | X | |
| Improve market readiness & identify business opportunities | X | | | X | X | |
| Support standardization and translate results into policy | | | X | X | | |
| Open future research opportunities | X | X | | | X | |

## 2.4 Dissemination tools and channels

FELICE consortium members have an array of tools and channels at their disposal to disseminate information about the project. Channels include a series of national and international conferences where consortium members hold workshops and presentations as presented in Table 4. A ranking[1] is provided for conferences when applicable. However, rankings are not common in all disciplines covered by *FELICE* partners:

*Table 4: List of conferences including their abbreviations and rankings attended by FELICE partners*

| Abbrev. | Score | Conference name |
|---|---|---|
| **ACIRS** | - | Asia-Pacific Conference on Intelligent Robot Systems |
| **AHFE** | - | Applied Human Factors and Ergonomics |
| **BMVC** | A2, B | British Machine Vision Conference |
| **CVPR** | A1, A | Conference on Computer Vision and Pattern Recognition |
| **DGAUM** | - | German Society for Occupational Medicine and Environmental Medicine |
| **ECCV** | A1, A | European Conference on Computer Vision |
| **ERF** | - | European Robotics Forum |
| **ESREL** | - | European Safety and Reliability Conference |
| **ETFA** | B1 | International Conference on Emerging Technologies and Factory Automation |
| **EuroCast** | B3 | International Conference Computer Aided Systems Theory |
| **GECCO** | A1, A | Genetic and Evolutionary Computation Conference |
| **GfA** | - | Gesellschaft für Arbeitswissenschaft e.V. (Society for Work Science) |
| **HFES** | - | Human Factors and Ergonomics Society |
| **HRI** | A2 | International Conference on Human-Robot Interaction |
| **I3M** | - | International Multidisciplinary Modelling & Simulation Multiconference |
| **ICAILEP** | - | International Conference on Artificial Intelligence: Law, Ethics, and Policy |
| **ICCV** | A1, A | International Conference on Computer Vision |
| **ICPR** | A1, B | International Conference on Pattern Recognition |
| **ICRA** | A1 | International Conference on Robotics and Automation |
| **IEA** | B | International Ergonomics Association |
| **INTERACT** | B1, A | International Conference on Human-Computer Interaction |
| **IROS** | A1, A | International Conference on Intelligent Robots and Systems |
| **ISM** | - | International conference on Industry 4.0 and Smart Manufacturing |
| **ISOES** | | Annual International Occupational Ergonomics and Safety Conference |
| **ISPRS** | | International Society for Photogrammetry and Remote Sensing |
| **ITSC** | B1 | International Conference on Intelligent Transportation |
| **MMAR** | B4 | International Conference on Methods and Models in Automation and Robotics |
| **RO-MAN** | B1 | International Conference on Robot and Human Interactive Communication |

Other channels include non-scientific events (e.g. trade fairs), conference proceedings, as well as journal and magazine publications. Examples for each partner's dissemination capabilities are presented in Table 5:

[1] ERA and Qualis rankings provided by http://www.conferenceranks.com/

*Table 5: Examples for dissemination tools and channels available to consortium members*

| Partner | Scientific events/conferences | | Other events* | | Journal/magazine entries & conference proceedings** | |
|---|---|---|---|---|---|---|
| | Y/N | Examples | Y/N | Examples | Y/N | Examples |
| **AEGIS** | N | | N | | N | |
| **CAL-TEK** | Y | ISM; I3M | | | Y | Conference proceedings |
| **CRF** | Y | ERF | | | Y | CRF Newsletter |
| **FHOOE** | Y | EuroCAST; GECCO; ISM; I3M | Y | FHOÖ Zukunftsforum; FH Open Door Day | Y | FHOÖ SHORTCUTS (magazine) and Newsletter; Springer LNCS; conference proceedings |
| **FORTH** | Y | CVPR; ICCV; ECCV; IROS; ICRA; BMVC; ICPR | Y | European researchers night | Y | T-RA[4]; IJRR[5]; IVC[6]; CVIU[7]; Frontiers in Robotics & AI; THRI[8] |
| **ICCS** | Y | CVPR; ICCV; ECCV; ISPRS | | | Y | Conference proceedings |
| **IfADo** | Y | GfA; DGAUM; AHFE; INTERACT; HFES Europe; ESREL | | | Y | IfADo ErgoBlog; Conference proceedings; Human Factors Journals |
| **Fraunhofer** | Y | ERF; ICRA; ITSC; IROS; ACIRS; ETFA | Y | LogiMAT[1]; Hannover Messe; transport logistik; Digital Hub Logistics Hamburg | Y | Conference proceedings |
| **PRO** | Y | ERF; ICRA, IROS, RO-MAN, ETFA, | Y | Lange Nacht der Forschung | Y | Conference Proceedings; Frontiers in Robotics and AI; Taylor & Francis |
| **TUD/IAD** | Y | GfA; DGAUM; IEA; ISOES; AHFE; HFES Europe | | | Y | Applied Ergonomics; ZfA[3] |
| **EUN** | Y | ICAILEP | | | Y | EDPL[2]; Bioethica |
| **ACC** | Y | ICRA; IROS; MMAR; ERF | Y | Lublin Innovation Days; LogiMat; Automatica; Medica | Y | Conference proceedings |
| **UNISA** | Y | CVPR; ICPR; ICRA; IROS; HRI | | | Y | Autonomous Robots; Transactions on Robotics and Automation; IJRR; International Journal of Social Robotics |

**[1]LogiMAT: International Trade Show for Intralogistics Solutions and Process Management**
**[2]EDPL: European Data Protection Law Review**
**[3]ZfA: Zeitschrift für Arbeitswissenschaft**
**[4]T-RA: Transportation Research Part A**
**[5]IJRR: International Journal of Robotics Research**
**[6]IVC: Image and Vision Computing**
**[7]CVIU: Computer Vision and Image Understanding**
**[8]THRI: ACM Transactions on Human-Robot Interaction**

## 2.5 Expected impact of dissemination activities

The impact of the dissemination activities is measured by the KPIs defined in the project proposal. A list of KPIs that can be attributed to dissemination activities can be seen in Table 6:

*Table 6: Dissemination activity KPIs*

| Dissemination activity | KPI | Target audiences | Frequency | Threshold |
|---|---|---|---|---|
| Journal publications | Num. of international referred journal publications | Scientific community | Project End | >8 |
| | Num. of special issues in international referred journals | Scientific community | Project End | >2 |
| Articles in magazines | Num. of articles in printed and online magazines, newspapers | All | Project End | >25 |
| Info days | Num. of info days | All | Project End | >2 |
| PPPs, initiatives, clusters | Num. of initiatives to collaborate | Industries, policy makers | Project End | >7 |
| Standardization groups | Num. of standardization groups to interact | Scientific community, policy makers | Project End | >4 |
| European Digital Innovation Hubs | Num. of toolkits to link with FELICE modules | Scientific community, Industry | Project End | >3 |
| EU commission & Regulatory sessions | Num. of events in the field of interest to participate | Scientific community, policy makers | Project End | >4 |

So far the FELICE project has been represented in multiple presentations at the 2021 European Robotics Forum from 13-15th of April.

A book chapter publication from consortium member PROFACTOR on "Programming-Free Approaches for Human–Robot Collaboration in Assembly Tasks" has been made possible in part by the FELICE project as well[2].

FELICE is also planned to be featured in an upcoming R&D column in an insert of the Austrian newspaper "Der Standard" with a reach of about 500.000 people.

[2] Akkaladevi S.C. et al. (2021) Programming-Free Approaches for Human–Robot Collaboration in Assembly Tasks. In: Wang L., Wang X.V., Váncza J., Kemény Z. (eds) Advanced Human-Robot Collaboration in Manufacturing. Springer, Cham. https://doi.org/10.1007/978-3-030-69178-3_12

# 3 Communication plan

## 3.1 Objectives of the communication activities

FELICE partners will take action to convey the objectives and progress of the project as well as events and activities to the target audiences in a clear and easy-to-understand way. FELICE communication activities will generally raise awareness about how public money is spent and show the success of European collaboration. Specific objectives of the FELICE communication plan are:

- Ensure best possible visibility and awareness of the project
- Promote FELICE events and activities, improving attendance and engagement rate
- Support the dissemination goals to reach and surpass dissemination key performance indicators (KPIs)
- Support market/industrial readiness

TUD will lead Task 9.1: "dissemination and communication activities". All partners contribute to ongoing communication activities e.g. by providing content for the designated communication channels and using the tools and channels at their disposal. Table 7 outlines each partner's tasks and responsibilities regarding FELICE communication activities:

*Table 7 –Tasks and responsibilities concerning communication actions*

| **Communication activities<br>L = Leaders<br>C = Contributors** | **ICCS** | **CRF** | **FHOOE** | **AEGIS** | **IFADO** | **FORTH** | **CALTEK** | **TUD** | **UNISA** | **Fraunhofer** | **ACC** | **PRO** | **EUN** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **LOGO AND GRAPHIC IDENTITY** | | | | | | | | | | | | | |
| Project logo and visual identity (M1-M2) | L | C | | | | C | | C | C | | | | |
| Templates for deliverables, presentations, … (M1-M2) | C | | L | | | | | | | | | | |
| **WEBSITE** | | | | | | | | | | | | | |
| Website creation and management - including news (M2 – M42) | C | | | | | | | C | L | | | | |
| **SOCIAL MEDIA** | | | | | | | | | | | | | |
| Outlining the social media strategy to partners (M2) | C | | | | | | | L | | | | | |
| Update and management of the social media channels (LinkedIn, Twitter) (M2 – M42) | | | | | | | | L | | | | | |
| Providing social media content (M2 – M42) | C | C | C | C | C | C | C | L | C | C | C | C | C |
| **VIDEOS** | | | | | | | | | | | | | |
| Creation of Youtube-videos (M2-M42) | C | C | | C | C | C | C | C | C | C | C | L | C |
| **PRESS RELEASES** | | | | | | | | | | | | | |
| Creation of press releases (M2-M42) | C | C | C | C | C | C | C | C | C | C | C | | C |
| **NEWSLETTERS** | | | | | | | | | | | | | |
| Creation of newsletters (M2-M42) | C | C | C | | C | | | L | | | | | |
| **L = Leaders<br>C = Contributors** | **ICCS** | **CRF** | **FHOOE** | **AEGIS** | **IFADO** | **FORTH** | **CALTEK** | **TUD** | **UNISA** | **Fraunhofer** | **ACC** | **PRO** | **EUN** |

## 3.2 Communication target audiences

Communication activities differentiate mainly from Dissemination activities in their focus on the target audiences described in chapter 2.3, having a greater emphasis on creating awareness of the project overall. Communication activities apply to and are engaged by a wider audience, focusing on the wider public, other h2020 project members, and researchers.

## 3.3 Messages to be distributed

Messages that are conveyed in an easy-to-understand way include:

- FELICE facts, objectives, and expected results
- FELICE events, congress participation, workshops, and publications
- FELICE project progress, outputs, and outcomes

Messages will be distributed using tools and communication channels available to consortium members as described in section 3.4.

## 3.4 Communication tools and channels

To reach the aforementioned objectives *FELICE* will use the tools and distribution channels of the consortium members specified in Table 8. Partners will use their websites to outline their role in the *FELICE* project and post updates. Furthermore, the social media channels of each partner should be used to post messages containing the information described in the previous chapter.

In addition to the communication capabilities of each consortium member, the FELICE project will communicate with the stakeholders using a variety of channels and tools described in the following chapters. The creation of these channels and the project's visual identity were described in deliverable 9.1 in Month 3 (M3). Measures include the FELICE logo and graphic identity, the FELICE website, Social Media channels, and Videos on a FELICE YouTube channel. The social media channels will post messages frequently and will also be used to share the messages posted by partners. Partners on the other hand will share messages distributed via the FELICE channels, so their existing communication networks can be exploited.

*Table 8: Communication tools and channels available to consortium members*

| Partner | Website | Facebook | Twitter | LinkedIn | YouTube | Instagram |
|---|---|---|---|---|---|---|
| **AEGIS** | https://aegisresearch.eu/ | x | x | x | x | |
| **CAL-TEK** | www.cal-tek.eu | x | | x | x | |
| **CRF** | www.crf.it | | x | x | | |
| **FHOOE** | https://forschung.fh-ooe.at/<br>https://www.fh-ooe.at/<br>https://heal.heuristiclab.com/<br>https://sar.fh-ooe.at/ | x | x | x | x | x |
| **FORTH** | https://www.ics.forth.gr | x | x | | x | |
| **ICCS** | https://www.iccs.gr/ | | x | x | | |
| **IfADo** | https://www.ifado.de/ | x | x | | | |
| **Fraunhofer** | https://www.iml.fraunhofer.de | x | x | x | | x |
| **PRO** | https://www.profactor.at/en/ | | | x | x | |
| **TUD** | https://www.arbeitswissenschaft.de | | x | | | |
| **EUN** | https://www.eunomia.ltd/ | | x | | | |
| **ACC** | http://engineering.accrea.com/ | x | | x | x | |
| **UNISA** | https://mivia.unisa.it/<br>https://www.unisa.it/<br>https://diem.unisa.it/ | x | | x | | |

### 3.4.1 Logo and graphic identity

Fonts, color palette were agreed upon and templates were created, including:

- A template for project deliverables
- Templates for other documents
- A template for FELICE presentations (PowerPoint)

The uniform design gives FELICE outputs a high recognition value.

### 3.4.2 Website

The FELICE website (https://www.felice-project.eu/) was created as part of deliverable 9.1 and features a description of the project and the work packages. Furthermore, news of the project can be shared on the website to support FELICE communication efforts.

Social media channels are linked on the website and Twitter posts are embedded on the page, as seen in Figure 2:

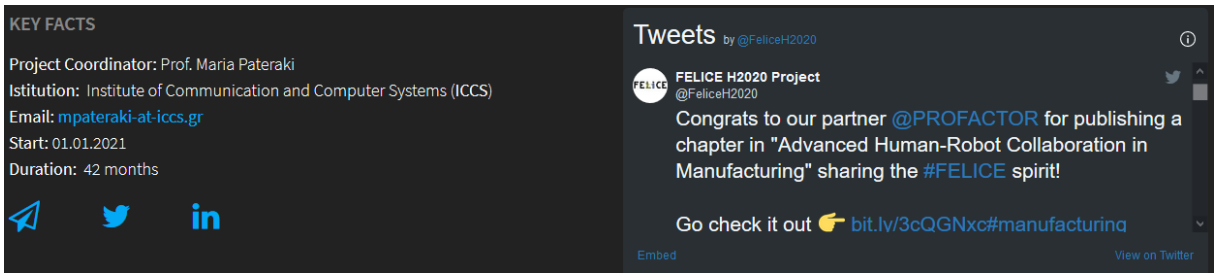


*Figure 2:Links to FELICE social media channels and an embedded tweet on the website*

### 3.4.3 Social media and video sharing

Information about FELICE e.g. news, publications, and milestones are shared on social media. LinkedIn and Twitter accounts have been created for deliverable 9.1:

*Table 9: FELICE social media channels*

| Site | URL |
|---|---|
| **Twitter** | https://twitter.com/FeliceH2020 |
| **LinkedIn** | https://www.linkedin.com/company/h2020feliceproject |

At least five videos about the FELICE project are planned for the duration of the project. FELICE consortium members will upload Videos to a FELICE YouTube channel. The production of videos will occur mostly during the later stages of the project when work on physical demonstrators and prototypes begins.

### 3.4.4 Newsletter

Electronic newsletters will be created by the coordinator and TUD up to three times a year using partner contributions and are shared using the communication channels of FELICE and consortium members throughout the project community.

### 3.4.5 Press releases

Press releases are planned in Phase III of the project's dissemination and communication strategy to disseminate news and results of the project to media outlets.

## 3.5 EC Communication Guidelines

The consortium partners commit to following the EC guidelines on communication[3] and will therefore include in all dissemination of results:

(i) The sentence: 'This project has received funding from the European Union's Horizon 2020 research and innovation program under grant agreement No 101017151.' on any of the publications that will be elaborated under the scope of the project.

(ii) A disclaimer stating that any communication or publication related to the action, made by the beneficiaries jointly or individually in any form and using any means reflects only the author's view and that the Commission is not responsible for any use that may be made of the information it contains.

(iii) The EU emblem

## 3.6 Expected impact of the communication activities

The impact of the communication activities will be measured according to Key Performance Indicators (KPIs). Tools like Google Analytics (Website) and built-in social media analytics features will be used with the KPIs to evaluate the project communication activities. A list of KPIs related to communication activities is presented in Table 10:

*Table 10: KPIs of communication activities*

| Communication channel | KPI | Target audience | Frequency | Threshhold |
|---|---|---|---|---|
| **FELICE Website** | Num. of visitors/country | All | Monthly | >100 visitors |
| | Num. of site access annually | All | Annually | >5000 |
| | Num. of downloads per month | All | Monthly | >100 |
| **Social media (Twitter/ LinkedIn)** | Num. of push announcements | All | Monthly | >20 |
| | New followers worldwide/month | All | Monthly | >20 |
| | Num. of re-tweets per month | All | Monthly | >20 |
| **Videos** | Num. of views to FELICE YouTube videos | All | Project End | >500 |
| | Num. of FELICE YouTube videos | All | Project End | >5 |
| **Newsletters** | Num. of downloads of FELICE newsletters | All | Project End | >1000 |
| **Press echoes** | Num. of press echoes (from all over Europe) | All | Project End | >10 |

[3] https://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/amga/h2020-amga_en.pdf

So far (Month 6), according to the Google Analytics tool, the FELICE website has received visitors from 99 different countries with a total of 723 unique users. Recording over 900 visits in the first three and a half months it has been active. LinkedIn and Twitter social media channels have a combined following of 254 users. User counts are expected to rise when new announcements are made after the M6 milestone, with many deliverables completed in various work packages of the project.

# 4 Exploitation Plan

## 4.1 Objectives of the exploitation activities

The objective of this deliverable is to define a strategy for the exploitation of the results of the project activities. In this document, results are understood to be both intellectual results such as methodologies, working methods and analyses as well as products and technologies that can be sold or used standalone.

In both cases, it is possible to foresee an adequate path of exploitation of the results within the partnership and outside the project (after the end of the project) in the form of a commercial product. Therefore, in the next few months, potential commercial partnerships will be taken into consideration in order to evaluate the commercialization of the system or any sub-systems derived from it.

In regards to the exploitation of intellectual results, including the development of new knowledge, the focus will be on dissemination and communication to raise awareness of the potential of the system under development.

Finally, the objective of the deliverable also includes a definition of the most suitable markets to enable the exploitation of the FELICE system. This type of definition makes it possible to identify the main market needs, which in turn stimulates the development of a system with innovations that can meet the needs of the market identified. For this last evaluation, please refer to what has already been set out in deliverable D1.4.

Exploitation activities aim to implement the project's outcomes and to achieve long-term sustainability of its results and assets. The project will develop a plan and a formal procedure on how to better promote and exploit the developed assets through the established DIH functions, which includes:

- user customization
- user communication
- brokerage i.e. robotics repository, rating and feedback, service exchanges' tracking
- tools such as investment calculator, file repository, active matchmaking
- training platform

The plan and the liaison with DIHs will be constantly updated and monitored in Task 9.4 lead by IML (partner in DIH2).

## 4.2 Exploitation Strategy

The exploitation strategy includes eight different phases that aim to lead to a concrete business model and a go-to-market plan, and support industrial readiness, as depicted in the list below and in Figure 3:

i) analysis of market insights

ii) business requirements

iii) definition of project's assets and value proposition
iv) requirements validation;
v) elucidation of business model;
vi) viability of scenarios and post-project partnership planning
vii) identification of open issues and consolidation
viii) business plan to go-to-market and for industrial readiness

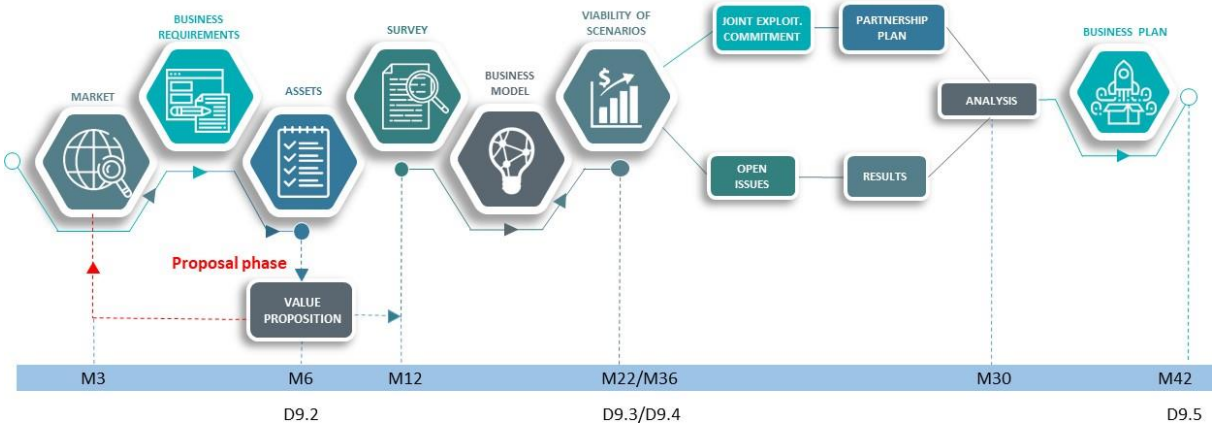


*Figure 3: Phases of the FELICE exploitation strategy of the whole project*

Up to month six (M6) the analysis of market insights, business requirements and a definition of project's assets as well as a value proposition have been drafted based on the Grant Agreement that will be improved during the project.
These activities aim to establish a procedure to recognize, capture and characterize the project's results and are based on common techniques from the business management literature, the objectives of the project and the assets described in chapter 4.4.2. The assets will be analysed in regards to the value they create for the stakeholders. The models used to achieve an insight in the market are further described in chapter 4.4.1.
The procedure for capturing project results initiated in the Grant Agreement is going to be respected by all partners and continuously applied, e.g. through notification of partners of any publication. Moreover, in the procedure it is foreseen to regulate and define appropriate arrangements to ensure that the legitimate interests of the project partners are not compromised (e.g. the filing of a patent, or the need to keep results confidential) - such as pre-publication reviews.

## 4.3 Exploitation target audiences

The exploitation activities especially target the following groups from the aforementioned list of stakeholders:

- Robotics & manufacturing industry: including robotic system developers and manufacturing/automation industry sectors
- Researchers and academia: Scientific Communities & Societies, Research hubs, EU funded research projects

- Investors: private and public
- Policymakers & government

The stakeholders will support the validation of the project's results as well as the innovation and business potential of its assets.

## 4.4 Main steps for the exploitation of assets

The current plan for the exploitation of assets includes several steps, in which information is collected or activities are performed:

1. Analysis of the market
2. Asset definition and collection of extra assets from all partners throughout the project
3. Analysis of the potential exploitation of the extra assets
4. Business requirements definition
5. Collection of the Business Model Canvas (BMC) from each partner
6. Compilation of a general BMC model for the *FELICE* system

The plan will be evaluated and adjusted during the course of the project. The steps are described in more detail in the chapters below.

### 4.4.1 Market analysis

The FELICE consortium will utilize three different models to get in-depth knowledge of the market and the needs of target groups, namely:

i) The *Market insight model*, which instructs the team to begin with listing market trends that are specific to their proposition

ii) The *Client insight model*, which helps to better understand the needs of the target groups

iii) The *Competition insight model* as part of a SWOT analysis which helps the team to determine possible weaknesses and translate these into differentiation when compared against competitors with relevant offerings

A first step is to:

- ✓ Identify market opportunities to recognize and assess competing technologies, market competitors, future trends, etc.
- ✓ Describe the main target groups/customers, including their needs, expectations and potential benefits.
- ✓ Provide details on the size and readiness of the market (including scheduling, risks, barriers) to implement the innovation.

This will be elaborated in the final deliverable and the results will be updated according to new market trends. Market trend data is also collected from all partners concerning the assets they have declared.

As far as the market opportunity, *FELICE* focuses on collaborative robots with the objective of automating production processes. The "collaborative assembly processes" market is still growing. Some references are reported in the literature[4] and also in deliverable D1.4. These processes are also among the most expensive in product industrialization and manufacturing. The application of the project spans a wide variety of possibilities and can potentially be used in a wide range of industrial applications and in any other industry with a desire for a more flexible, effective and less expensive manufacturing processes. The manufacturing and electronics industry for example consists of many companies using production line systems, which have the potential for optimization. The focus is on all companies with production lines that could be improved in their efficiency by adding "collaborative systems" (cobot, orchestrator and adaptive workstations) to work closely with their workers. Although the FELICE system is more complex than a single collaborative robot, the potential for exploitation depends on the general interest in collaborative robots, which is showing a positive trend[5,6] as depicted in the figure below[7].

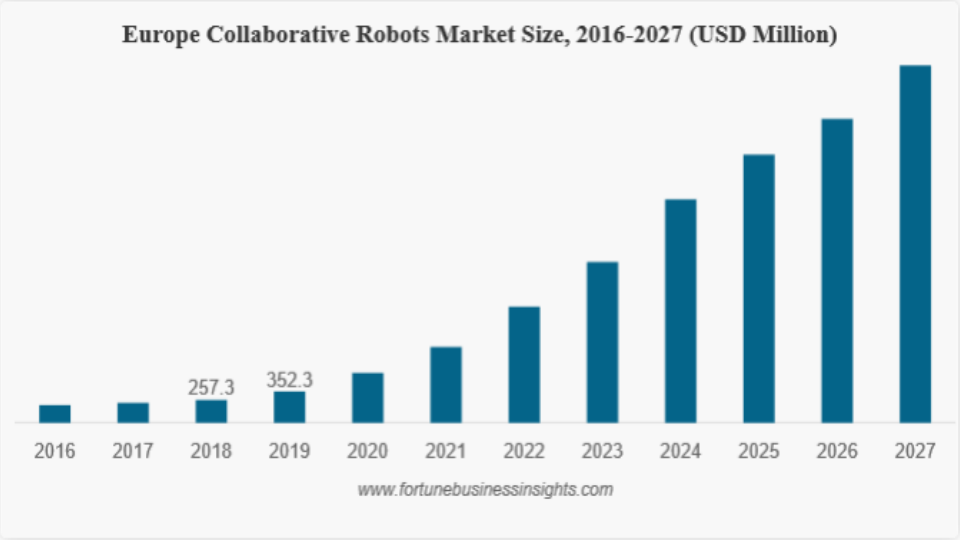


*Figure 4: Expected Collaborative Robots Market Size in Europe from 2016 to 2027*

An overview of the market and the definition of target markets as well as the SWOT analysis is performed for deliverable D1.4. The SWOT analysis is presented in Figure 5.

[4] https://ec.europa.eu/growth/sectors/automotive_en
[5] Groupe Alpha and Alphametrics: http://ec.europa.eu/social/BlobServlet?docId=3049&langId=en
[6] http://applia-europe.eu/statistical-report-2017-2018/documents/APPLiA_SR19.pdf
[7] https://www.fortunebusinessinsights.com/

| | | | |
|---|---|---|---|
| **Strengths** | ✓ orchestration of the production adaptability of the workstation<br>✓ collaborative and mobile robotics digitalization of the process<br>✓ HRI development<br>✓ safety and ergonomics improvement<br>✓ workload optimization and reduction<br>✓ increasing of efficiency and productivity | ✓ complexity of the system<br>✓ interfacing with the existing production system<br>✓ communication protocols among several systems<br>✓ speed of intervention for effective and efficient support<br>✓ certified procedures | **Weaknesses** |
| **Opportunities** | ✓ modularity of the system<br>✓ advanced HMI interface for not skilled workers<br>✓ reduction of cognitive workload<br>✓ easier management of the workforce in case of limitation and aging<br>✓ customization of the workplace | ✓ data privacy management<br>✓ security assurance<br>✓ unregulated use of the system and ethics issues<br>✓ reliability of the components<br>✓ impact of competitors patents on subsystem and components | **Threats** |

*Figure 5: SWOT analysis for the FELICE system*

A second step is to describe how the project results will be accessed and used (i.e. for further research, policy or licensing issues, new products/services, start-ups, joint ventures, standards, etc.) and to define the expected terms of access and use. This is partly explained in the individual exploitation plans of each partner but a common strategy will be provided later in the updated version of this deliverable.

### 4.4.2 Exploitable assets

A list of preliminary assets has been developed in the projects proposal. In the following chapters those assets will be further developed, as well as a selection of extra assets introduced that have been identified since the launch of the project.

#### 4.4.2.1 Exploitable hardware assets

In this chapter, the main hardware assets that have been identified in the project will be described. They include the adaptive workstation and the collaborative robot that are in development:

**Adaptive workstation**

The adaptive workstation (AWS) asset is designed by TUD with support of industrial partner CRF. The mobile workstation demonstrator will be designed for the door-assembly use case. The worker will be supported by an adaptive system that will change the height and inclination of the workpiece automatically based on a consensus between productivity and ergonomics. It will further feature cognitive support systems designed

by IfADo that inform the worker about the assembly process and the mobile robot support system. The exploitation of the AWS is planned at CRF level at the assembling line for process testing, in the Orbassano and Melfi facilities. It will be further exploited eventually, according to the implementation plan of the company (related to new products) at plant level for low and niche productions at the AGAP plant or Mirafiori Plant.

**Collaborative robot**

The collaborative robot designed by ACC will consist of a mobile platform, a central column with the possibility of changing the height, an arm equipped with a gripper, and a head with a touchscreen on a motorised neck. All these modules are designed to optimally adapt the robot to the employee and to the adaptive workstation. Exploitable assets will be the robot as a whole. It will be also exploited eventually and according to the implementation plan of the company. ACC will strive to design the robot in possibly modular way, meaning that the selected modules will be available in several versions (e.g. different heads, arms, mobile platforms) so that the individual modules will be combinable in various configurations depending on the use case. ACC will exploit the individual modules and the combinations also for other use cases e.g. logistics, healthcare.

#### 4.4.2.2 Exploitable software assets

A list of seven exploitable software assets has been identified in the project's proposal. Table 11 lists the assets and gives an overview of the expected maturity level of the asset and the time-frame in which market achievement was estimated by experts in the project. A description of the assets is found below.

*Table 11: List of exploitable software assets*

| Asset | Type | Product/Technology description | Maturity level | Market achiev. |
|---|---|---|---|---|
| **1.Digital Twin** | SW | Graphic simulation tool to support virtual and constructive simulation for complex, immersive 3D virtual scenarios for manufacturing systems | 100% | 0 years |
| **2.Pervasive scene description** | SW | A real time environment monitoring module producing low-level representations by combining info from multiple visual sensors. | 75% | 1 year |
| **3: Detection and localization of challenging 3D objects** | SW | plug-n-play tool for detection and pose estimation of objects with difficult appearance properties, exploiting visual and non-visual cues (tactile) during robot actions | 75% | 1 year |
| **4: Fluent human-robot interaction** | SW | A planner enhancing Human-Robot collaboration fluency by considering action interdependencies, prioritization, and time constraints | 75% | 1 year |
| **5: Assembly Line Orchestration** | SW | A tool that dynamically deploys robots to support human workers, detect and resolve errors and improve assembly line performance | 75% | 1-2 years |
| **6: Domain Specific Workflow Modelling Language** | SW | A language for assembly-task description to provide hierarchical task structures for the dynamic scheduling of the assembly line and task orchestration | 75% | 1-2 years |
| **7: Human-Robot Interaction Model** | SW | Parameter-based model as a tool encompassing socio-cognitive prerequisites for effective interaction and signaling modes for system state. | 60% | 2-3 years |

## Digital Twin

The prototype of the Digital Twin, which graphically simulates a representation of the *FELICE* system, will be developed under the leadership of Cal-Tek within the FELICE project will be evaluated after the project's conclusion. Its aim is to start an industrialization process that will lead to the commercialization of the Digital Twin module (as stand-alone module, as part of the FELICE system or as integrated in other CAL-TEK products or solutions).

## Pervasive Scene perception

The "Pervasive Scene perception" is a software tool that enables the robot to navigate within the dynamic and partially known environment of an assembly shop floor. The robot will simultaneously localize itself with respect to the surrounding environment and will constantly update its representation thereof. This tool will handle challenging cases of sensor noise, illumination changes, and independently moving objects, and avoid drift caused by errors accumulated over long distances.

**Detection and localization of challenging 3D objects**

A software tool for the detection and accurate 6D pose calculation of 3D objects of the scene will be developed. This tool will focus on assembly objects with challenging visual characteristics, like symmetries or reflective, dark and textureless surfaces. It will also focus on challenging scene conditions, like overlapping and occluded objects. This functionality can facilitate object grasping, a handover by the robot, and detection of missing components, adding to the fluency of human-robot interaction.

**Fluent human-robot interaction**

A software tool for coordinating human-robot activities on industrial environments and assembly lines in particular is developed. The module will take into account how multimodal sensor input can be utilized in real-time for enhancing the collaboration between human-robot pairs, in order to seamlessly and effectively achieve the common goal. Particular attention will be paid to object (e.g. tool) handover efficiency, which is of particular interest for many robotic application domains.

**Assembly line Orchestration**

An orchestration software for assembly lines that includes a monitoring part which relates the workflow state, tracks the execution history in order to provide input for the analytics and the planning part that optimizes workflows and which assigns workflows to the respective stations in the assembly line will be developed. Such orchestration is an integral part of running an assembly line in a semi-automated way. The feedback from the line and the analytics processes provide feedback on the performance and the ergonomic aspects to the line manager. The planning part suggests actions to be taken. In addition, the orchestrator enables a robust task execution by providing intelligent recovery policies for failure cases.

**Domain specific Workflow-Modeling Language**

The WORM (Workflow Modeler) is a software tool created to provide users with functionality for structured assembly task modelling. Supported by a rich user interface, tasks can be created and linked graphically, resulting in dynamic and generic workflows. These workflows can be enhanced by utilizing the included WORM plugin-system, creating custom functionality for the workflow models such as specific actions or visualizations. Therefore, WORM can be used to create generic assembly task workflows which can be adapted to the existing infrastructure by creating custom plugins, allowing them to simultaneously include humans, robots and machines in the execution of the workflows.

**Human-Robot Interaction Model**

A framework which enables the communication between a robot and a human will be developed. Beside the communication between humans and robots, the modeling of the human state is going to be a focus of this framework to allow for improvements in the acting of a robot towards a collaborating human worker. In detail, multiple sensors should be used and fused to model the current state of the collaborating human worker. The evaluation of this framework should take place to ensure the functionality and usability of the developed framework.

### 4.4.3 Extra assets

All partners have been asked to declare extra assets at month six of the project. Some partners have declared extra assets so far, which are briefly described below:

**Human behaviour monitoring for ergonomic risk analysis**

The "Human behaviour monitoring for ergonomic risk analysis" asset developed by ICCS can be used to monitor user activities, phase progression during manufacturing assembly tasks, and to automatically compute indicators for ergonomics risks in real-time and in a non-invasive setting using visual data acquired by a multi-camera system. The method is configured in accordance with company standards for the preliminary assessment of workplace ergonomics, whereby if non-conformities were to be found, a second-level analysis has to be carried out to measure the ergonomic risk.

**Human-Robot Interaction in the context of assembly tasks**

The "Human-Robot Interaction in the context of assembly tasks" asset declared by FORTH coordinates human and robot activities in different assembly tasks to improve human productivity.

**Speech and gesture analysis**

The module developed by UNISA detects a predefined set of human gestures from video streams, localizes the human voice, and recognizes a predefined set of speech commands. A predefined set of gestures are recognised by the gesture recognition module which in turn continuously monitors the gestural expressions of the user and tries to match user movements to the loaded gesture sets. A predefined set of speech grammars are loaded to the speech recognition engine which in turn continuously monitors the verbal expressions of the user and tries to match spoken words to the loaded grammar sets.

### 4.4.4 Business requirements

In parallel, a first analysis of the business requirements was started inside the project partnership to better align the exploitation strategy with the consortium members.
The following table reports the most relevant aspects of the Business requirements based on the evaluation of some partners who were more involved in the vision of the business

at this stage of the project's development. More details concerning the project's exploitation strategy of the whole consortium will follow on the basis of the further definition of the *FELICE* system.

*Table 12: Current state of Business Requirements collected from partners*

| Partner | Business Requirements |
|---|---|
| **ICCS** | The exploitation of R&D results will be through providing services, licensing specific products to industrial partners, contracting with industrial partners to jointly develop new products, and participating in start-up/spin-off companies and joint ventures |
| **CRF** | The Felice system must be commercial with a CE mark with an after-sales service network available.<br>Moreover, it must be cheap enough to be competitive with others MES.<br>Finally, it has to be compliant with standards ISO 11228-1/2/3 UNIEN 1005-1/2/3/4/5 and ISO 10218-TS 15066 |
| **FHOOE** | The prototypical implementation is also geared towards scientific evaluation and needs to be implemented using a rigorous software engineering process in order to achieve a maintainable and stable product. This will potentially take 1-2 years for a dedicated team of developers. |
| **FORTH** | The exploitation of R&D results will be through providing services, licensing specific products to industrial partners, contracting with industrial partners to jointly develop new products, and participating in start-up/spin-off companies and joint ventures |
| **CAL-TEK** | Considering that the main output of the FELICE project will be a prototype (and also the Digital Twin will be realized as s prototype according to the selected case study e.g. assembly line), an industrialization process is required to bring the TRL up to the maximum level and the Digital Twin on the market. Obviously, this will require a specific study to understand how to carry out the industrialization as well as additional resources (e.g. people, money, etc.) to be used. Once the Digital Twin is, ready for the market, specific development work will be needed for each customer as their own Digital Twin is a replica of a real production environment and real production environments are varying. Therefore, while the core engine of the Digital Twin can be reusable and scalable, additional activities are required to adapt the solution to the real production environment considered. |
| **TUD** | A functioning demonstrator at the end of the FELICE project is planned based on the requirements concerning cognitive and physical ergonomics that are specific to the use case. |

### 4.4.5 Business Model Canvas (BMC)

The Business Model Canvas (BMC) is a strategic model used for business creation and development. In other words, it is a visual template that shows the infrastructure, products, customers, suppliers and other elements that can help the business. All these information are reported in a form that offers an easy overview[8].

[8] Osterwalder, Alexander; Pigneur, Yves; Clark, Tim (2010). Business Model Generation: A Handbook For Visionaries, Game Changers, and Challengers. Strategyzer series. Hoboken, NJ: John Wiley & Sons. ISBN 9780470876411. OCLC 648031756.

This methodology is extended to the *FELICE* project. In this case the BMC is useful to orientate all project participants towards business exploitation and to provide a framework for the development of the FELICE system. The table presented on the following pages is a first approach based on the BMC evaluation of some individual partners. The individual BMC entries have been collected and are presented as a table for better visualisation. These first entries to the model reported here will be extended and improved in the next steps and will be reported in the deliverable 9.3.

*Table 13: Draft of the collected BMC entries until month 6*

| Section | Collected entries (Based on the BMCs of CAL-TEK, CRF, FHOOE, FORTH, ICCS and TUD) |
|---|---|
| **Key partners** | ❖ Software Licenses Suppliers (e.g. Unity 3D, AnyLogic, processSimulate, etc.)<br>❖ Companies acting as Dealers Network<br>❖ FELICE system developers, producers, integrators, and teams for the system customization, installation and training<br>❖ Standard part suppliers (e.g. Bosch, Item)<br>❖ Actuator suppliers (e.g. LINAK)<br>❖ Illumination system supplier (e.g. Bosch)<br>❖ Sensor suppliers (e.g. Pepperl & Fuchs)<br>❖ Controller supplier (e.g. B&R, LINAK) |
| **Key activities** | ❖ *Software Development:* Design, Development, Test and Release of the Software<br>❖ *Maintenance and Help*: Design, development, test and release of Help, FAQ, Chat Service and Community, Documentation, Knowledge Base Articles<br>❖ *R&D activities:* Increase the solution innovation level , Keep under control and introduce technological advances<br>❖ *Marketing:* CRM, Digital and Traditional Marketing, Search for Commercial Partnership, Customer Satisfaction monitoring<br>❖ *Implementation* of dedicated ICT network<br>❖ *Training* for correct use of the FELICE system<br>❖ *Setup and tuning* (customization on plant needs) by Manufacturing Engineering<br>❖ *Privacy data management*<br>❖ *System application:* guideline and protocols<br>❖ *R&D activities:* Faster algorithms, more complex problem definitions, more accurate prediction models |

| | |
|---|---|
| | ❖ *Marketing:* Success Stories, Digital and Traditional Marketing, Search for Commercial Partnership<br>❖ *Service provisioning*<br>❖ *Integration with existing services*<br>❖ Ergonomic evaluation<br>❖ *Configuration of adjustable workstation* system due to ergonomic requirements<br>❖ *Consulting* |
| **Value propositions** | ❖ Creation of Digital Twin assets;<br>❖ Monitoring, Reasoning and Control over the real manufacturing process through the use of Key enabling technologies<br>❖ Reduced times and costs for education and training<br>❖ Better Knowledge Management<br>❖ Greater simplicity in identifying solutions to already encountered problems<br>❖ Long-term efficiency and productivity gains;<br>❖ Real time data to predict and improve assets and processes.<br>❖ "What if" simulations for better decision making<br>❖ 3D virtual scenarios<br>❖ Wellbeing (Reducing, stress, fatigues and diseases) of workers<br>❖ Human Robot collaboration safety<br>❖ Process efficiency<br>❖ Productivity<br>❖ Monitoring through Smartwatch and Smartphone<br>❖ Managing of work tasks / Method (based on rules and AI)<br>❖ Monitoring and control of assembly line processes can consider a much larger number of factors than human line managers.<br>❖ Reaction to changes in stress levels increases human worker satisfaction and reaction to changes in demand, as well as optimization of the use of robots increases productivity.<br>❖ Analysis of historic data and reports provide insights for the continuous improvement processes.<br>❖ Detection and localization of 3D objects with challenging characteristics |

| | |
|---|---|
| | ❖ Unobtrusive monitoring of human activities to support action phase classification and ergonomic risk analysis during assembly task execution<br>❖ Development and assembly of adaptive workstation<br>❖ Better ergonomics analysis<br>❖ More real-time data conveyed to operators in an innovative way<br>❖ Having CHARACTERISTICS of:<br>- Newness<br>- Performance<br>- Convenience<br>- Usability<br>- Customization<br>- Accessibility |
| **Customer relationships** | ❖ Collecting Customers Feedback<br>❖ Self Service Assistance (Help/ FAQ)<br>❖ Dedicated Assistance (Chat)<br>❖ On-site Assistance<br>❖ CRM<br>❖ Webinars<br>❖ Customers Involvement to increase the Value Propositions through the actions described above<br>❖ Direct contact with the team leader or others colleagues of WCM dept.<br>❖ Workshops<br>❖ Client communities<br>❖ Provide feedback and technical support |
| **Customer segments** | ❖ Manufacturing Systems Industry ( Revenue > 500k€, Employees > 25)<br>❖ Companies having good attitude toward knowledge management and digitization process already ongoing. Big investments planned in digitalization in the next 3 years<br>❖ Manufacturing systems user and industry with complex production processes where workers carry out more than just one small action (e.g. automotive assembly industry)<br>❖ Companies that carry R&D Activities |

| | |
|---|---|
| | ❖ Final users (assembly line workers)<br>❖ Team leaders / Assembly line managers/ HR managers<br>❖ Segmented and niche markets<br>❖ Productive segment in several different production plants.<br>❖ Robot companies<br>❖ Companies developing AR technologies<br>❖ Companies integrating vision technologies for detection and tracking objects (e.g., surveillance, quality management etc.)<br>❖ Market owners and solution providers<br>❖ High number of employees (at assembly line) |
| **Key resources** | ❖ Personnel<br>❖ Developers/Programmers<br>❖ R&D Team<br>❖ Marketing Specialist Manager<br>❖ Accounting Personnel<br>❖ Sellers<br>❖ PCs<br>❖ Offices Spaces, Laboratory space, Shopfloor space<br>❖ Software<br>❖ Budget for Digital Marketing, Ads, etc.<br>❖ Database Access for Market Analysis<br>❖ HR team and psychologists<br>❖ ICT team & services<br>❖ WCM training and consulting infrastructure<br>❖ Social media channel on YouTube, Facebook, Instagram, Twitter, LinkedIn<br>❖ Software Licenses, Marketing and Market Analysis Budget<br>❖ Software architects<br>❖ Repository<br>❖ Provision of ground truth data<br>❖ Communication<br>❖ R&D, Production |

| | |
|---|---|
| **Channels** | ❖ Company Website/Store online<br>❖ E-mail Marketing<br>❖ Ads and Social media & networks (e.g. Google, FB, LinkedIn)<br>❖ Commercial Partners and Dealers network<br>❖ Technical Review<br>❖ Scientific fora and journals<br>❖ Plants promotional videos with stories of experience<br>❖ Internal newsletters<br>❖ Dedicated workshops<br>❖ Direct contact with team leader or dept. manager or by phone or email<br>❖ Industry fairs<br>❖ Existing Direct Contacts /Existing customer base |
| **Cost structure** | ❖ Personnel Costs, Hardware Costs, Software Licenses Costs, Marketing Costs,<br>❖ Commercial Partnership Costs, Dealers Network Costs, IPR and Legal Costs,<br>❖ Personnel Update Costs, Offices Space Costs and Utilities, Administrative and Accounting Costs, Bank Services Costs. Legal and other infrastructure and administrative costs (10%)<br>❖ IoT infrastructure (sensors, cameras, smartphone and smartwatch combos)<br>❖ Connection to external HW<br>❖ FELICE app licence or FELICE embedded system<br>❖ Training courses<br>❖ Technology development and updates<br>❖ Customization and integration<br>❖ Equipment (wearables and measurement systems)<br>❖ Travelling expenses<br>❖ Overheads |
| **Revenue streams** | ❖ Selling the Digital Twin according to different configurations and different prices;<br>❖ Digital Twin Maintenance and After Sale Services<br>❖ Specific consultant works for the Design additional development work |

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| | ❖ Mitigation of risks and accidents/ Reduction of costs for sickness and diseases<br>❖ Productivity increasing<br>❖ Flexibility of workplace management<br>❖ Knowledge and competences keeping<br>❖ FELICE-system customer segment dependent, Volume dependent Licensing of the orchestration software<br>❖ Customization of the software and development of customer-specific features<br>❖ Licensing, SaaS offering / Subscription fees<br>❖ Selling of adaptive workstation system<br>❖ Consulting and maintenance fees<br>❖ R&D fees |

In the following months, for a better refinement of the FELICE system, a systematic revision of the BMC model will be carried out. Because it will be systematically updated, the final version of the BMC for the entire FELICE system will be available towards the end of the project.

## References

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