Artificial Intelligence supported Tool Chain in Manufacturing Engineering

ITEA 3 – 19027

Work package 7
Dissemination and exploitation

Deliverable 7.2
Communication and dissemination plan

Document type	: Deliverable
Document version	: 1.3
Document Preparation Date	: 2023-01-24
Classification	: private
Contract Start Date	: 2020-12-01
Contract End Date	: 2023-09-30

Final approval	Name	Partner
Review Task Level	Päivi Aaltonen	LUT
Review WP Level	Tatu Säisä	3D Talo
Review Board Level	Kristofer Bengtsson	Volvo

Executive Summary

The goal of AIToC is to develop an integrated toolchain for manufacturing engineering that supports decision-making from an early phase. The scope and approach of the project include the integration of artificial intelligence supported tools that enable development of existing or new tools for requirements definition and management, generation of process plans, generation of equipment models, and layout generation. Results will be available in the form of knowledge, methods and tools for a digital model driven approach for the manufacturing engineering tool chain to production system design, process plans and instructions. Several use-cases originating from four different countries and across the value chain from research institutes and universities, technology experts and tool providers, industrial end-users, will ensure a holistic development of solutions and wider applicability.

The integration of the tool chain will focus on and find solutions for interoperability of tools, and plug & play capabilities, to be flexible in building simulation environment. This will have a substantial impact on efficiency (cost), quality of models and lead time for simulations in industrial context. Through the strong consortium, which covers the whole value chain from cutting-edge research institutes and universities, technology experts and tool providers, to industrial end users, an industry-driven approach is assured.

This report describes the AIToC communication and dissemination strategy and highlights the approach, tools, direction, and objectives of the project dissemination. The detailed content of the expected exploitable results is collected in report D 7.3, and the details of the public and private webpages in report D 7.1. This deliverable (D 7.2) provides a guide to project partners in matters related to communication and dissemination. Specifying the design, implementation, coordination and monitoring of all project activity, this document aims to achieve the dissemination objectives of the project. An effective dissemination strategy should also include a plan for measuring the impact of the dissemination effort and evaluating the success of the strategy in reaching the target audience and achieving the desired outcomes. Thus, individual concrete activities and channels employed are outlined in subsequent sections and updated versions will be available during the lifetime of the project until finally submitted at the end of the project lifetime as report D 7.2.

Table of contents

List of figures

List of tables

1 Introduction

Dissemination is the process of sharing or spreading information, knowledge, or resources to a wider audience. It is important because it allows new ideas, research findings, and best practices to be shared and applied in different contexts, which can lead to advancements in various fields and improved outcomes for individuals and society as a whole. Additionally, dissemination helps to ensure that research is transparent and accountable, and that it reaches the people and organizations that can benefit from it. In order to share the results for the public audience and work on the project simultaneously, the AIToC project will set up a project website (public) and an intranet workspace (private). Through the public website, project related issues, news and public documents will be carried out. A private project intranet workspace will facilitate the sharing of project related tiles and information amongst the project partners. Both will be continuously developed and updated through the project and shall remain online for a period after the project has finished to ensure full exploitation of the project results.

Developing an effective dissemination strategy requires careful consideration of the target audience, the message being communicated, and the resources available. Factors to consider for this dissemination and communication strategy are, firstly, identifying the key target audiences and tailoring the message and dissemination channels to meet their specific needs and interests.

Secondly, choosing dissemination channels that are most likely to reach the target audience and that are appropriate for the type of information being shared. Third, measuring the effectiveness of the dissemination strategy and making adjustments as necessary.

A dissemination strategy is a plan or approach for sharing and communicating research findings, information, and knowledge with a specific target audience. The goal of a dissemination strategy is to ensure that the information reaches the people who can use it to improve decision-making, policymaking, and practice. A dissemination strategy typically includes a combination of different dissemination channels, such as peer-reviewed journals, conferences, social media, and digital platforms, that are chosen based on the target audience, the type of information being shared, and the goals of the dissemination effort.

2 Communication and dissemination plan overview

A dissemination strategy is a plan or approach for sharing and communicating research findings, information, and knowledge with a specific target audience. The goal of a

dissemination strategy is to ensure that the information reaches the people who can use it to improve decision-making, policymaking, and practice. A dissemination strategy typically includes a combination of different dissemination channels, such as peer-reviewed journals, conferences, social media, and digital platforms, that are chosen based on the target audience, the type of information being shared, and the goals of the dissemination effort.

2.1 Objectives

Short term objectives include wider dissemination of key messages of the project to as wide an audience as possible, particularly the stakeholders involved. As the project advances, the goal of the project is to maximize the chances for the exploitation of its results at the European, national and institutional levels. During the project, the focus is to disseminate the messages and output of the project as they emerge during the research, timely and effectively, widely in Europe and beyond through targeted communication actions towards stakeholders who are crucial in realising the expected impacts. I order to facilitate exploitation efforts; results need to be made easily accessible to stakeholders and interested parties.

Dissemination can have a significant impact on the market, as it can influence the success and adoption of new products, services, and technologies. When new ideas, research findings, and best practices are disseminated, it can lead to the development of new products and services that can improve efficiency, reduce costs, and meet the needs of customers in new ways. This can create new market opportunities and increase the competitiveness of companies that are able to take advantage of the new information. In addition, dissemination can also help to build trust and credibility in a particular product, service, or technology. When information is shared transparently and widely, it can help to build confidence in the product or service and increase the likelihood that it will be adopted by more customers. Moreover, dissemination can also help to increase the participation of different stakeholders in the market and promote collaboration among companies, researchers, and government agencies, which can lead to better outcomes for society as a whole.

All in all, dissemination plays an important role in shaping the market by promoting innovation and competitiveness, building trust and credibility, and encouraging collaboration among different stakeholders. In conclusion, the strategy is to provide constant and regular

contact all along the project while ensuring communication of project messages and results to broadest possible range of stakeholders and sustained external parties' commitment.

2.2 Expected impacts and audience

The project seeks to provide a digital model-driven approach for the manufacturing engineering tool chain to production system design, process plans and instructions. There is a strong need to develop an integrated toolchain for manufacturing engineering at early phases with advanced digital tools and methods supported by different artificial intelligence techniques to guide the decision-making process. The dynamic nature of the transportation business, combined with global trends such as electro-mobility and autonomous vehicles will cause major changes in the industrial systems. Driven by new product and process technologies and related processes, new mindsets in production concepts and human factors, more efficient and effective methods for "smarter" manufacturing engineering of the future production systems will be required. The markets within the projects partners: Trucks, Bus and Coach, Car, Heavy Machinery, Aircraft and Production Equipment; are massive, diverse and global, as illustrated in Table I.

Table I Project markets

Industry	Specific characteristics
Trucks	Highly customized products and wide variety of products in production system Fierce competition with aim to increase productivity and quality European manufacturing firms dominate global sales Environmental challenges pave the way for electric and hybrid electric vehicles
Bus and coach	Global bus market expected to reach $64.07 bn by 2027 Fragmented buss market with major players like Daimler Buses, Tranton, Tata Motors Simulation of manual processes is essential
Car	Global car and automotive manufacturing market size - $2.9 tr Europe – 21% of total global passenger car production Shared mobility, data-driven services and autonomous technology – drivers of growth
Heavy machinery	Integration of AI in manufacturing industry to improve efficiency and assisting in business expansion Raute offers heavy machinery for better production with enhanced design and implementation efficiency
Aircraft	Global airline market estimated at $413.51 bn in 2021

	Airbus, Boeing and Embraer account for 98% of market share Complex manufacturing process, needs man-machine integrated digital processes
Production equipment	Production of different product variants across all industries makes production process complex Multiple changes in manufacturing processes lead to changes in layout and equipment of production system which is automated AIToC aims to provide simulation systems to design production systems faster

In order to realize the expected impacts requires efficient and pragmatic use of resources available combined with proactive planning and information flow across a network of stakeholders. Dissemination activities need to be targeted to stimulate specific types of stakeholders, designed to encourage sharing and broadcast across the network.

2.3 Key messages

The key messages illustrate the purpose of the project, the significance of the outcomes, the benefits of the outcomes to the partners and the wider impact of the solutions created in the AIToC- project.

Further, industrial trends can indicate suitable marketing messages to be utilized. As creating individual slogans and for all publication channels falls beyond this report, the content of the message can be themed under the main industrial themes, illustrated in Table II.

Table II Key message & supporting themes

Themes for key messages	**Description**	**Supporting themes**
Green transition	Environmental, social and government issues are increasingly becoming a major concern for manufacturers. Therefore, there is an increase in the focus on sustainability and carbon neutrality.	Climate protection
		New mobility concepts
		Sustainable production
Digital transformation	The digital transformation is not about only being digital or digital products or services. It´s a combination of transformative digital technologies, tools, processes and most importantly the	Digital Twins Technology
		Artificial Intelligence of Things (AIoT)

	people (culture and mindset) truly transforming the way businesses are done today. It is no doubt that technology is a critical piece, but digital transformation is more than that. It is not a reaction to the business environment today but rather a proactive approach to anticipating the next big opportunity and therefore digital transformation is usually tied to innovation.	Automation, Hybrid workplaces and Intelligent co-working Robots (Co-bots)
		Additive Manufacturing
		Distributed Manufacturing
		Predictive Maintenance
		Autonomous driving

3 Logos and visualization

3.1 Project logo

The project will be presented under one brand and logo, the AIToC Manufacturing Engineering Toolchain. A graphic identity is the base of seamless communication externally and internally for the target audience to be able to easily identify and recognize the AIToC project. A title, logo, color scheme are the basics of a coherent and communicable identity. AIToC as an acronym of AI- supported tool chain in manufacturing engineering is easy to remember and ties in the keywords: AI-supported tool chain while the logo focuses on the manufacturing engineering aspect of the project.

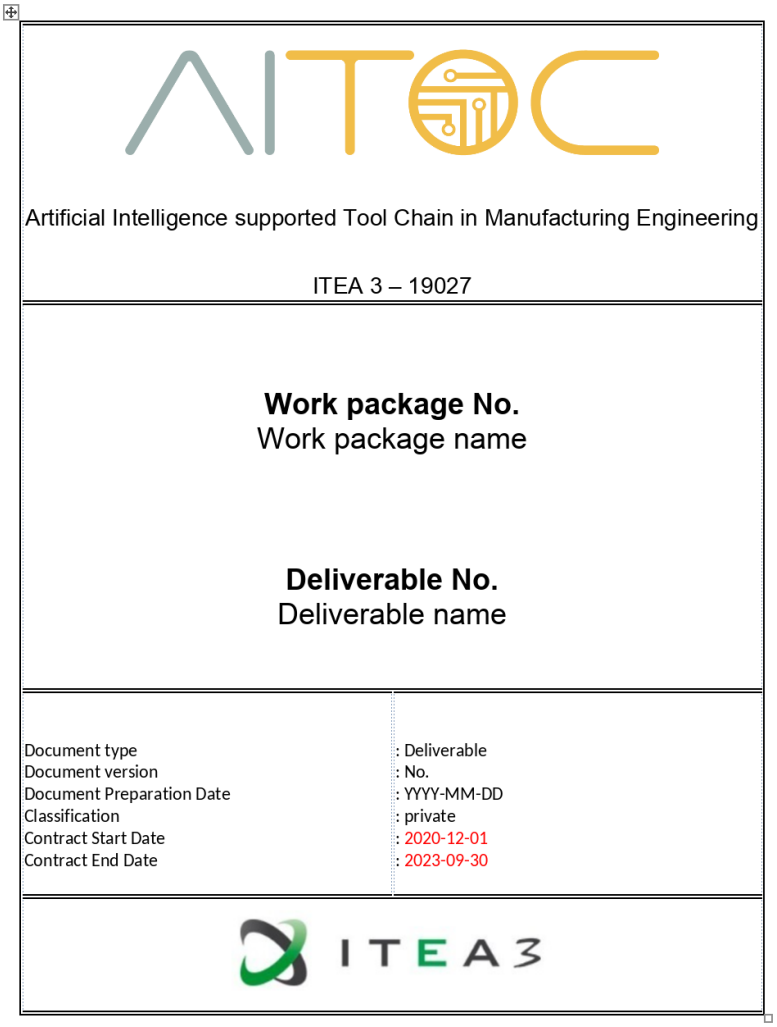
Figure 1 Project logo

3.2 Materials

The material intended for AIToC communication and dissemination are freely available to the project partners. These include presentation templates, pictures of joint meetings and other available information presented on the AIToC public webpage, such as free-to-share publications and documentation. As the documentation will largely be available only after the project, this has been taken into consideration in the audience and scope of the dissemination plan.

Figure 2 Presentation template

Figure 3 Partner logos linked to websites


Artificial Intelligence supported Tool Chain in Manufacturing Engineering

ITEA 3 – 19027

Work package No.
Work package name

Deliverable No.
Deliverable name

Document type	: Deliverable
Document version	: No.
Document Preparation Date	: YYYY-MM-DD
Classification	: private
Contract Start Date	: 2020-12-01
Contract End Date	: 2023-09-30

Figure 4 AIToC deliverable template

4 Dissemination content

4.1 Project vision and introduction

The development of an integrated tool-chain for manufacturing engineering that supports decision-making in early phases.

Modern approaches for manufacturing engineering rely heavily on software tools for planning, simulation, and automation. While these tools are highly sophisticated in their area of application, interoperability is a problem due to missing standards and incompatibilities between tools, methods, and formats. Engineering software tools therefore must be adapted to each company's needs, with great effort, as the number of variants and combinations in which a production system can be built is huge. The AIToC scope and approach include the

development of existing or new tools for requirements definition and management, generation of process plans, generation of equipment models, and layout generation.

As an ITEA 4 project, the AIToC project consists of four national consortiums, Sweden, Germany, Finland and Turkey. The goal if AITOC is to develop an integrated toolchain for manufacturing engineering that supports decision-making in early phases. To achieve this, the toolchain will support the formalization and automated analysis of requirements, the computer-aided generation of process plans, simulation models and instructions and the software supported generation of layouts. In all of these dimensions, Artificial Intelligence will be utilized in expert systems and simulations based on data from existing solutions. The interoperability of engineering tools is also in focus and will be developed using standardized neutral data formats.

4.2 National consortium partner introductions

4.2.1 The Swedish consortium

The Swedish consortium is composed of a mix of partners from universities, research institutes, SMEs, suppliers and vendors, and OEMs, supporting the overall value chain for manufacturing engineering in the automotive and similar type of industries.

The Volvo Group is one of the world's leading manufacturers of trucks, buses, construction equipment, drive systems for marine and industrial applications, and services. In the AIToC project, Volvo will focus on developing initial requirements and provide inputs to concepts and solutions, as well as relevant data for use cases to demonstrate how a future efficient manufacturing engineering tool chain can be applied.

Chalmers, within the automation research area, conducts a wide range of research in industrial methods and tools. The focus is mainly on planning, optimization, supervision and control of production systems, especially discrete event and logical systems, where complexity and information integration are two main challenges. Artificial Intelligence is becoming important and is highly relevant in this application area. Through Chalmers AI Research Center (CHAIR) a broad competence and experience is available and will be utilized in the AIToC project.

The Fraunhofer-Chalmers Research Centre for Industrial Mathematics (FCC) is offering contract research, services, algorithms and software based on advanced mathematics within Modeling, Simulation and Optimization (MSO). In AIToC, FCC will

contribute with research and development within modelling and simulation related to layout planning and optimization.

AFRY (formerly known as ÅF) is an engineering and consulting company with assignments in the energy, industrial and infrastructure sectors. During the last few years, the company has put significant efforts to integrate engineering methods and functionality of simulation tools, especially to achieve full virtual commissioning. Their experience and knowledge will be important for the integration of tools in AIToC, to realize the use cases and demonstrations.

ABB is a word-leading manufacturer of industrial robots and robot systems and can provide state of the art automation knowledge to the project, especially virtual models that represents the true behavior of equipment's in a production system. With the combination of Artificial Intelligence methods to fine tune models with data, and deep knowledge of the equipment and their control systems, they have capabilities to make optimized, trained and programmed virtual devices.

Algoryx Simulation is a leading provider of software and services for visual and interactive physics-based simulation. Algoryx have designed and developed a next generation physics engine with fidelity, performance, functionality and extensibility that surpasses all comparable solutions on the market. Their contribution will be particularly important for the creation of the models and simulations of processes and resources.

Solme AB develops software tools and provides services for industrial engineering. This includes methods and tools for effective analysis of manual assembly processes, by combining video analysis with time and motion studies, visualization and optimization of line balancing from the aspects of time, ergonomic stress, material access and operator work zone. Solme AB will contribute with competence and tools for data acquisitions and how to make use of the AIToC approach for process and operations planning to generate information and visualizations that will be used in production.

Univrses is a fast-growing start-up company with a highly qualified team of scientists and engineers within computer vision and machine learning as key competence. One key area is 3D computer vision creating and delivering technologies for 3D Positioning, 3D Mapping, 3D Localization, Spatial Deep Learning and Sensor Fusion. Their competence and products can be used in combination with physically based methods to create more complete and realistic system models for both geometry and function.

4.2.2 The German consortium

The German consortium will benefit from a strong international consortium working in several domains with different industrial use cases. Sharing knowledge related to different technological solutions using artificial intelligence will be the base for optimizing engineering tools and for common standardization activities. The German consortium is composed of partners supporting the overall value chain for planning, simulating and optimizing manual and automated production processes (use -cases in production equipment manufacturing and bus & coach manufacturing).

Daimler Buses is one of the world leading bus & coach manufacturers with plenty of plants in Europe and worldwide. Daimler AG, the German coordinator, acts from a planning and simulation end user's point of view. Daimler plans to industrialize the AIToC solutions as it fits to the internal vison towards a Digitalized Manufactory. Success shall be ensured through direct involvement in all WPs. Direct involvement in the novel AIToC technologies will result in higher efficiency of planning and simulating of manual processes, which will give a chance to further differentiate from competitors.

DFKI is one of the biggest research centers for artificial intelligence worldwide. The involved DFKI research group already achieved international excellence in motion synthesis for virtual characters as well as for Artificial Intelligence technologies for planning and scheduling.

TWT GmbH Science & Innovation is offering scientific and development services to its customers. While TWT already has a strong technological base in the context of requirements engineering, simulation technologies and related AI methods, the AIToC project bears a significant risk, due to the high ambition of the technological advances. Furthermore, TWT hopes to further enter the market of production planning tools and technologies, which promises further expanding its business, but at the same time involves multiple risks. Through the AIToC project, TWT will be able to mitigate these technological and business -related risks, through strong national and international collaboration.

Raumtänzer GmbH provides solutions for humans working in modern industry environments. AIToC will allow Raumtänzer to explore, how the design of instructions for augmented reality devices can be optimized by incorporating knowledge about instructability from early in the specification and planning process. The results

of AIToC are expected to scale in other business areas of Raumtänzer, such as chemical engineering and healthcare.

IFAK e. V. is a well-known research and development partner of large and medium sized industry in the domain of automation for about 20 years. The applicability of Artificial Intelligence technologies in engineering tools, e.g., for production planning, has not yet been investigated. Furthermore, the use of AI to support the automatic evaluation of the target/actual comparison of the behavior of the production system is unsolved. IFAK intends to provide these technological achievements towards other potential customers from automation industry.

For EKS InTec, the advantages from AIToC results are to achieve a higher level of detail for the virtual commissioning components as well as modelling of these components becomes no longer necessary. This in combination with a standard package format offers EKS InTec the opportunity to enhance current engineering process according to labour efficiency. It is expected that this will have positive influence on the engineering service business.

Software AG: Results and knowledge gained from the project will be directly used to improve the existing tool-chain within R&D but also foster the acquisition of customer projects in the problem domain. This project is hence considered as a competitive advantage that will improve market competitiveness through the envisaged technology and tools. We further intent to share results using cook-books and customer success stories. Along with each success we share with Software AG's sales and pre-sales teams the targeted solution, the market and the customer that could eventually test configure the solution before licensing will occur.

in2sight gmbH is a start-up company which was founded based on results of the ENTOC project. The software game4automation is a development framework for visualization, virtual commissioning, virtual and augmented reality in the domain of automation. It is planned to extend the software with artificial intelligence functionalities and to combine it with solutions for the simulation of manual processes.

For isb – innovative software businesses GmbH, the added value is to extend the current focus of behavioral modeling with artificial intelligence to other industries and topics and to improve the toolchain for the selection of models. The project is intended to support standards such as AutomationML, FMU or MMU.

4.2.3 The Turkish consortium

Turkish consortium has been positioned as a complete value chain sub-consortium which covers all the work packages and provides integrated exploitation scenarios from Turkish automotive industry. The consortium includes two use- case providers and four tool and service provider partners, which are led by Eryaz Software.

Ford Otosan is an automotive manufacturing company which has achieved 9 consecutive years automotive industry championship. The company has the biggest E&d organization of the Turkish automotive industry with a production capacity of 455,000 commercial vehicles, 70,000 engines and 140,000 powertrains by the end of 2019. In AIToC, Ford Otosan will provide use-case on the AI-based analysis of the machining lines.

TOFAS is an automobile manufacturer which manufactures passenger cars and light commercial vehicles with 450,000 vehicles annual production capacity. TOFAS will provide use case on the simulations and decision-making support for constructing the production systems. TOFAS will also provide support for work package that is concerned with the product design.

UNIT R&D will bring its extensive knowledge and experience on the model-based systems modeling and analysis that they gained during their previous and present ITEA research projects. So, UNIT will provide high expertise covering project innovations in automated analysis of requirement engineering models of manufacturing and product engineering. UNIT will also support the project for the dissemination of the works done via the relevant well-regarded conferences and journals.

ARDGroup will use their expertise on different artificial intelligence (AI) techniques (e.g., optimization, expert systems, and machine learning) that they have gained from their past and present research projects. ARD will provide support for the AI -based tool developments in the project, which make them involved in several work packages. These include the tools that apply different AI techniques for selecting the optimum manufacturing process plan among all the alternatives existing, optimizing the layout in factories for manufacturing the modeled products, and generating the optimum production resources for the modeled products.

Ericsson will collaborate with Eryaz on developing the AI-based tool for collecting factory data at real-time and simulating them. More importantly, Ericsson will provide the tool developments for the visualization of the data resulted from the AI-based tools and the integration of the tools developed.

Eryaz Software will act as the national coordinator and be responsible for developing a modeling language and toolset for the requirements engineering. Eryaz will also contribute to the development of an AI-based tool for collecting real-time data from the factory and simulating them and the disseminations of the works done by preparing the journal/conference papers on the products/technologies proposed.

4.2.4 The Finnish consortium

Led by LUT University, the Finnish consortium is composed of partners supporting the overall value chain for fundamental developments, planning, simulating, optimization of manufacturing engineering and training using artificial intelligence in the context of the heavy machinery and industrial sites as well as exploitation of these leading-edge developments locally and exporting those internationally as a part of the complex value propositions: end-product or services. With these partners, covering the whole value chain, the Finnish consortium can develop the core concepts, software modules, simulation tools with major features needed for simulating ergonomic human motion alongside the manufacturing value chain.

The Finnish consortium is summarized in more detail in section 6.2.

4.3 Partner logos

Each of the partners will be represented under the project webpages and when possible, in other material with their own logo. The logos are collected jointly and available for other partners to use in their own materials.

Figure 5 Partner logos

4.4 Project results

Due to the confidential nature of the project on-going research, some of the expected outcomes are not disseminated publicly, depending on the type of the outcome. For example confidential tools and services in their development stages are not introduced fully, yet particular segments of ones can be presented to a wider audience. The content of the communication and dissemination plan, thus, focuses on the key messages of the project, emphasizing the collaboration international R&D efforts, the consortium partners and the publicly available content of conference presentations, news and additional material. By the end of the project, the freely accessible content and documentation will be uploaded to the public project webpages and available to academic and non- academic audience alike. The figure below presents an overview of what such content is planned to be.

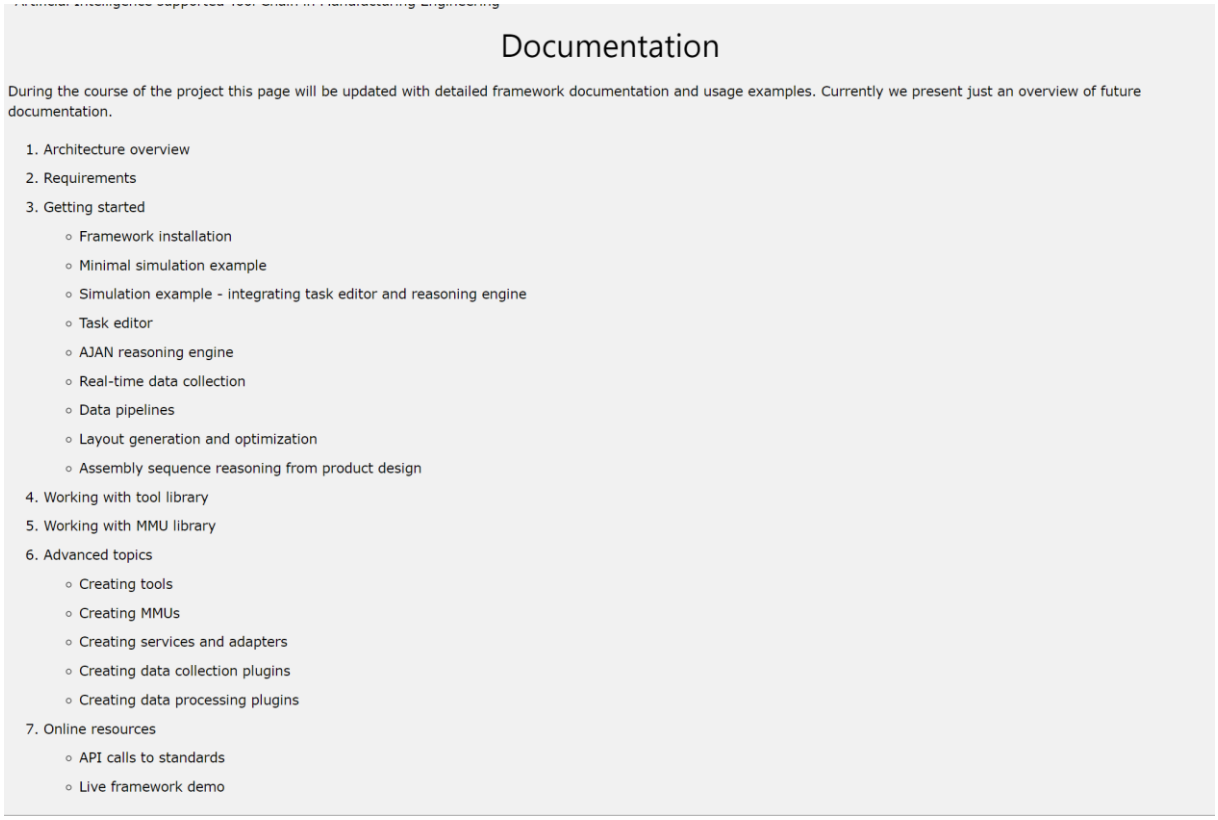


Figure 6 Example of types of documentation made available after the project

5 Audience and scope

Identifying appropriate dissemination channel to similar or different targets may contain similar or partly overlapping messages. The purpose of this multichannel dissemination is to reinforce the message and its credibility.

Dissemination channels refer to the methods or platforms through which research findings, information, and knowledge are shared and communicated to a target audience. These channels can include traditional forms such as peer-reviewed journals and conferences, as well as newer forms such as social media and digital platforms. The choice of dissemination channel will depend on the target audience, the type of information being shared, and the goals of the dissemination effort. Effective dissemination is crucial for ensuring that research and knowledge reaches the people who can use it to improve decision-making, policymaking, and practice.

Table III Audience and estimated scope

Target audience	Scope during the project	Scope after the project
A Single actors	20	50
Practitioners, individual scholars and students, educators, consultants and managers		
B Local and national associations	50	200
Informal networks, regional networks and personal networks of project partners, non-private organizations and collaborative informal networks		
C Professional associations	100	500
Funding organizations, national collaborative networks, established educational or research networks, boards and public third party organizations		
D SMEs	50	1000
Software developers, Technology providers, past and future collaborative partners		
E Large companies	10	25
Value chain partners, market competition, market collaboration		
F Policy Makers	20	50
Public bodies and task forces at the core of policy-oriented activities, funding programmes and regulatory proposals, responsible for setting the legal framework and public incentives for a digital and sustainable transformation.		
G Universities and academia	20	40
Research, technology, and innovation generators for the technologies, management and practices transforming the target sectors.		
H Advocate ecosystems	5	10
Collaborative ecosystems from EU, ITEA and through national collaboration		
I Society	150	1000
Non-academically interested single actors, associations, policy makers and small companies		

6 Communication and dissemination channels and activities

6.1 Project public webpages

The project public website can be found under aitoc.eu. It contains the introduction to the project, the latest and past news on events, communication and dissemination attendance, detailed information of the project and progress, publications and public

documentation related to the project as well as contacts and partner logos. The first version of the pages was released in early 2022, and the next updated version with revised design and content will be released in the fall of 2022. The contents of this report refer to the first version of the pages and may differ from the current available version under aitoc.eu. Furthermore, links to social media channels will be made accessible from the home page. The project front page emphasizes the project vision and current events.

Figure 7 Project frontpage

6.2 Partner webpages

The partners of the project are free to create additional news and parallel project sub-pages to their own webpages given they have such an opportunity. The AIToC project is visible also under the LUT MORE SIM webpages (moresim.fi)

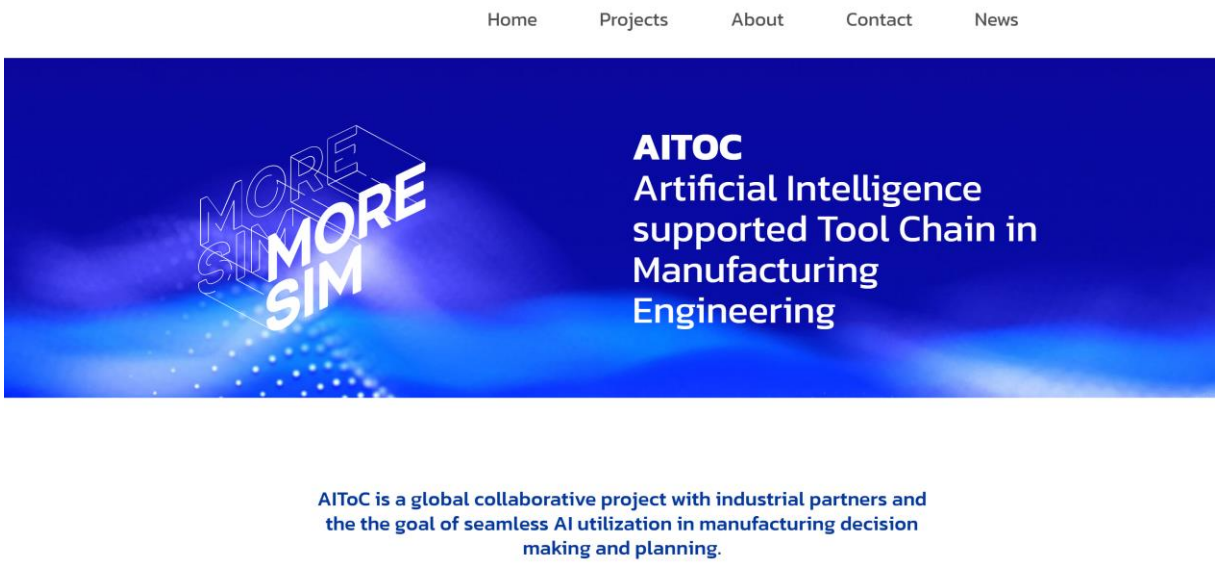


Figure 8 Partner page project home page

The partner pages contain public material available also on the AIToC pages, such as the project vision and introductions of the project consortiums. The pages also contain short introductions of the project use cases, funding partners and existing networks.

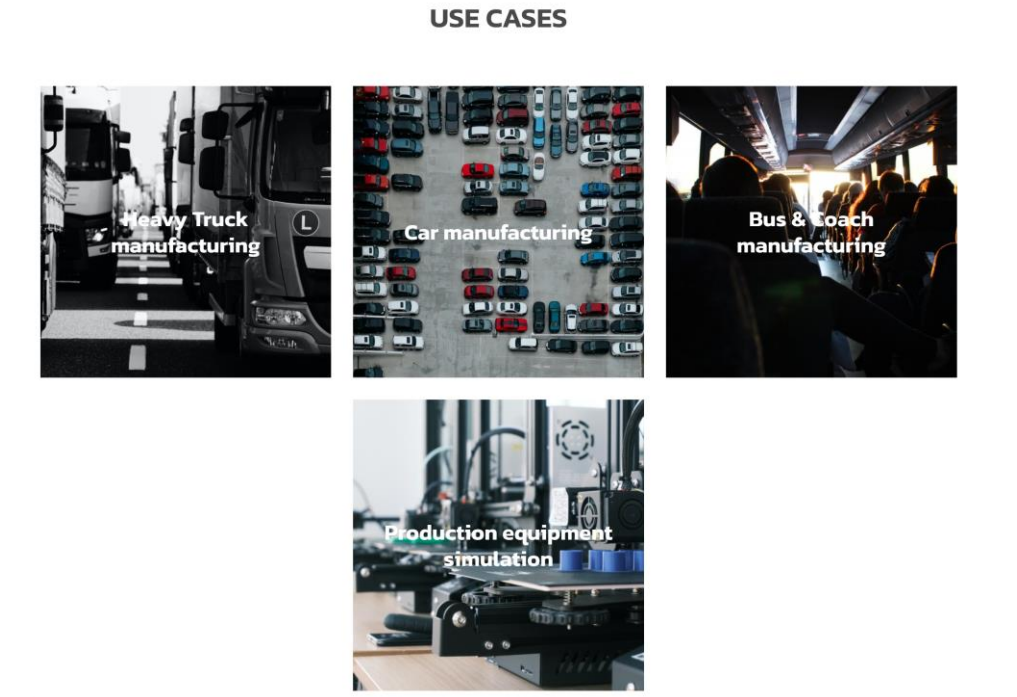


Figure 9 Use cases introduction

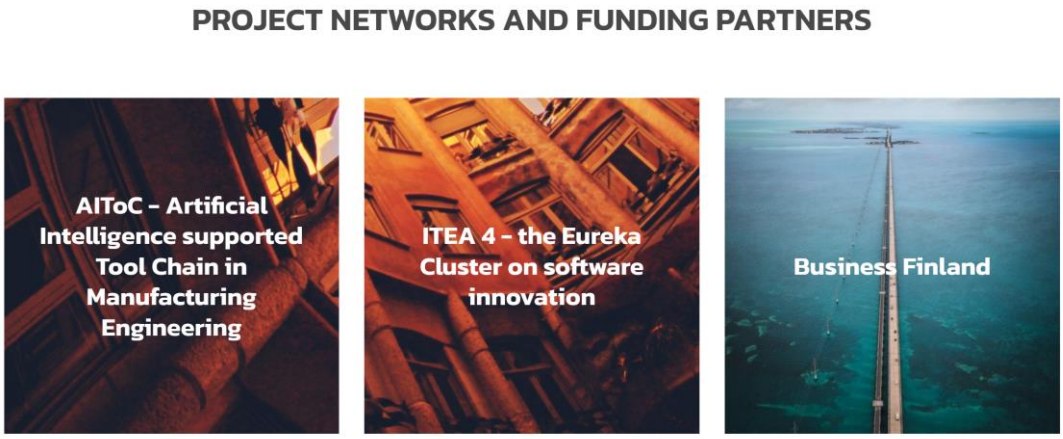


Figure 10 Introduction to national networks and funding agencies

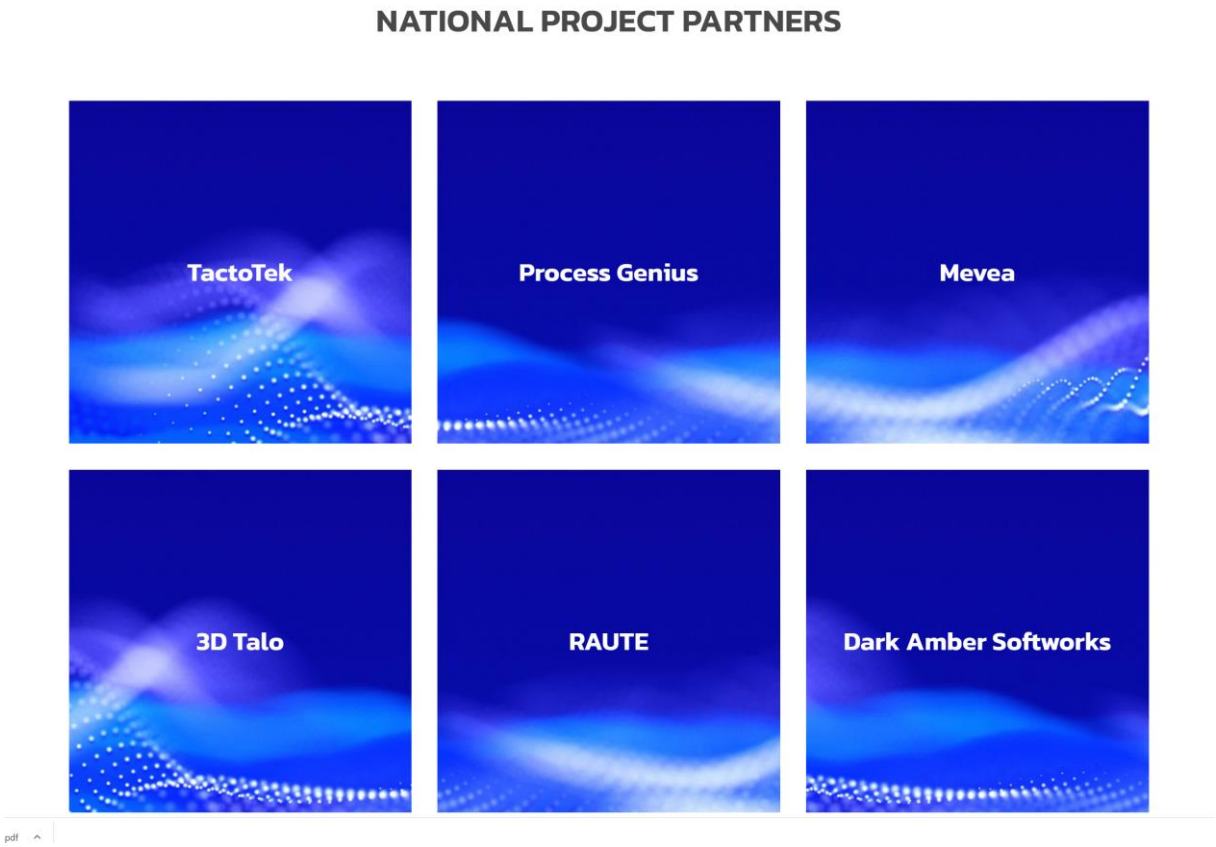


Figure 11 National project partners

6.3 Publications and conferences

Consortium partners will produce peer reviewed scientific publications relating to the foreground of the project. Publications will be pursued broadly in the following scientific areas and their intersections: combined AI and simulation modelling, digital human modelling;

computer science etc. The aim is to have achieved major scientific publications in academic journals corresponding to the core parts of the project (WPs 1-6). Similarly, participation in national and international scientific conferences with papers will also be encouraged. The AIToC public webpages hosts a location where material available for sharing can be collected. Publications in other channels can further be added to the pages either as third party links, full files or news, depending on the content of the publication.

Figure 12 Position of AIToC publications outlet

Table IV List of conferences and publications

Topic	Name of conference	Date
Understanding user-driven disruption in design for digital working environments	Annual conference: International Society of Professional Innovation Manager	December 2021
Extensible Worker Assistance (EWA): Presenting a Comprehensive Framework for Context-Aware Assistance in Manual Assembly	15th CIRP Conference on Intelligent Computation in Manufacturing Engineering, Gulf of Naples, Italy	July 2021
Context-aware worker assistance: Potential of demonstrations by virtual humans in AR	12th International Conference on Applied Human Factors and Ergonomics	July 2021
Modeling of Formalized Process Description by using Pi-Calculus	IFAC World Congress 2023	June 2022
Enhancements in Formal Process Description	EKA 2022 - Entwurf komplexer Automatisierungssysteme	1st June 2022
ENASE (17th Int. Conference on Evaluation of Novel Approaches to Software Engineering)	Online	April 2022
Integration of monitoring systems for AI-aided process optimization in structural electronics	10th European Expert Workshop on Reliability of Electronics and Smart Systems, EuWoRel 2022	September 2022
Digital Twin at EvoBus	Fachkongress Digitale Fabrik	September 2022

6.4 Thesis and dissertations

The project will serve as an empirical material for several Bachelors, Masters and Doctoral dissertations. Prior to publication, the project consortium accepts and monitors that the content does not harm the agreed project anonymity, and it can be freely published as academic and scientific content. When possible, additional options for wider accessibility via Open Access will be investigated.

Table V Summary of dissertations

Topic	Status and Type
Digital twin modelling and simulations using FMU/FMI	June 2021/Masters Thesis
Efficient Generation of worker instructions	April 2022/Masters Thesis
Assisted generation of workplans	June 2022/Masters Thesis
Time series data pre-processing	May/2022/Masters Thesis
Factory Layout simulation	July 2022/Masters Thesis
AI and business	August 2026/Doctoral Thesis
AI and business	August 2026/Doctoral Thesis

6.5 Press releases and non-scientific publications

Any opportunity to be presented through mass media including references on the radio or television, articles in the popular press (newspapers and magazines) and the internet (e.g. In technological news services) will be encouraged to reach large audiences of possible stakeholder communities and to develop general interest in the manufacturing engineering industry with respect to technological innovation. Consortium members are motivated to make use of any such opportunities at the national level as it would ensure good quality, targeted communication, thus establishing credibility to the project.

Table VI List of press releases, news and publications

Title	Channel
Web page for the project	www.aitoc.eu
Non-academic article on future engineering projects	https://easyengineering.eu/
post on LinkedIn about progress in wp4	
Second project page	www.moresim.fi/aitoc
Webpages updates	www.aitoc.eu

7 Monitoring and planning

Systematic monitoring and proactive planning ensure active dissemination management here critical communication points during project lifetime are identified and proactively planned for. LUT coordinates the planning activity and enables consortium members collectively reach synergies in their individual dissemination activities. Through the lifetime of the project, the dissemination planning is an ongoing activity, which is discussed at every consortium meeting and reported periodically. Dissemination activities are also closely monitored by LUT by a systematic method relying on a process of self-reporting. In order to reach targeted outreach for different audiences, LUT will utilize information from systematic monitoring to continually adjust plans. Thus, the consortium is prepared to quickly adapt its communication and dissemination to the changes caused during the lifetime of the project. This document records the monitoring effort with periodic updates thus creating an updated version of the deliverable frequently.