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DELIVERABLE

D7.4 – Integrated Secure and Safe AI Solutions - Final Version

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Executive Summary

This deliverable constitutes the final report on the structure and contents of the STAR Marketplace. With the STAR project reaching its final stage and, therefore, the final results being reported, it was possible to identify all required updates needed to support project results, whether they are technologies and validations from the pilot use cases, training material like courses and workshops or independent platforms or tools developed in STAR.

Since the initial version of this deliverable, D7.3 was on M24, there have been significant content updates and new sections have been added to the STAR marketplace. This follows now the structure outlined below:

- Assets
- Success Stories
- Services
 - STAR Courses
 - Workshops
 - STAR Book
 - Workers' Training Platform
 - AI Trustworthiness Framework
- External Resources
 - External Courses
 - Relevant Communities

In addition to new content types, external platforms and tools have been integrated in the marketplace, namely a course player for the STAR courses described in D7.5 "Training and Innovation Management Services", the Workers' Training Platform described in D5.10 "Workers' Training Platform - Final version" and the AI Trustworthiness Framework described in D7.6 "Safety and Security Certification Programme for AI Services in Manufacturing - Initial version" and D7.7 "Safety and Security Certification Programme for AI Services in Manufacturing - Final version" respectively.

Visually, the marketplace also underwent a few upgrades to accommodate the increase of content. The STAR marketplace now provides support to all the content required to cover all the project results. With the final structure defined and implemented, the marketplace will remain open to content updates provided by the respective owners.

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Definitions, Acronyms and Abbreviations

Acronym/ Abbreviation	Title
AI	Artificial Intelligence
CMS	Content Management System
IoT	Internet of Things
VDIH	Virtualised Digital Innovation Hub
WP	Work Package

1 Introduction

This deliverable constitutes the final report on the structure and contents of the STAR Marketplace. With the STAR project reaching its final stage and, therefore, the final results being reported, it was possible to identify all required updates to support the project results, whether they are technologies and validations from the pilot use cases, training material like courses and workshops or independent platforms or tools developed in STAR.

1.1 Link to other WP7 Deliverables

The development of the STAR marketplace was reported throughout the project mainly in four deliverables. D7.1 “Market Platform and VDIH Services Specification” presented the first website design, structure and content specification. It outlined what would become the first version of the marketplace, reported in deliverable D7.2 “Market Implementation and VDIH Establishment”.

With the project in M24 and, therefore, the implementation at an advanced stage and some results already available, D7.3 “Integrated Secure and Safe AI Solutions - Initial version” reported a major update in the marketplace’s content.

The deliverable at hand represents the final update of the marketplace, in terms of design, structure and content. Figure 1 represents the followed roadmap for the marketplace implementation in the context of WP7.

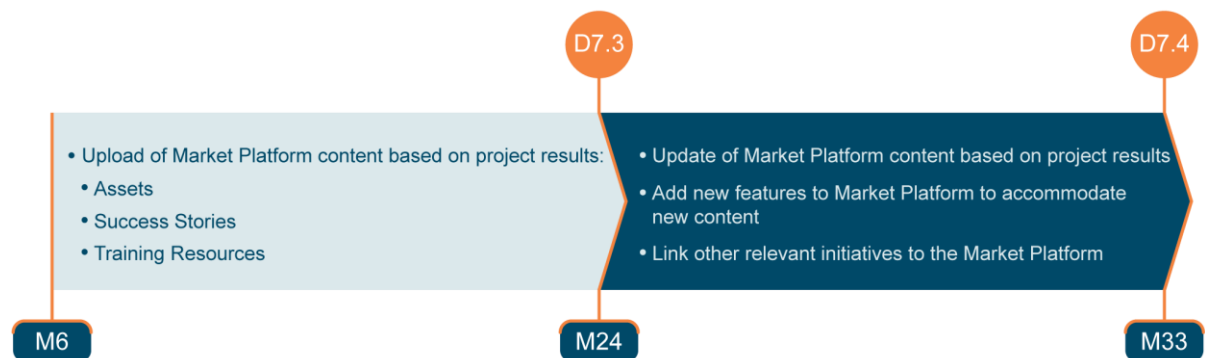


Figure 1: STAR marketplace implementation roadmap in the context of WP7

1.2 Document Structure

This deliverable is organized so that the tools and pages that support the content are introduced prior to the content itself.

Chapter 2 starts with the description of the whole infrastructure that supports the website, followed by a description of all the sections and pages.

Chapter 3 provides the updated content lists for all the sections, with each element linking to the respective marketplace page.

Chapter 4 provides the conclusions taken from the work done along with the next steps to be carried out in order to continue the improvement of the marketplace.

2 Marketplace Structure

STAR Marketplace’s final structure has been defined, implemented and is accessible through the link below.



Figure 2: STAR marketplace logo and URL

In Figure 3, the homepage is presented. It contains sections for all the main content, highlighting some statistics along with the recent content additions.



Figure 3: STAR Marketplace’s homepage

2.1 Marketplace Infrastructure

The marketplace has been developed using WordPress, the most popular open-source Content Management System (CMS) vastly used worldwide. While providing several out of the box features, with its tens of millions of currently live websites and hundreds of millions of monthly visitors, WordPress takes advantage of its vast community of users and developers to stay up to date with new content and features.

Its features can be extended by using external plugins or themes. Plugins allow the use of extra features not available on the basic installation such as: advanced user management, contact forms, integration with external applications among others. Using themes gives the user more freedom and choices on how to customise the look of the web site.

STAR Marketplace uses a customized theme and a variety of third party plugins in order to provide all the required functionalities, namely, the integration with external platforms, user management and visual elements. The following section will describe the main tools developed or used to achieve these functionalities.

2.1.1 IoT-Catalogue.com Integration

[IoT-Catalogue.com](https://www.thingiverse.com) is a web-based tool developed by UNPARALLEL meant to be the one-stop-source for IoT knowledge, innovations and technologies, aiming to help IoT stakeholders (developers, integrators, advisors, end-users, etc.) to take the most advantage of the Internet of Things for the benefit of society, businesses and individuals. It serves as an explorer for innovations in IoT applications and technologies; that is, a web-based tool that enables to pick & choose IoT solutions; a wide repository of knowledge, use cases, contacts, etc. of the Internet of Things.

In the context of the STAR marketplace, IoT-Catalogue.com serves as the main backend source, as it already provides the functionalities to add and edit the majority of the content types required in the marketplace. The integration of the IoT-Catalogue.com content in the STAR marketplace is done via the IoT-Catalogue plugin for WordPress, responsible for importing and updating the content associated to the specific data subscription created. For each type of content, a new port type is created and the database is populated with the respective posts that, visually, provide all the content available on IoT-Catalogue.com, respecting the colour scheme of the destination website. This integrated content is presented, for example, in Figure 11.

This ease of integration, due to the IoT-Catalogue.com already providing all the required tools, was the main point for choosing it as the main content support platform.

2.1.2 Course Player

The course player is a platform created to support the course content present in the STAR marketplace.

The course player supports multiple content formats such as text, video, presentation, quiz, or a combination of these. The landing page features a details section with all the relevant information on the supported course, such as the instructors and their respective institutions of origin, the price and content specifics of the course. This information is accessed by clicking on the symbol presented on top of the table of contents, as seen in Figure 4. Each course purchased by a user is intended to be stored accordingly so that the user can later return to the course or switch between courses. This is achieved through implementing a database for

all registered users where a user profile is created with all information on the purchased courses and their respective progress and use history.

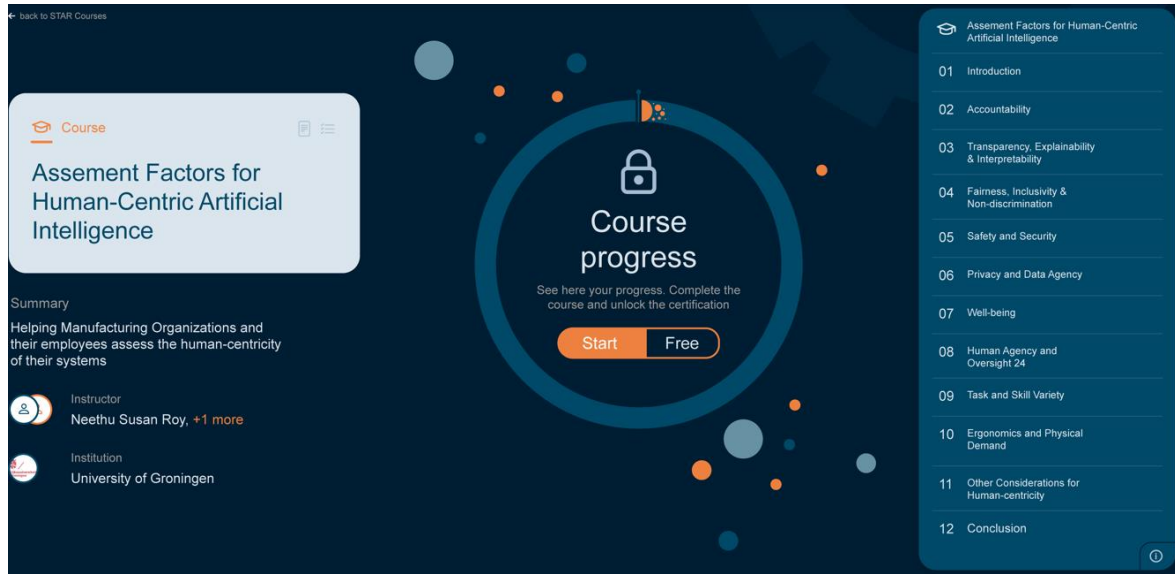


Figure 4: Course player landing page

The table of contents, presented on the right, in Figure 4, displays the course divided into its respective chapters, each chapter discriminates the type of content present in it. Each chapter that is marked as completed is signalled in the table of contents with a “check” symbol. The last chapter to be consulted is also registered in the table of contents as an “eye” symbol. Each time a new chapter is marked as complete the progress circle featured in the landing page is incremented. The course is finished when all chapters are marked as complete. Once the course is finished and the progress circle reaches 100% a certificate of completion, sharable on all social media platforms is unlocked.

Figure 5 presents the popup menu of the course player. When hovering the items of the table of contents a chapter menu in the form of a popup is presented with each sub-chapter and its featured contents.

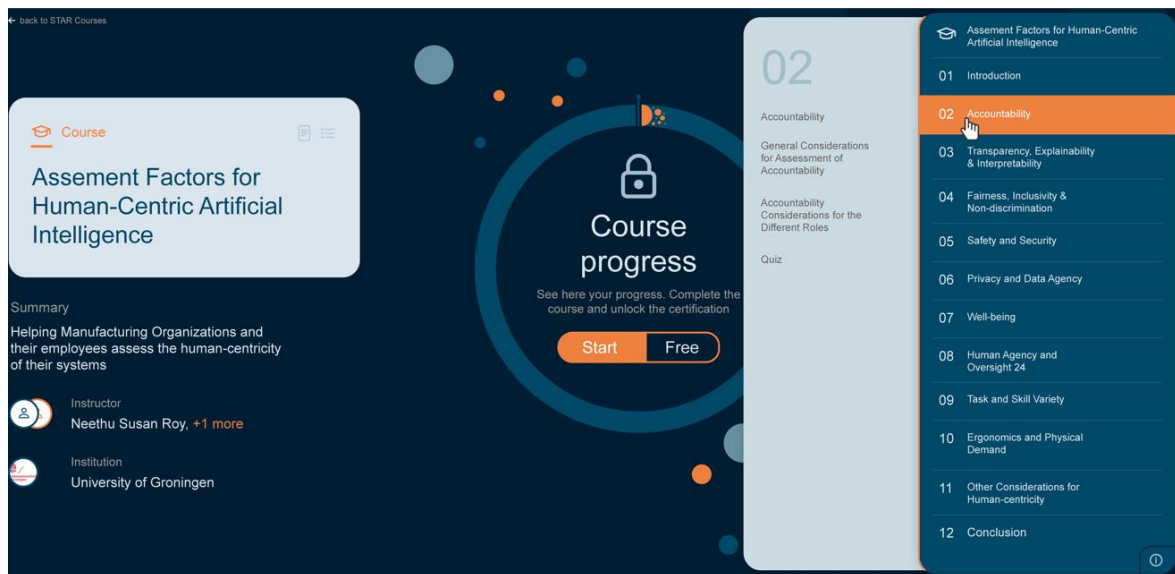


Figure 5: Course player with popup menu opened

The chapter page of the player includes a clickable chapter menu on the left and the content of the chapter presented on the right. The contents presented in each chapter can be text, video, presentation, or any combination of these.

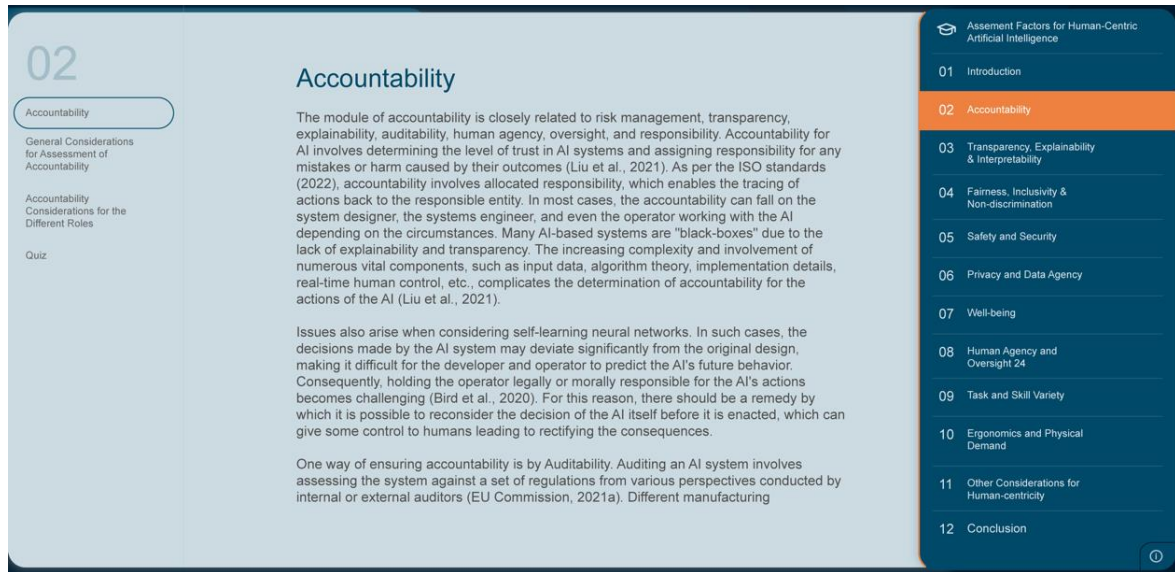


Figure 6: Course player chapter page

Each chapter is complete when the user marks it as read in a checkbox, with no other form of validation needed. The courses are educational and are not intended to test the user's knowledge, as such, there is no verification if the user read all content or if the featured quizzes are answered. The quiz is merely a tool to assist the integration of the acquired knowledge, because of that the quiz is designed so that the correct answer is presented as soon as the user responds to a question and small text with the explanation of each question is also presented as a support for the quiz.

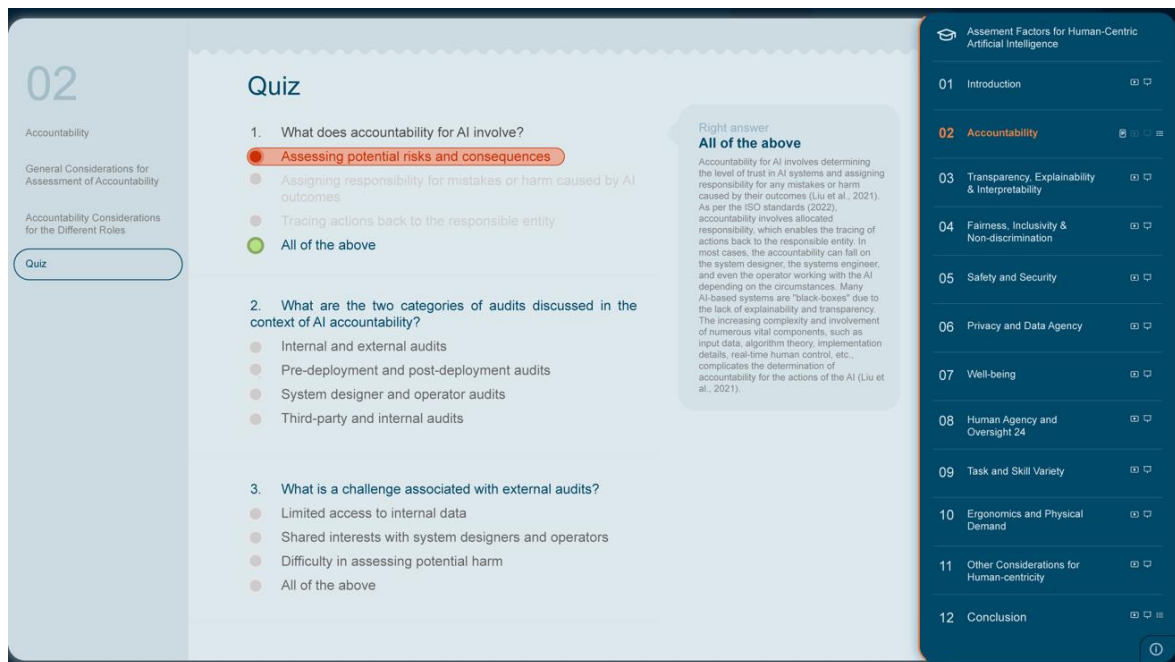


Figure 7: Quiz section of a chapter page

2.1.3 User Management

For user management, the Ultimate Member plugin is used. It provides all the required register and login forms, user role management, social login and individual page access control.

By clicking the “Sign In” tab of the navigation bar or while trying to access restricted content, the user is presented with the login page shown in Figure 8.

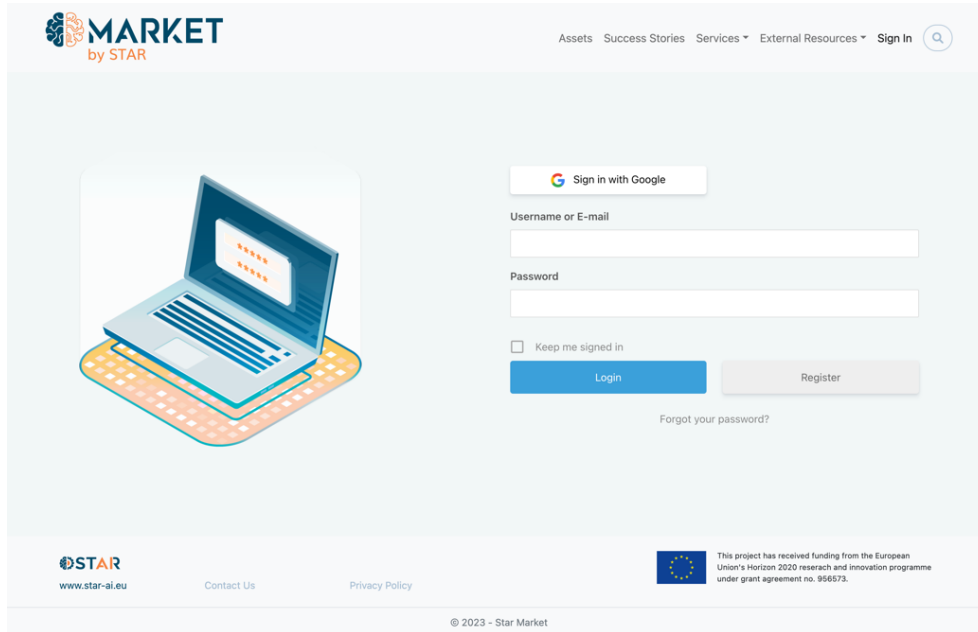


Figure 8: Login page

If the user is not yet registered, they can do so by clicking “Register” and going to the page shown in Figure 9.

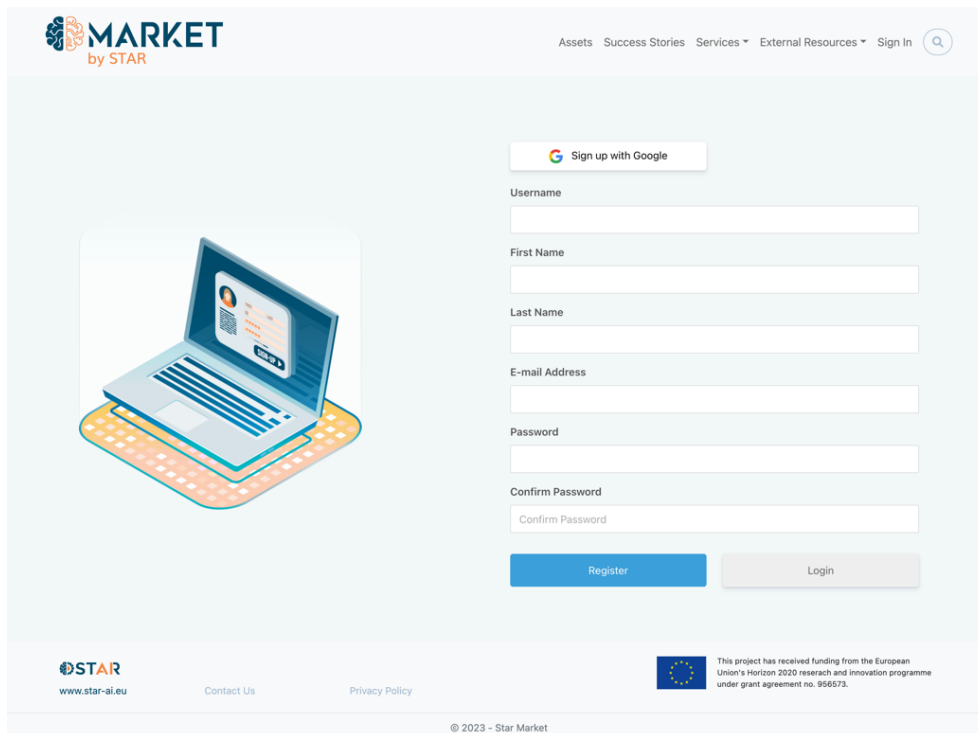


Figure 9: Register page

2.2 Structure

The marketplace follows the structure outlined below:

- Assets
- Success Stories
- Services
 - STAR Courses
 - Workshops
 - STAR Book
 - Workers' Training Platform
 - AI Trustworthiness Framework
- External Resources
 - External Courses
 - Relevant Communities

The Services section has been restricted to registered users only. The remaining content has been left accessible to everyone. In the next sections, all the marketplace pages are introduced.

2.2.1 Assets

In the [Assets section](#), all the available Assets are listed, as shown in Figure 10.

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Assets Success Stories Services External Resources Sign Out

Assets

Active Learning (AL)

This module provides a placeholder for AL systems i.e., AI systems that can consult an authority (e.g., a...

AI Cyber-Defence Strategies (ACDS)

The module implements different strategies in response to various attacks against AI system, notably poisoning and evasion attacks.

AMR Safety

It is composed by a safety zone detector and a robot planner. The first module will be used...

Distributed Ledger Services for Data Reliability (DLSDR)

Distributed Ledger Services for Data Reliability (DLSDR) provides a decentralized data reliability solution for industrial AI algorithms configurations...

Explainable Artificial Intelligence (XAI) Models and Library

This module provides and executes Explainable Artificial Intelligence models and algorithms.

Fatigue Monitoring System (FaMS)

FaMS uses artificial intelligence (AI) models relying on machine learning to estimate fatigue exertion level and mental stress...

Feedback Module

The feedback module interfaces to some interaction modules (e.g., GUI or NLP) that enable the transfer of user...

Human Digital Twin Core Infrastructure (HDT)

The platform supports human in the loop processes, provides feedback/results on workers' safety and performance.

Natural Language Processing (NLP)

Natural Language Processing related components, proof of concepts and recommendations to facilitate the interaction between humans and machines...

Production Processes Knowledge Base (PPKB)

This module consolidates domain knowledge about the production processes of the manufacturing environment.

Risk Assessment and Mitigation Engine (RAME)

This module is destined to assess risk for assets associated with AI-based systems in manufacturing lines.

Runtime Monitoring System (RMS)

RMS is a Data collection framework which provides the specifications and relevant implementation to enable a real time...

1 2

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Figure 10: Assets page

By selecting one, all the details of the respective asset are presented as shown in Figure 11.

[Assets](#) [Success Stories](#) [Services](#) [External Resources](#) [Sign Out](#)

[Home](#) / [Assets](#) / AMR Safety

AMR Safety

It is composed by a safety zone detector and a robot planner. The first module will be used to provide insights on the safe placement of robots in a manufacturing environment.

TRL 4

Developers THALES, University of Groningen

Communication Ethernet

Developed in Project STAR

Provide Insights Safety Zone Detection

Trend Industry 4.0 Artificial Intelligence

Type of Machine Learning Supervised Object Classification Frugal Learning Object Classification Unsupervised BG Subtraction Reinforced AMR Planner Deep Learning Skeleton Reconstruction

Types Software System

Description

The solution is conceived by merging the following technologies:

- Dynamic object detection via CNN
- Skeleton extraction by human pose detection convolutional neural network (CNN)
- 3D-localization and motion in the infrastructure and estimation of human-robot distances using the geometric calibration of fixed RGB cameras
- Heterogeneous and homogeneous multi-sensor fusion merging video analytics results coming from cameras dispatched in the production lines including other localization sensor data
- All these elements are used to obtain a spatial density map, called HeatMap, that will feed a planner to define a safe trajectory for a fleet of robots

This module requires that the work floor layout is monitored actively using cameras. Two ceiling-mounted cameras will stream video data to create real-time layout of the area. Having the livestream data from these two-ceiling cameras allow the layout monitoring and, using the THALES vision-based algorithm, define the safety zones for the robot. The workers, as well as the obstacles, will be detected and an anonymised density chart will be obtained to feed a module that creates a safety path for the robots. There will be no stored data as the layout can change at any time. However, a link to stream the live video will be provided. For experimental purposes, data could be collected and stored

Used On

Human intention recognition

1	1	8	4	3
Validations	Places	Components	Value Propositions	ICT Problems

Robot reconfiguration based on the dynamic layout

1	1	7	4	3
Validations	Places	Components	Value Propositions	ICT Problems

Dynamic Path Planning

1	1	8	4	3
Validations	Places	Components	Value Propositions	ICT Problems

[Use Cases](#) [Projects](#)

Reference 19 Documents

Documentation 19

- ["Background modeling methods in video analysis: A review..."](#)
Y. Xu, J. Dong, B. Zhang and D. Xu
- ["Adaptive background estimation and foreground detection..."](#)
C. Ridder, O. Munkelt and H. Kirchner
- ["Adaptive background mixture models for real-time tracking..."](#)

- ["Wallflower: Principles and practice of background..."](#)
K. Toyama, J. Krumm, B. Brumitt and B. Meyers
- ["Image segmentation in video sequences: A probabilistic..."](#)
N. Friedman and S. Russell
- ["Non-parametric model for background subtraction,..."](#)

Media Gallery 1 photo

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Figure 11: Single Asset page

2.2.2 Success Stories

In the [Success Stories section](#), all Success Stories are listed as shown in Figure 12.

The screenshot shows the 'Success Stories' page on the STAR Market website. The page header includes the STAR Market logo and navigation links: Assets, Success Stories, Services, External Resources, and Sign Out. The main content area is titled 'Success Stories' and features a list of ten success stories, each presented in a card format. Each card includes a partner logo, a title, and a brief description of the project.

Partner	Success Story Title	Description
IBER-OLEFF	Agile production management system data integrity and reliability	In this use case it is planned to identify external and internal threats to information systems affecting the production system, mitigate them, and reduce as much as possible the harmful effects.
DFKI	Dynamic Path Planning	The "Human intention recognition" and "Robot reconfiguration based on the dynamic layout" use cases are going to be combined to have a safe environment for the workers and the hardware equipment. The newly received coordinates of the stations will be used to set...
PHILIPS	Easy reconfiguration for automated part handling	In this use case, three different building blocks are defined that together could provide flexibility from a part handling perspective. The first building block revolves around the development of a system for automated part recognition and detection. In this building block, the...
IBER-OLEFF	Employee training for the reduction of human errors	This use case is intended to identify and quantify human errors associated with the assembly process. With the help of the right tools, it is expected to achieve better-operating methods and better management of human resources on the assembly line.
DFKI	Human intention recognition	This use case plans to detect the human activities and predict their next actions, which then will be combined with robot navigation to create a safer environment. For this matter, DFKI created typical worker scenarios, happening during normal daily work. The behavior...
PHILIPS	Human supervised learning for visual quality inspection	In this use case, we aim to investigate and implement solutions that can help setup quality inspection systems in an easy and flexible manner. Normally visual quality inspection systems are trained based on extensive datasets and can be easily optimized due to...
IBER-OLEFF	Production planning optimization	This use case has as its main objective the reduction to a minimum of unfinished product stocks. Practically, there will always be a certain stock of the unfinished product, i.e., injected components and purchase elements that will be assembled according to the...
IBER-OLEFF	Production processes simulations for accelerated decisions and safe processes	This use case assumes the development of an IT solution that will help production management in making high-level decisions. This solution will be based on real-time simulation of the production process and will benefit from instant production data as well as their...
DFKI	Robot reconfiguration based on the dynamic layout	This use case consists in the dynamic update to the navigation route of the mobile robot, by considering human and/or other (non-moving) objects in the environment. This use case will also enable easier reconfiguration of the robot in case the layout of...
PHILIPS	Safe collaboration between human and robot	This use case is related to the implementation of the human digital twin. This innovative technology is developed to measure and analyse the human aspect within production. The goal is to measure aspects like physical stress, mental stress, job engagement, happiness, and many...

The footer of the page includes the STAR logo, contact information, a privacy policy link, the 'Powered by IOT CATALOGUE' logo, and a European Union logo with text: 'This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no. 956573.' The copyright notice is '© 2023 - Star Market'.

Figure 12: Success Stories page

By selecting one, all details about the respective success story are presented as shown in Figure 13.

MARKET by STAR Assets Success Stories Services External Resources Sign In

Success Stories / Human supervised learning for visual quality inspection

PHILIPS

Human supervised learning for visual quality inspection

In this use case, we aim to investigate and implement solutions that can help setup quality inspection systems in an easy and flexible manner. Normally visual quality inspection systems are trained based on extensive datasets and can be easily optimized due to mass-production and data collection. However, to setup an automated visual quality inspection for lower volume production, alternative solutions are needed since the data volumes available will decrease significantly. Therefore, the aim of this use case is to setup an automated quality inspection in a quick and easy way by employing active learning to the quality inspection algorithms. This would enable the setup of such an automated quality system with a relatively small dataset after which the system can continue learning based on operator input to cases in which the algorithm is not sure about its quality assessment. By doing this, we are aiming to utilize the best of both machines and humans to create a dynamic and efficient production environment.

Domain: Manufacturing Human-AI Collaboration

Trend: Artificial Intelligence

Validation Type: Use Case

Summary

Map: Philips Factory location

Statistics: Countries: 1, Regions: 1, Components: 13, ICT Problems: 4, Value Propositions: 4, Places: 1

Human supervised learning for visual quality inspection

Timeline: 01 Jan 2021 (Planned), 31 Dec 2023 (Ongoing), 01 Jan 2024 (Ended)

Places

Philips Factory

White Goods & Appliances (Type of Production), Factory (Type of Place)

Team

Contact: Bas Snijders (bas.snijders@supsi.com)

Entity: SUPSI (Switzerland), PHILIPS (Netherlands)

Characterization

Value Proposition: Improve Flexibility, Reduce Time to Market, Reduce Repetitive Tasks, Improve Quality

ICT Problem: Inspect visual requirements, Learning based on human input, Learning based on incomplete datasets, Learning based on small datasets

Function: Inspect (Products, Dust, Minor Scratches, Colour Differ..., Learning (Human Input, Incomplete D...)

Target: Production System, Products, Domain (Manufacturing)

Solutions

1 Solution, 13 Components

Developed in Project: Apache Kafka, Cobot, Cobot Vision, Risk Assessment and Mitigation Engine (RAME), Runtime Monitoring System (RIMS), Feedback Module, Star Security Policies Manager (SSPM), Active Learning (AL), Distributed Ledger Services for Data Reliability (DLSDR), AI Cyber-Defence Strategies (ACDS), Simulated Reality (SR), Explainable Artificial Intelligence (XAI) Models a...

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Figure 13: Single Success Story page

2.2.3 Services

This section comprises all the content developed in the context of the STAR project, those being:

- STAR Courses
- Workshops
- STAR Book
- Workers’ Training Platform
- AI Trustworthiness Framework

In the following sections, all the services available in the STAR Marketplace will be presented.

2.2.3.1 STAR Courses

In the [STAR Courses section](#), the available STAR Courses are listed as shown in Figure 14.

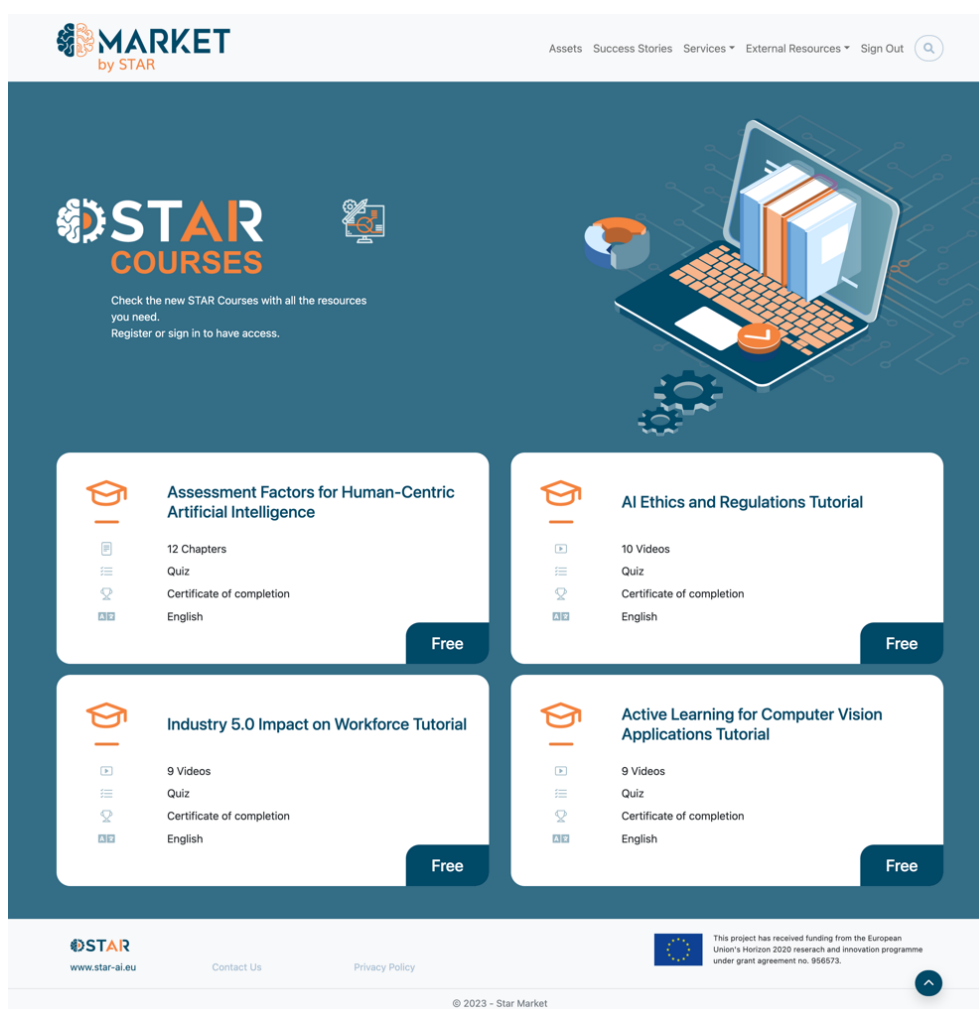


Figure 14: STAR Courses page

By selecting one, the user is redirected to the selected course player page, as shown in Figure 15.

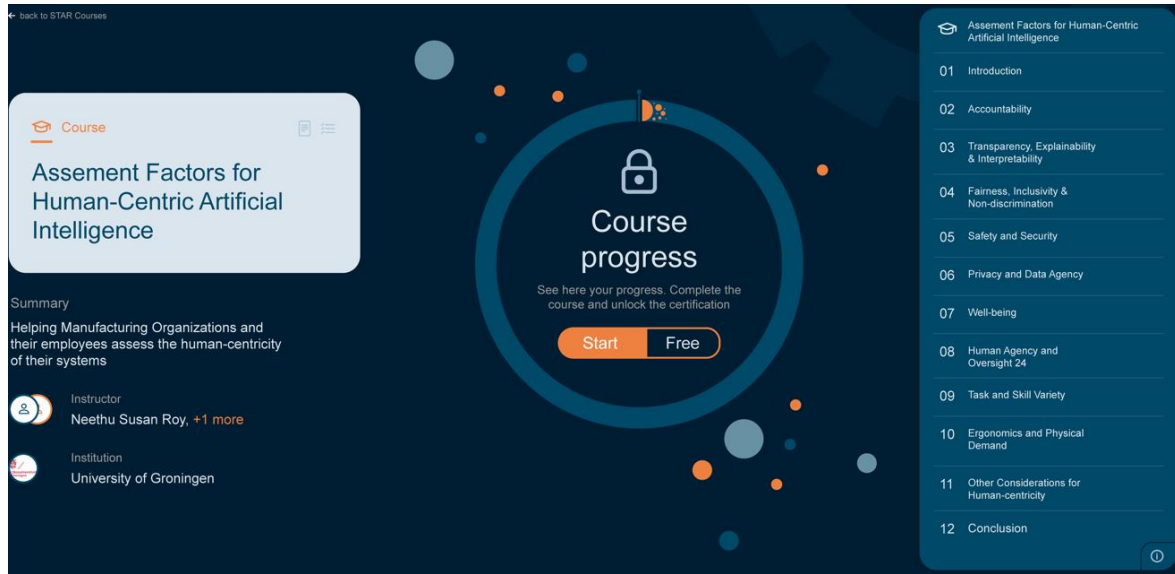


Figure 15: Assesment Factors for Human Centric Artificial Intelligence Course

All four courses mentioned in D7.5 “Training and Innovation Management Services” are being finalized in the Course Player and will be available in the marketplace.

2.2.3.2 Workshops

In the [Workshops section](#), all workshops are listed as shown in Figure 16.

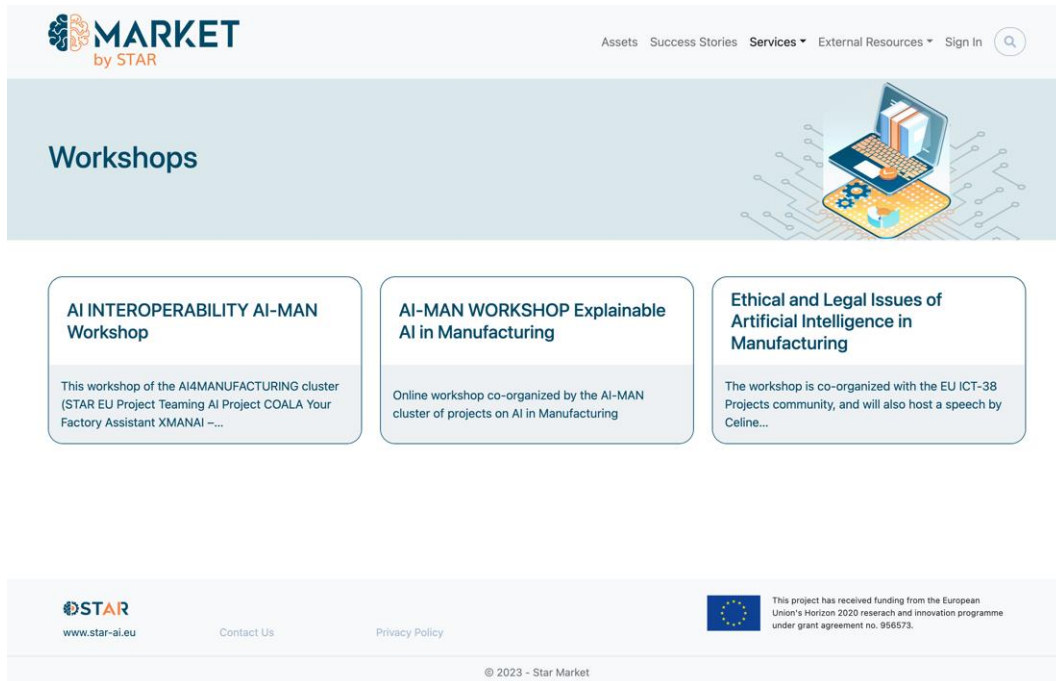


Figure 16: Workshops page

By selecting one, all the details about the workshop are displayed as shown in Figure 17.



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by STAR

Assets Success Stories Services External Resources Sign Out

Workshop / AI INTEROPERABILITY AI-MAN Workshop

AI INTEROPERABILITY AI-MAN Workshop

ai4manufacturing.com

AI-MAN WORKSHOP
AI Interoperability
November 17th, 10:00-12:00 CET

Ver no YouTube

Description

This workshop of the AI4MANUFACTURING cluster (STAR EU Project Teaming AI Project COALA Your Factory Assistant XMANAI – EU Project ASSISTANT Project-H2020) where is presented how data interoperability and artificial intelligence interoperability improves industrial automation in industry 4.0 production lines and digital shopfloors. This workshop focuses on how Data and AI Interoperability Technologies can boost automation processes in the modern digital shopfloor.

Details

11/24/2022 Date
1:40h Duration

Agenda

- 00:00 – 00:05 Introduction to the Workshop
- 00:05 – 00:25 "Manufacturing data, information, and knowledge made actionable", Klaas Gadeyne, H2020 Assistant Project
- 00:25 – 00:45 "On a generalised framework for Time-Aware knowledge graphs", Franz Krause, H2020 Teaming AI
- 00:45 – 01:05 "XMANAI foundations for explainability and interoperable AI", Michele Sesana, H2020, XMANAI Project
- 01:05 – 01:25 "Using Asset Administration Shell for modelling and deploying Planning Agents in a Smart Factory '4", Vasilis Siatras, H2020 MAS4AI Project
- 01:25 – 01:30 Discussion – Workshop closing

Team

- Klaas Gadeyne** Speaker
- Franz Krause** Speaker
- Michele Sesana** Speaker
- Vasilis Siatras** Speaker

Resources

- 1. ICT38_Interoperability_FlandersMake
- 2. TeamingAI-TimeAware-KnowledgeGraphs
- 3. XMANAI AI-MAN Workshop
- 4. [AI-MAN]Using Asset Administration Shell

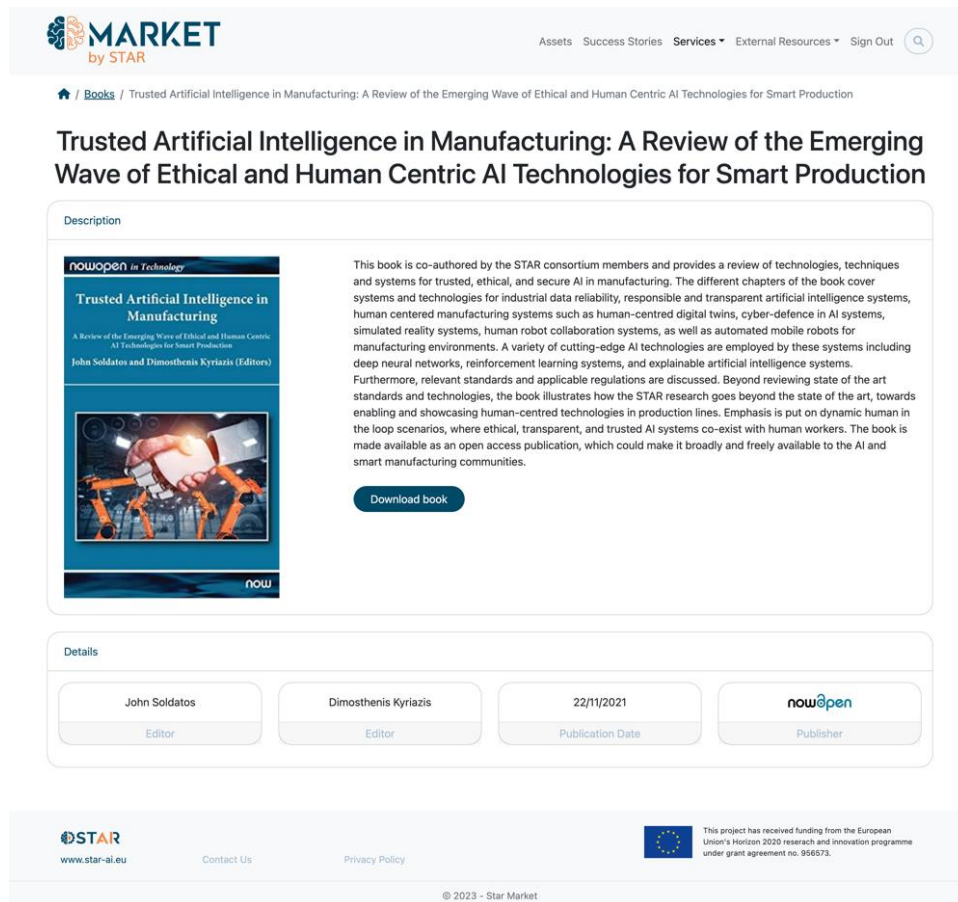
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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no. 956573.

Figure 17: Single Workshop page

2.2.3.3 STAR Book

The [STAR Book section](#) presents the open access book, written by STAR consortium members, on the topic of trusted, ethical, and secure AI in manufacturing. More details on this book can be found in D7.5 "Training and Innovation Management Services". Figure 18 presents the STAR book page.



The screenshot shows the 'MARKET by STAR' website interface. At the top, there are navigation links for 'Assets', 'Success Stories', 'Services', 'External Resources', and 'Sign Out'. The breadcrumb trail indicates the current page is 'Books / Trusted Artificial Intelligence in Manufacturing: A Review of the Emerging Wave of Ethical and Human Centric AI Technologies for Smart Production'.

The main heading is 'Trusted Artificial Intelligence in Manufacturing: A Review of the Emerging Wave of Ethical and Human Centric AI Technologies for Smart Production'. Below this is a 'Description' section featuring a book cover image on the left and a text description on the right. The book cover is titled 'nowopen in Technology' and 'Trusted Artificial Intelligence in Manufacturing: A Review of the Emerging Wave of Ethical and Human Centric AI Technologies for Smart Production' by John Soldatos and Dimosthenis Kyriazis. The description text states: 'This book is co-authored by the STAR consortium members and provides a review of technologies, techniques and systems for trusted, ethical, and secure AI in manufacturing. The different chapters of the book cover systems and technologies for industrial data reliability, responsible and transparent artificial intelligence systems, human centered manufacturing systems such as human-centred digital twins, cyber-defence in AI systems, simulated reality systems, human robot collaboration systems, as well as automated mobile robots for manufacturing environments. A variety of cutting-edge AI technologies are employed by these systems including deep neural networks, reinforcement learning systems, and explainable artificial intelligence systems. Furthermore, relevant standards and applicable regulations are discussed. Beyond reviewing state of the art standards and technologies, the book illustrates how the STAR research goes beyond the state of the art, towards enabling and showcasing human-centred technologies in production lines. Emphasis is put on dynamic human in the loop scenarios, where ethical, transparent, and trusted AI systems co-exist with human workers. The book is made available as an open access publication, which could make it broadly and freely available to the AI and smart manufacturing communities.' A 'Download book' button is located below the text.

The 'Details' section below the description lists the following information:

- John Soldatos** (Editor)
- Dimosthenis Kyriazis** (Editor)
- 22/11/2021** (Publication Date)
- nowopen** (Publisher)

At the bottom of the page, there is a footer with the STAR logo and website URL (www.star-ai.eu), contact and privacy policy links, the European Union logo with a funding notice ('This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no. 956573'), and a copyright notice (© 2023 - Star Market).

Figure 18: STAR book page

2.2.3.4 Workers’ Training Platform

The [Workers’ Training Platform section](#), presents the main features and redirects to this platform developed in STAR, described in detail in D5.10 “Workers’ Training Platform - Final Version”. As shown in Figure 19, four sections describe the main functionalities, with links to visit the platform.

Figure 19: Workers' Training Platform

2.2.3.5 AI Trustworthiness Framework

In [this section](#), the AI trustworthiness evaluation framework is presented. The page shown in Figure 20 introduces the user to this self-assessment tool, described in detail in D7.6 “Safety and Security Certification Programme for AI Services in Manufacturing - Initial version”.

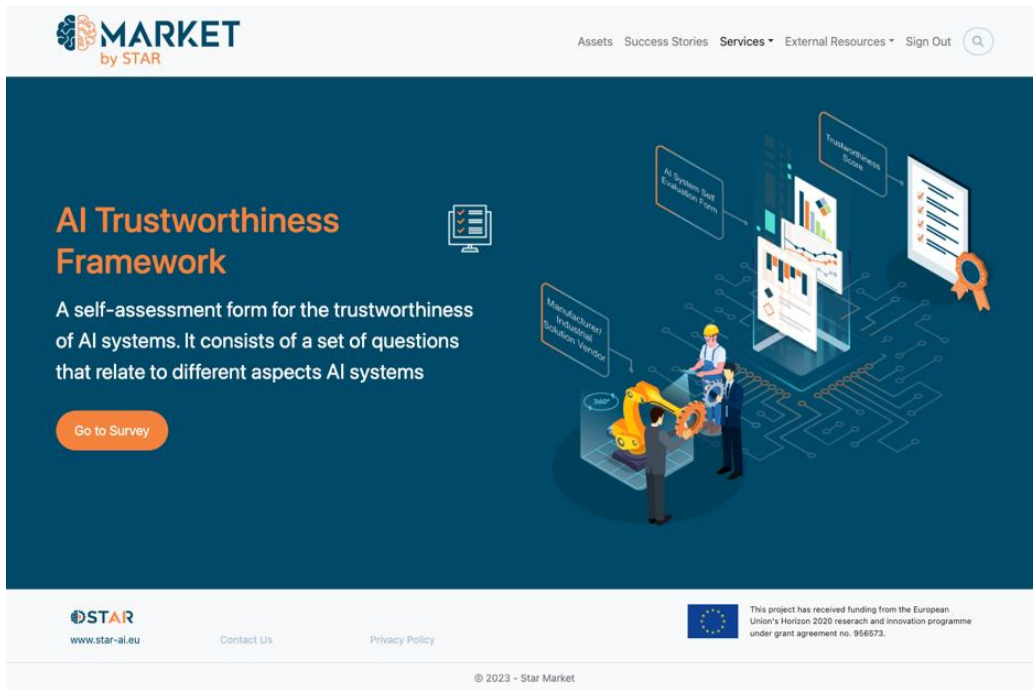


Figure 20: AI Trustworthiness Framework page

By clicking the “Go to Survey” button, the user is taken to the survey page. For this purpose, a survey was created using the SurveyMonkey platform, as shown in Figure 21 and Figure 22.

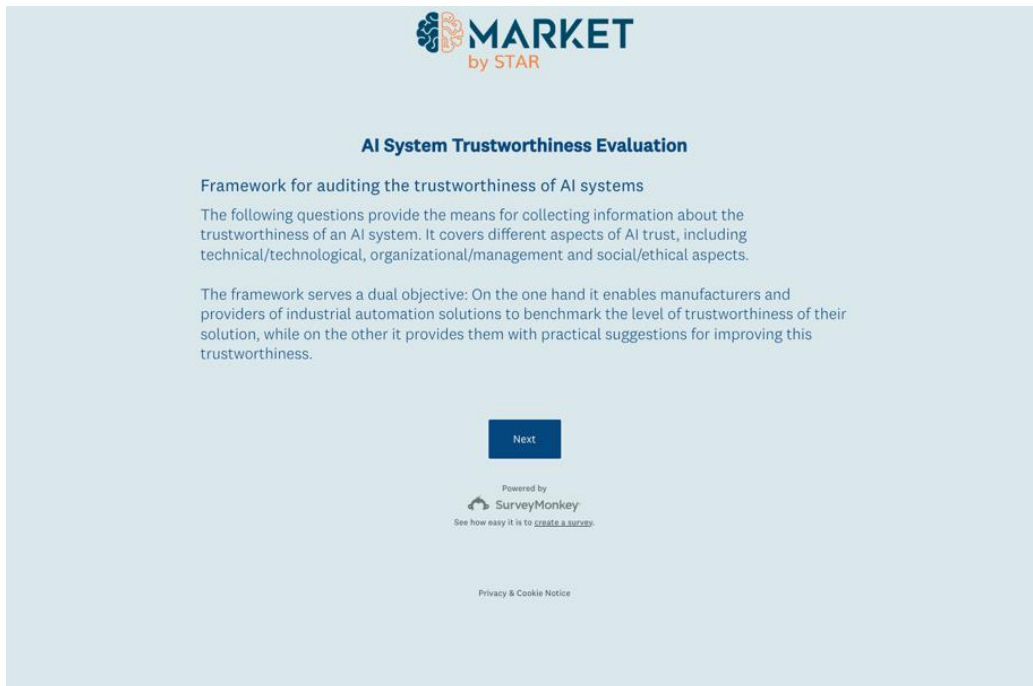


Figure 21: AI System Trustworthiness Evaluation survey entry page



Figure 22: AI System Trustworthiness Evaluation survey

This 14 question survey was designed to evaluate the trustworthiness of an AI system. The user must check all the boxes that apply to their system and, at the end, a score is given based on the number of checked boxes, along with a summary of all responses.

2.2.4 External Resources

This section comprises a collection of external content and sources that directly relate to the STAR project and its topics. In the following section all these external resources subsections are presented.

2.2.4.1 External Courses

The [External Courses section](#) consists of a list of courses from external sources that directly relate to the STAR project and its topics. In this section, all these courses are listed as shown in Figure 23.



Figure 23: External courses page

By selecting one, all the details about that specific course are presented as shown in Figure 24.

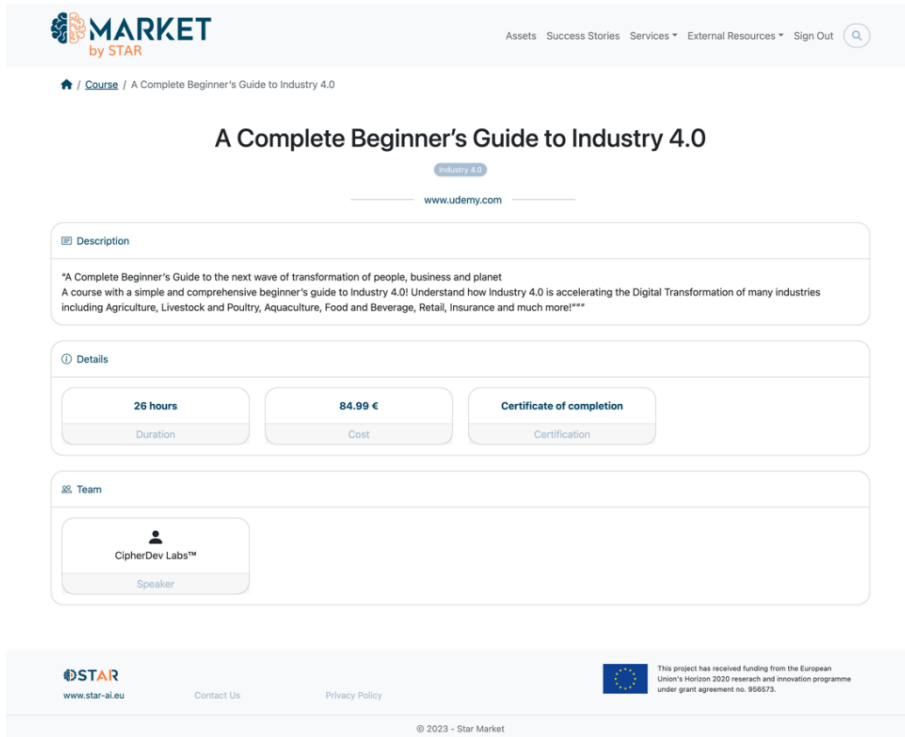


Figure 24: Single external course page

2.2.4.2 Relevant Communities

In [this section](#) all digital communities that powered the STAR marketplace and provided its content are listed, each one redirecting to their website, as shown in Figure 25.

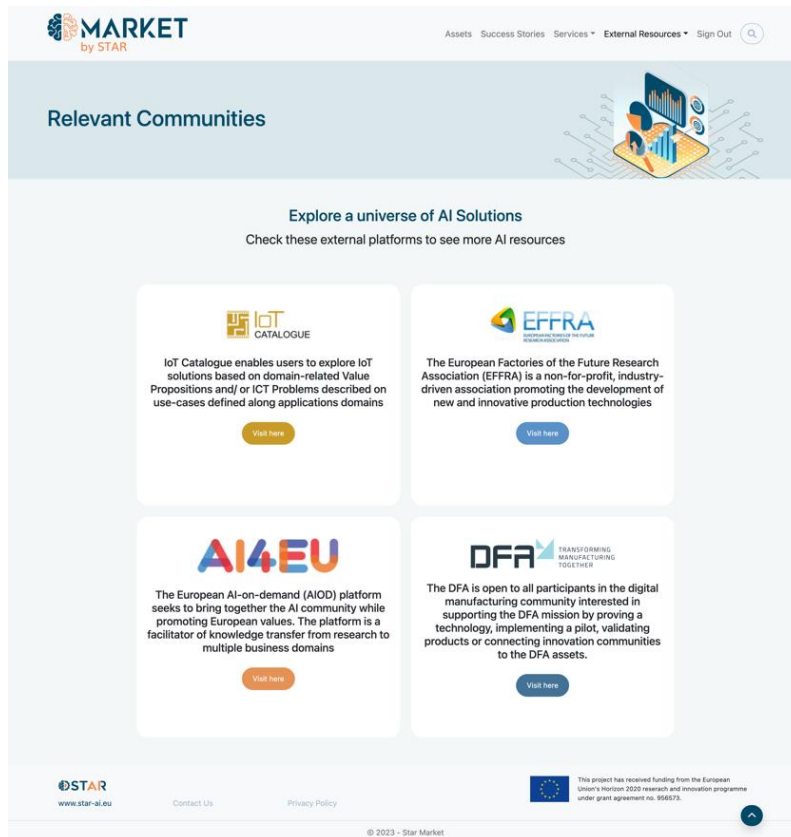


Figure 25: Relevant communities page

3 Content

This chapter describes the content status of the STAR marketplace. It is divided according to the marketplace structure and for all the sections where required, its content is listed along with a link to the STAR marketplace.

Content-wise, as of the delivery of this document, STAR marketplace has:

- 15 Assets
- 10 Success Stories
- 5 Services
 - 4 STAR Courses
 - 3 Workshops
 - 1 Book
 - Workers’ Training Platform
 - AI Trustworthiness Framework
- 2 External Resources
 - 43 External Courses
 - 4 Relevant Communities

3.1 Assets

The assets list, presented in Table 1, has been updated with the most recent available info and may suffer more updates in the future.

Table 1: List of available assets

Asset Name	Link
Active Learning (AL)	Market by STAR
AI Cyber-Defence Strategies (ACDS)	Market by STAR
AMR Safety	Market by STAR
Distributed Ledger Services for Data Reliability (DLSDR)	Market by STAR
Explainable Artificial Intelligence (XAI) Models and Library	Market by STAR
Fatigue Monitoring System (FaMS)	Market by STAR
Feedback Module	Market by STAR
Human Centred Digital Twin (HDT)	Market by STAR
Natural Language Processing (NLP)	Market by STAR
Production Processes Knowledge Base (PPKB)	Market by STAR
Risk Assessment and Mitigation Engine (RAME)	Market by STAR
Runtime Monitoring System (RMS)	Market by STAR

Star Security Policies Manager (SSPM)	Market by STAR
Simulated Reality (SR)	Market by STAR
Workers Activity Recognition (WAR)	Market by STAR

3.2 Success Stories

The success stories list, presented in Table 2, has been updated with the most recent available info and may suffer more updates in the future.

Table 2: List of available success stories

Success Story Name	Link
Agile production management system data integrity and reliability	Market by STAR
Dynamic Path Planning	Market by STAR
Easy reconfiguration for automated part handling	Market by STAR
Employee training for the reduction of human errors	Market by STAR
Human intention recognition	Market by STAR
Human supervised learning for visual quality inspections	Market by STAR
Production planning optimization	Market by STAR
Production processes simulations for accelerated decisions and safe processes	Market by STAR
Robot reconfiguration based on the dynamic layout	Market by STAR
Safe collaboration between human and machine	Market by STAR

3.3 Workshops

The workshops list, presented in Table 3, has been updated with the most recent available info and may suffer more updates in the future.

Table 3: List of available workshops

Workshop Name	Link
AI Interoperability AI-MAN Workshop	Market by STAR
AI-MAN WORKSHOP Explainable AI in Manufacturing	Market by STAR
Ethical and Legal Issues of Artificial Intelligence in Manufacturing	Market by STAR

3.4 External Courses

The external courses list, presented in Table 4, has been kept up to date with the courses still available and may suffer more updates in the future.

Table 4: List of available external courses

Course Name	Link
A Complete Beginner’s Guide to Industry 4.0	Market by STAR
A Subjective Introduction to the IoT	Market by STAR
Advanced Diploma in Introduction to Internet of Things	Market by STAR
Advanced Manufacturing Enterprise	Market by STAR
Architecting Smart IoT Devices	Market by STAR
Arduino: Make an IoT environment monitor	Market by STAR
AWS IoT: The Hobbyists Guide to Home Automation	Market by STAR
AWS Serverless Design for IoT	Market by STAR
Beginners Masterclass into Internet of Things	Market by STAR
Big Data Analytics in IOT domain	Market by STAR
Build IOT Apps using Raspberry Pi, AspNet Core and SignalR	Market by STAR
Building a Thing for the Internet of Things IoT	Market by STAR
Building Internet of Things Projects with Arduino IOT Cloud	Market by STAR
Capstone: Autonomous Runway Detection for IoT	Market by STAR
Complete Guide to Build IOT Things from Scratch to Market	Market by STAR
Complete Python 3 and Raspberry Pi Masterclass	Market by STAR
Cyber Security in Manufacturing	Market by STAR
Cybersecurity and the Internet of Things	Market by STAR
Data Analytics in Internet of Things (IOT)	Market by STAR
Data-Driven Decision Making (DDDM) Specialization	Market by STAR
Digital Transformation and Industry 4.0	Market by STAR
Digital Transformation and Industry 4.0 Masterclass	Market by STAR
Digital Transformation from Industry 4.0 to Industry 5.0	Market by STAR
Digital Transformation in Industry 4.0: A Complete Guide	Market by STAR
Digital Transformation of Mining	Market by STAR
Embedded Systems – Shape the World: Multi-Threaded Interfacing	Market by STAR
Embedded Systems Essentials with Arm: Get Practical with Hardware	Market by STAR

Emerging Technologies: From Smartphones to IoT to Big Data Specialization	Market by STAR
Exploring AWS IoT	Market by STAR
Fundamentals of IoT	Market by STAR
Fundamentals of IoT (Internet of Things)	Market by STAR
Get started in Internet of Things	Market by STAR
Hands-on Internet of Things Specialization	Market by STAR
Imagine IoT	Market by STAR
Industrial IoT Markets and Security	Market by STAR
Internet of Things (IoT) – The Mega Course	Market by STAR
Internet of Things (IoT) and Sustainability	Market by STAR
Internet of Things (IoT) Automation using Raspberry Pi 2	Market by STAR
Internet of things (IoT) for Beginners: Getting Started	Market by STAR
Internet of Things (IoT) with Arduino Programming & ESP8266	Market by STAR
Internet of things and everything: A Workshop on ZIGBEE	Market by STAR
Internet of Things Business Impact	Market by STAR
IoT Internet of Things Bundle	Market by STAR

4 Conclusions

This deliverable complements D7.3 “Integrated Secure and Safe AI Solutions - Initial Version”, which focused on the content itself, by providing the infrastructural point of view of the marketplace, along with all the content updates from the third year of the project.

The integration of the Workers’ Training Platform and the AI Trustworthiness Framework has the benefit of aggregating all the project results in one place, not only making them easier to be found by the users but also making it easier to monitor website visitors and, therefore, having a better notion of the dissemination effectiveness.

Currently, the marketplace has:

- 15 Assets
- 10 Success Stories
- 5 Services
 - 4 STAR Courses
 - 3 Workshops
 - 1 Book
 - Workers’ Training Platform
 - AI Trustworthiness Framework
- 2 External Resources
 - 43 External Courses
 - 4 Relevant Communities

STAR marketplace has now reached its final version, with only a few content updates planned. It provides all the required sections to showcase all the project’s results, with the potential of being a core dissemination tool.