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Executive Summary

The main objective of this deliverable is to report on the activities of task T7.5 “Integration and Continuous Collaboration with AI4EU” during the last year of the project. This Task is in charge of integrating the project’s market platform and VDIH with the AI4EU platform and ecosystem. The Task’s scope was to interconnect the two projects/communities with the purpose to collaborate closely in fine-tuning the integration, but also in community and ecosystem building activities. The deliverable at hand is the second and final version of two deliverables prepared about the topic and describes the activities and assets included by STAR in the AI4Europe/AI on Demand (AIoD) platform.

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Definitions, Acronyms and Abbreviations

Acronym/ Abbreviation	Title
AI	Artificial Intelligence
AIoD	AI on Demand Platform
ML	Machine Learning
WP	Work Package

1 Introduction

1.1 Purpose and Scope

The main objective of the STAR project is to conduct research, develop, validate, and provide solutions for trustworthy Artificial Intelligence (AI) in production lines and industrial use cases, with the goal of supporting the emerging human-centered Industry 5.0 paradigm. The project's technical work packages have already produced and validated a diverse array of solutions for trustworthy AI, covering areas such as cyber-security for AI systems, explainable AI systems, trusted human-AI interactions (including trusted Human Robot Collaboration), and safety of digital manufacturing systems in production lines. These solutions have been tested in real-life manufacturing cases in two European factories and a smart factory testbed. Importantly, the solutions are not limited to specific use cases but are designed as broader, reusable infrastructures to enhance the trustworthiness of AI systems in various manufacturing scenarios beyond the project's initial use cases.

The solutions developed enable developers and deployers of industrial solutions to increase the trustworthiness and resilience of their AI-based industrial solutions. Moreover, based on the development of these solutions, the STAR partners have gained experience on the different elements and dimensions of an industrial AI system's trustworthiness, which include technical/technological, organizational/managerial, and social/ethical aspects. This knowledge has been shared both via the project channels but also in a wider audience.

1.2 Methodology

The following document presents the conclusive iteration of the efforts undertaken by Task 7.5 "Integration and Continuous Collaboration with AI4EU". This Task focused on providing input to Work Package 7 "Virtualized Digital Innovation Hub for Secure and Safe AI in Manufacturing" of STAR, with the objective of investigating the potential collaboration between the former AI4EU ecosystem and the now named AIoD (AI on Demand) platform, with the aim of creating mutual benefit.

Figure 1 below, presents the Relationship between Task T7.5 and the other WP7 tasks.

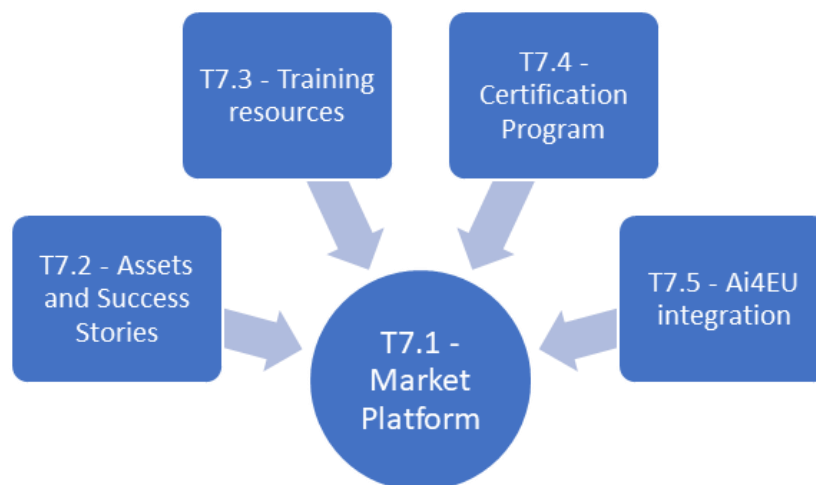


Figure 1: Relationship between T7.5 and WP7 tasks

1.3 Structure of the Document

The structure of the document is as follows:

- Section 2 presents the AI4EU & AIoD (AI-on-Demand) Portal
- Section 3 presents participation and collaboration of STAR with AI4Europe/AIoD.
- Section 4 presents how STAR developments have been introduced in the AIoD platform.
- Finally, Section 5 is the short conclusion of this document

2 AI4EU & AIoD (AI-on-Demand) Portal

In January 2019, the AI4EU consortium was established to build the first European Artificial Intelligence On-Demand Platform and Ecosystem with the support of the European Commission under the H2020 programme.

The AI4EU portal (<https://www.ai4europe.eu/>), now known as the AI-on-Demand (AIoD) portal, is a platform for the development and deployment of Artificial Intelligence (AI) in Europe. It serves as a comprehensive ecosystem for AI research, development, and innovation in the region, connecting AI researchers, developers, and businesses with each other, as well as with data, resources, and funding. The platform is designed to promote the development and use of AI in Europe, reflecting the diverse European AI landscape and offering various resources such as knowledge sharing, research experimentation, and state-of-the-art AI solutions and technologies.

It is an open and easily accessible environment for the European AI community, including researchers, students, SMEs, tech providers, and EU-funded projects, enabling them to contribute, access resources, learn about AI applications, and engage with peers and experts

The AI4EU project was funded under the ICT-26-2018-2020 call¹ about **Artificial Intelligence (AI)**, and it has run from January 2019 to December 2021, intending to **develop a platform** that:

- serves as a **central point** to gather and provide access to **AI-related knowledge**, algorithms, and tools;
- **supports potential users of AI** to facilitate the integration of AI into applications;
- facilitate the **interaction with existing data portals** needed for AI algorithms, and resources, such as HPC or cloud computing, and support interoperability.

At the same time the AI-on-Demand Platform (AIoD) is a community-driven channel designed to empower European research and innovation in Artificial Intelligence (AI), while ensuring the European seal of quality, trustworthiness and explainability. The platform is a fundamental building block of the European Commission's strategy on AI, with the objective of making Europe a world leader in human-centric and trustworthy AI.

The AIoD platform is a community resource, and its success depends on the active engagement of the entire European AI Ecosystem. The platform is therefore open to individuals or organizations interested in technically developing aspects of the platform, leading or contributing to different components, sharing outputs of research or simply sharing news updates or information on forthcoming events. In terms of users invited to use this platform these include AI researchers from academia and industry, students, SMEs, Tech providers and EU funded projects, Digital Innovation Hubs and other EU bodies. These users can benefit from the platform by:

- Technically developing or deploying different components, services or tools.
- Using it as a dissemination channel to share research outputs, news updates or

¹ <https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/topic-details/ict-26-2018-2020>

forthcoming events.

- Accessing AI educational courses and resources.
- Accessing relevant information, resources, datasets, tools or services.
- Engaging with other peers and experts

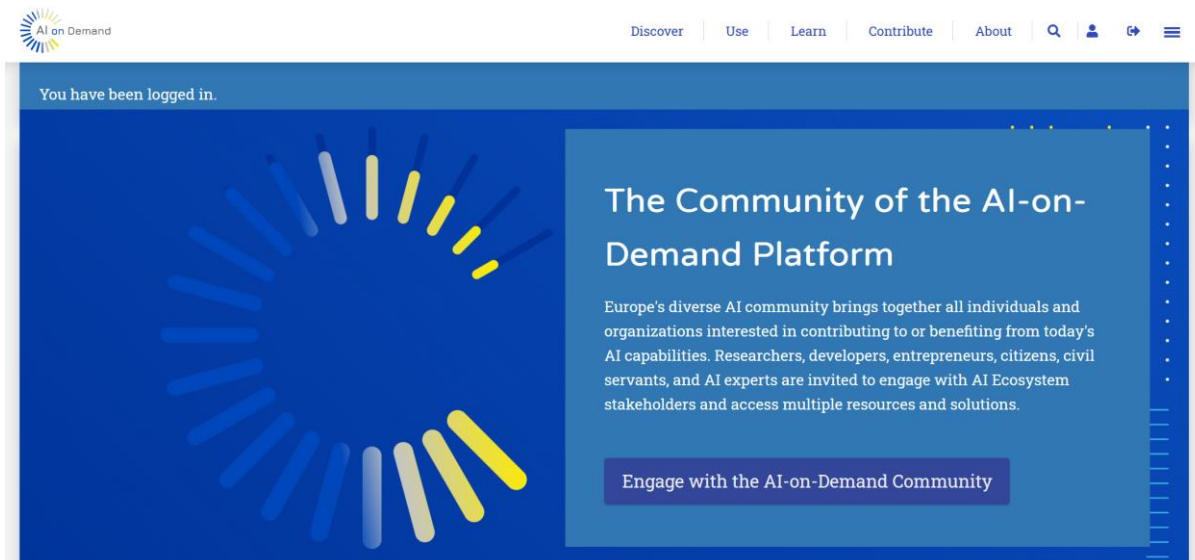


Figure 2: The AI4EU platform landing page (<https://www.ai4eu.eu/>)

The AI4EU platform offers a number of services and assets related to Artificial Intelligence. In the AI Assets Catalog the user can browse, search and download all assets currently indexed in the AI-on-Demand platform, including AI libraries, datasets, containers, and more.

The AI asset and Case Studies are grouped by the following sectors:

- Agriculture
- Cloud, Edge, and Infrastructure
- Cultural Heritage
- Earth Observation
- Energy
- Healthcare
- Manufacturing
- Maritime Sector
- Public Services
- Regional Engagement - DIHs
- Telecommunications
- Transportation

In respect to the Manufacturing sector the platform displays **42 Assets**.

3 Enabling Collaboration with AI4Europe/AIoD

As part of Task 7.5 "Integration and Continuous Collaboration with AI4EU" and as already described in Deliverable D7.8 "Report on Integration and Collaboration with AI4EU – Initial version" (which is the previous version of this deliverable) continuous collaboration and joint dissemination activities were planned to be organised with the AI4Europe project (formerly AI4EU project). As already reported the two projects/communities started to collaborate in fine-tuning integration, but also in community and ecosystem building activities. STAR project partners joined the activities of AI4Europe and participated in AI4Europe workshops.

The action plan developed was articulated in three main phases:

1. Phase 1: Workshop participation to establish a link between the two project consortia and start to learn the two project initiatives.
2. Phase 2: Learn the capabilities of the AIoD platform in order to have the range of possibilities to exploit for a mutual benefit.
3. Phase 3: Inquiry and defining the integration which is supporting STAR project.

The action plan for creating a collaborative and mutually beneficial action for disseminating AI assets between AIoD platform and the STAR market place that was presented in D7.8 included activities devoted to:

- **Capability assessment:** to understand both AIoD platform and the STAR market place features, including their functionalities, services, target audience and competition.
- **Identify common goals:** Identify the common goals and objectives of both AIoD platform and the STAR market place. This will help to establish a shared vision for the project.
- **Identify target audience:** Identify the target audience for the project, including potential customers, investors, and stakeholders.
- **Define the value proposition:** Define the value proposition for the target audience, including the benefits of using the AI asset on both platforms.
- **Investigate the key performance indicators (KPIs) set up in both projects:** Investigate the key performance indicators (KPIs) in order to create a beneficial collaboration that will not interfere with the strategies of AIoD and STAR.
- **Plan the integration:** Plan the integration of the AI asset into the AIoD platform and the STAR market place. This includes technical considerations, such as compatibility, security, and scalability.
- **Implement and test:** Implement the plan and test the AI asset on both platforms to ensure that it is functioning as expected.
- **Launch:** Launch the AI asset on both platforms, making it available to the target audience.
- **Monitor and evaluate:** Continuously monitor and evaluate the performance of the AI asset, and make adjustments as needed.

4 Actions Undertaken towards collaboration with AI4Europe

As a follow-up project of AI4EU, AI4Media collaborates closely with the AIoD platform with the aim to disseminate the AI4EU project's outputs such as modules, services and algorithms.

To this purpose, many workshops and Web Cafés were organized to establish a strong community around the AI4EU project. STAR partners were involved in some of them. These activities were already presented in the previous version of this deliverable D7.8 "Report on Integration and Collaboration with AI4EU – Initial version". Here we briefly mention some of them.

4.1 STAR participation to meetings

In this section we briefly describe participation of STAR on various meetings organised. On 11 November 2021², AI4Media organized a workshop on the European AI-on-demand platform: this was the first major event that gave to the STAR partners the visibility of the main components of the AIoD platform.

On 9 and 10 of December 2021³, STAR partners were invited to join remotely the final AI4EU event, which showcased outcomes from the project. The event was set up also to bring together AI experts and SMEs to explore the next steps of the European AI on demand strategy. Pipelines devoted to specific use cases, namely AI4Pilot, were showcased using AIoD functionalities.

On 17 of May 2022 the STAR consortium leaded a first meeting with the AI4EU board to establish joint activities with other ICT38 projects and AI4EU platform. This discussion initiated a first identification of AI assets that will be integrated on the AIoD platform.

Also, after these initial meetings STAR has been joining several of the regular (bi-weekly) calls for AI4Europe stakeholders, notably of organizations in charge of maintaining and expanding the AI4EU platform. As part of these calls STAR has contributed various presentations and shaped the agenda of the meetings to discuss the following topics:

- The identification of the ICT-38 cluster assets that will be integrated in the platform, including the ways AI4Europe could support cluster members in the integration process.
- The requirement for developing a branded catalogue of AI in manufacturing assets. The assets of the ICT-38 (AI4Manufacturing) cluster members are to be classified under this catalogue.
- The possibility of accessing AI4Europe resources metadata from other AI-related marketplaces and catalogues, such as the IoT Catalogue and the STAR marketplace. To this direction, STAR partners have prepared the STAR Market API that is presented later in this deliverable.

² [AI4media project](#)

³ [AI4EU Stakeholder Forum | AI4EU \(ai4europe.eu\)](#)

4.2 STAR contributions to the platform

Regarding the specific contributions of STAR to the platform it includes the description of the project

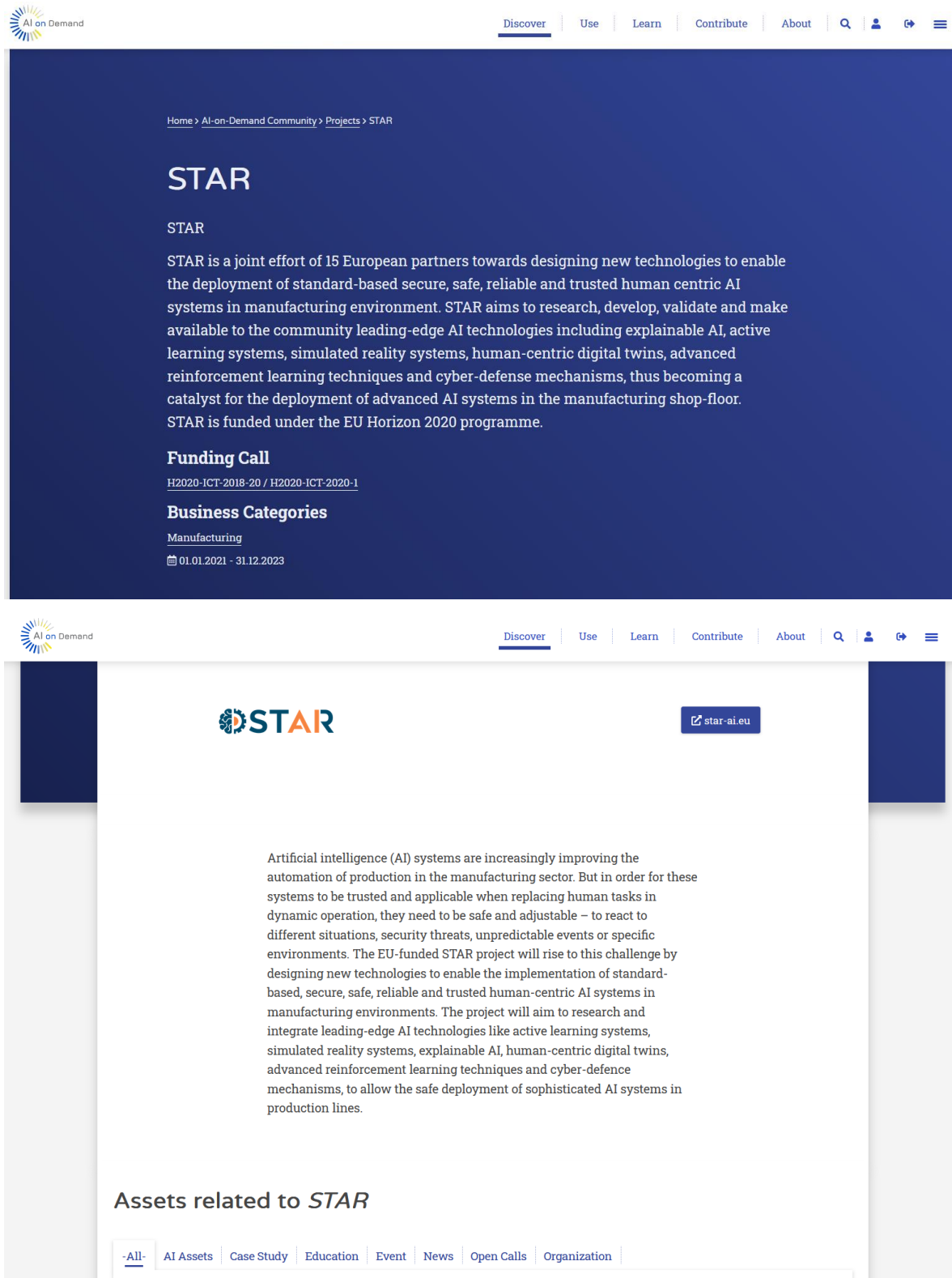



Figure 3: A screenshot from the STAR page in AioD.

Furthermore, it includes inputs about AI Asset, Education and News. These activities also link to the Market by STAR platform, which is the marketplace that was created by the STAR project.

Assets related to STAR

[-All-](#)
[AI Assets](#)
[Case Study](#)
[Education](#)
[Event](#)
[News](#)
[Open Calls](#)
[Organization](#)


Pilots


[STAR interactive AI co-creation workshop: Enabling and evaluating Safe, Secure and Ethical AI in manufacturing](#)

STAR is organising the on-site interactive AI co-creation workshop "Enabling and evaluating Safe, Secure and Ethical AI in manufacturing" that will take place on Wednesday 5th of April at 14:00 CET at Philips (SKILL building, Oliemolenstraat 5, Drachten).... [read more](#)

As a Service


[Human Digital Twin Core Infrastructure \(HDT\)](#)

Most of the available solutions for creating digital twins force industry solution architects to resort to ad hoc implementations and models. These solutions lack reusability, scalability, and extensibility, which prevents the introduction of a human digi... [read more](#)


Development
Resources


[MARKET by STAR is available!](#)

We are excited to announce that STAR Marketplace is already available! [read more](#)




["Trusted Artificial Intelligence in Manufacturing" STARs Open Access Book reaches 47.500 downloads](#)

The STAR Open Access Book "Trusted Artificial Intelligence in Manufacturing" has reached 47.500 downloads. [read more](#)




[STAR Results in Brief article published on CORDIS!](#)

We are excited to announce that the STAR Results in Brief article has been published under the Results Pack on human-centric manufacturing on the CORDIS website. [read more](#)




[Smart Industry Operations](#)

This course, offered by the University of Groningen, provides introductory knowledge and coverage of Industry 4.0 technologies and their interrelation with humans, with a specific focus on technologies such as internet of things, and machine learning / ar... [read more](#)


Research
Education

[The AI4Manufacturing cluster Book is published by Springer!](#)


"Artificial Intelligence in Manufacturing: Enabling Intelligent, Flexible and Cost-Effective Production Through AI" Upcoming Book (1st Quarter 2024) published by Springer! [read more](#)



Development
Resources

MARKET by STAR: the insights on the current trends, success stories and future developments related to Safe and Trusted Human-Centric Artificial Intelligence in Manufacturing


With the growth and improvement of production automation in manufacturing, Artificial Intelligence (AI) systems must be safe, trusted, and secure, even when operating in dynamic, unstructured and unpredictable environments. In this regard, one of the STAR... [read more](#)



Development
Resources

AI System Trustworthiness Evaluation


STAR developed and made available online the framework for auditing the trustworthiness of AI systems. It covers different aspects of AI trust, including technical/technological, organizational/management, and social/ethical aspects. [read more](#)



Development
Resources


STAR Workers' Training Platform available on MARKET by STAR!

In the increasingly demanding labor world, it's more important than ever to assess your skills and invest your time in suitable training for your career goals. [read more](#)



STAR on the Manufacturing Partnership Day

STAR participated on "The Manufacturing Partnership Day", which was took place on the 26th of September 2023 in Brussels. The event was co-organized by the European Factories of the Future Research Association (EFFRA) and the Factories of the Future and M... [read more](#)



Research
Education

STAR Booklet available online!

A series of STAR blogs for better understanding Trusted Artificial Intelligence in the Industry 5.0 era [read more](#)

Figure 4: STAR contributions in AioD.

The asset reported relates to the

- **Human Digital Twin Core Infrastructure (HDT).** Most of the available solutions for creating digital twins force industry solution architects to resort to ad hoc implementations and models. These solutions lack reusability, scalability, and extensibility, which prevents the introduction of a human digital representation into existing twins, thus hindering the full shift to the new Industry 5.0 paradigm. The Human Digital Twin Core Infrastructure (Clawdite platform) is an extensible and flexible IIoT based platform with a dual benefit: On the one hand, it supports the creation of customised data representations of production systems and their entities, including humans; on the other hand, it provides a modular infrastructure with interchangeable components for easy instantiation and commissioning of digital twins. Clawdite's design is suitable for applications with different purposes and supports data flows with different volume, speed and variety.

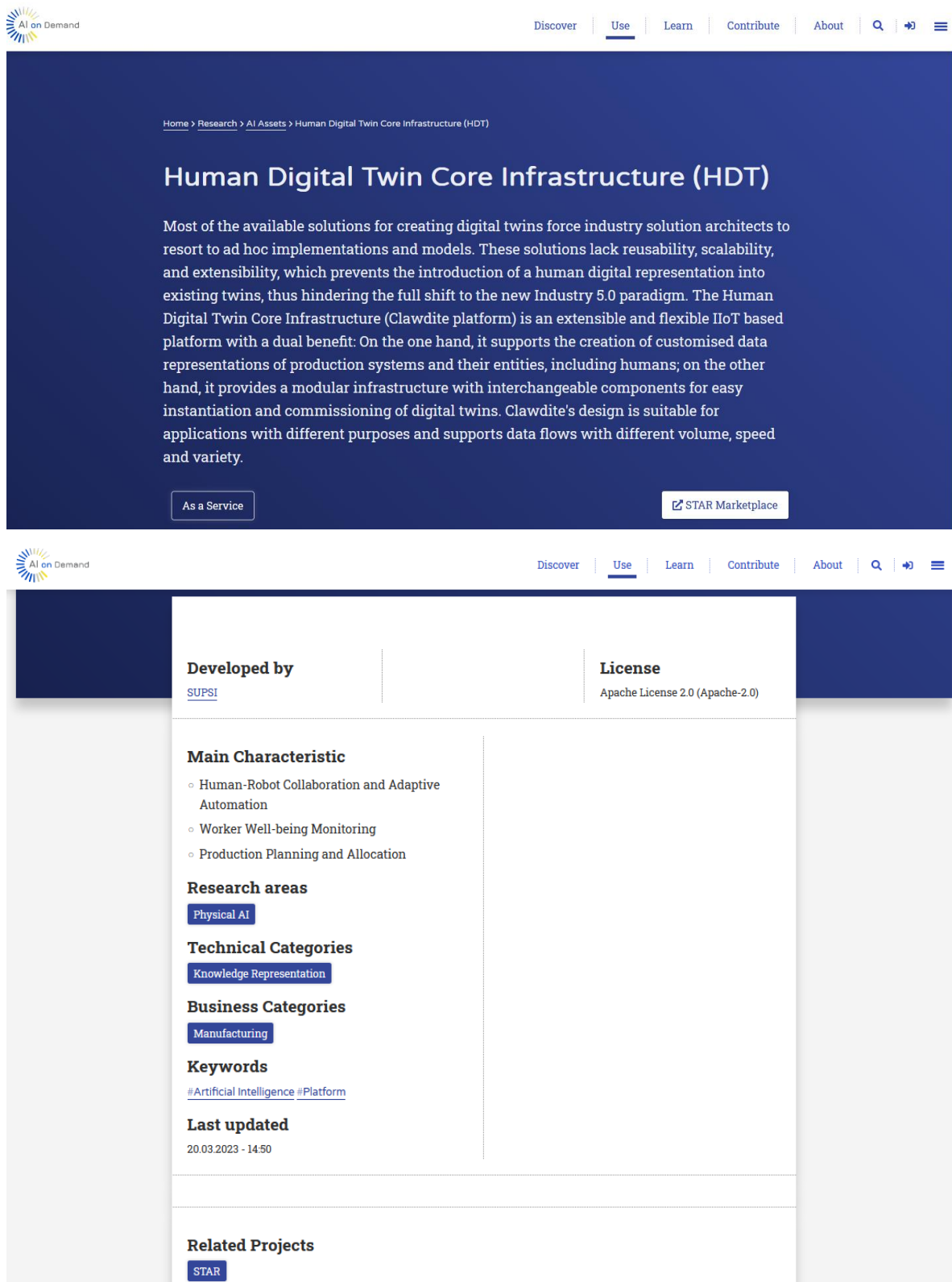
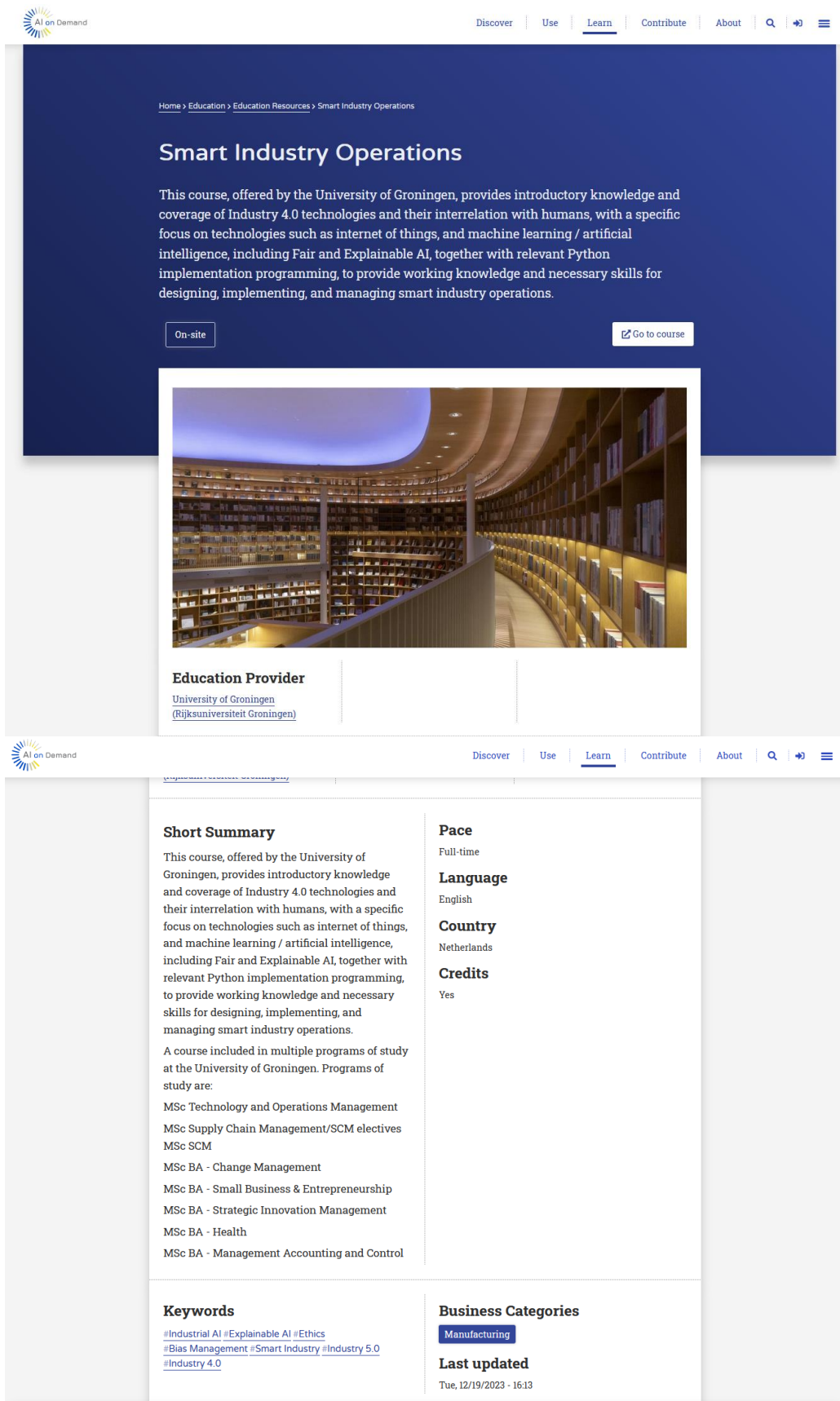


Figure 5: STAR asset in the AIOD Portal

In addition, under education resources STAR has included information about courses offered by the academic partners that are relevant to the activities undertaken in the project.



AI on Demand

Discover Use **Learn** Contribute About Q + ≡

Home > Education > Education Resources > Smart Industry Operations

Smart Industry Operations

This course, offered by the University of Groningen, provides introductory knowledge and coverage of Industry 4.0 technologies and their interrelation with humans, with a specific focus on technologies such as internet of things, and machine learning / artificial intelligence, including Fair and Explainable AI, together with relevant Python implementation programming, to provide working knowledge and necessary skills for designing, implementing, and managing smart industry operations.

On-site [Go to course](#)

Education Provider
[University of Groningen](#)
[\(Rijksuniversiteit Groningen\)](#)

AI on Demand

Discover Use **Learn** Contribute About Q + ≡

Short Summary

This course, offered by the University of Groningen, provides introductory knowledge and coverage of Industry 4.0 technologies and their interrelation with humans, with a specific focus on technologies such as internet of things, and machine learning / artificial intelligence, including Fair and Explainable AI, together with relevant Python implementation programming, to provide working knowledge and necessary skills for designing, implementing, and managing smart industry operations.

A course included in multiple programs of study at the University of Groningen. Programs of study are:

- MSc Technology and Operations Management
- MSc Supply Chain Management/SCM electives
- MSc SCM
- MSc BA - Change Management
- MSc BA - Small Business & Entrepreneurship
- MSc BA - Strategic Innovation Management
- MSc BA - Health
- MSc BA - Management Accounting and Control

Keywords

[#Industrial AI](#) [#Explainable AI](#) [#Ethics](#)
[#Bias Management](#) [#Smart Industry](#) [#Industry 5.0](#)
[#Industry 4.0](#)

Business Categories

[Manufacturing](#)

Last updated

Tue, 12/19/2023 - 16:13

Pace
Full-time

Language
English

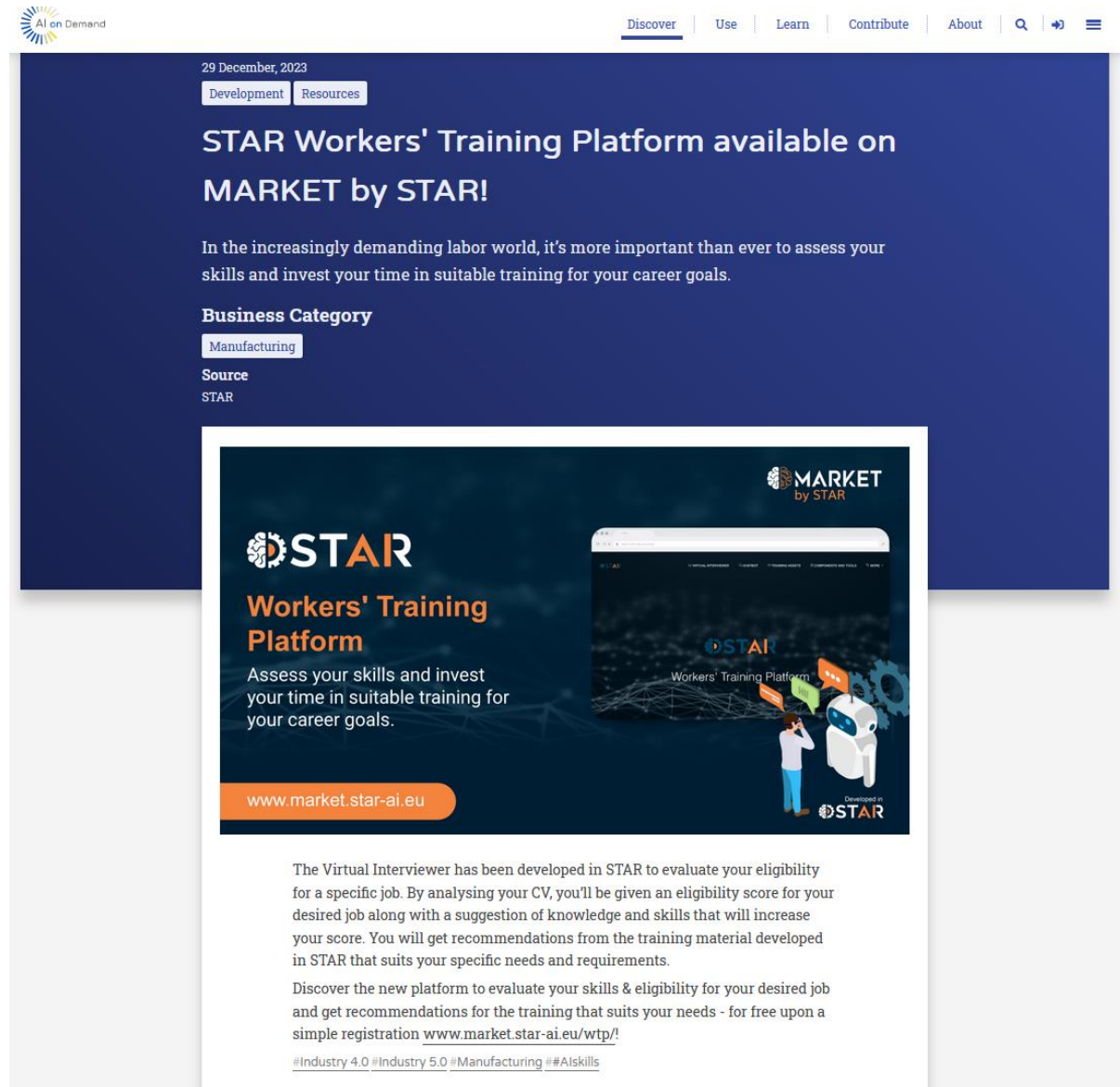
Country
Netherlands

Credits
Yes

Figure 6: Smart Industry Operations Course offered by STAR partner RUG

Furthermore, news in respect to activities, tools and frameworks have been included, as well as the news about the two books authored during the project execution. The first book was authored by only-STAR partners, whereas the second, whose publication is pending, was prepared in collaboration with other ICT-38 projects⁴.

Since STAR has developed its own platform, we link the news and developments to our own Market by STAR.



The screenshot shows a webpage from the 'AI on Demand' portal. At the top left is the 'AI on Demand' logo. A navigation bar includes 'Discover', 'Use', 'Learn', 'Contribute', 'About', a search icon, and a menu icon. The main content area has a dark blue background. It features a date '29 December, 2023' and two tags: 'Development' and 'Resources'. The headline reads 'STAR Workers' Training Platform available on MARKET by STAR!'. Below the headline is a sub-headline: 'In the increasingly demanding labor world, it's more important than ever to assess your skills and invest your time in suitable training for your career goals.' There are two tags: 'Business Category' and 'Manufacturing'. The source is listed as 'STAR'. A central image shows a promotional graphic for the 'STAR Workers' Training Platform' with the text 'Assess your skills and invest your time in suitable training for your career goals.' and the URL 'www.market.star-ai.eu'. Below the image, there is a paragraph of text describing the 'Virtual Interviewer' tool and a call to action to register on the platform. At the bottom of the text block are social media-style hashtags: '#Industry 4.0 #Industry 5.0 #Manufacturing ##AIskills'.

Figure 7: STAR Workers' Training Platform in the AIoD portal linking to the MARKET by STAR

⁴ Projects that are funded together with STAR under the EU H2020 ICT-38 call – Artificial intelligence for manufacturing, aiming to develop trustworthy human-centred AI in manufacturing.



Home > News & Events > News > Development > Resources > AI System Trustworthiness Evaluation

29 December, 2023

Development | Resources

AI System Trustworthiness Evaluation

STAR developed and made available online the framework for auditing the trustworthiness of AI systems. It covers different aspects of AI trust, including technical/technological, organizational/management, and social/ethical aspects.

Business Category

Manufacturing

Source

STAR



The framework serves a dual objective: On the one hand it enables manufacturers and providers of industrial automation solutions to benchmark the level of trustworthiness of their solution, while on the other it provides them with practical suggestions for improving this trustworthiness.

You can try the STAR AI Trustworthiness framework (upon a simple registration) at MARKET by STAR: www.market.star-ai.eu/ai-trustworthiness-framework

#Trustworthy AI #Industry 4.0 #Industry 5.0 #Manufacturing

Figure 8: STARs AI System Trustworthiness Evaluation linking to the MARKET by STAR

4.3 STAR Market API

STAR and the AI4Manufacturing cluster (i.e., the ICT-38 projects cluster) are enhancing the AI4Europe/AIoD also in the direction of providing API access to AI4EU resources. STAR and AI4Manufacturing have collaborated with AI4EU for the development of an API that would enable third-party marketplaces (including the STAR marketplace) to access the metadata of the assets of the AI4EU platform. This will facilitate cross-marketing and cross-dissemination actions between STAR and AI4EU towards mutual benefit.

STAR Market is implemented with Wordpress, which provides an interface for applications to interact with it. This REST API (standing for Representational State Transfer) offers a set of tools to access data as objects or collections by providing REST endpoints that can represent

virtually any data type from your Wordpress website. It can range from full post content to custom post types or taxonomies.

The API relies on JSON to structure the data and works with or without a well-defined structure schema. It benefits from being human readable while preserving a JavaScript object-like structure. It is compatible with any programming language that can handle HTTP requests and interpret JSON formatted data.

4.3.1 Endpoints

A REST endpoint links a certain URL and the respective HTTP method. The specific URLs depend on what data you're trying to access and how it is organized inside the website. For example, <https://www.market.star-ai.eu/wp-json/wp/v2/posts> will call an HTTP GET method and retrieve all the website posts which the request maker has access to. The retrieved data is displayed as a JSON object. Bellow, you can find an example of the JSON structure when requesting all the assets from STAR Market.

```
{
  "id":2630,
  "date":"2023-02-14T17:31:46",
  "date_gmt":"2023-02-14T17:31:46",
  "guid":{"
    "rendered":"https://www.market.star-ai.eu/assets/active-learning-al/"
  },
  "modified":"2023-03-01T16:14:00",
  "modified_gmt":"2023-03-01T16:14:00",
  "slug":"active-learning-al",
  "status":"publish",
  "type":"iotcat_component",
  "link":"https://www.market.star-ai.eu/assets/active-learning-al/",
  "title":{"
    "rendered":"Active Learning (AL)"
  },
  "content":{"  },
  "excerpt":{"  },
  "author":1,
  "featured_media":0,
  "comment_status":"closed",
  "ping_status":"closed",
  "template":"","
  "tags":[
    9,
    47,
    10
  ],
  "_links":{"  }
},
```

Another advantage of REST API is the ability to filter the data by type, ID, taxonomy and many other identifiers. More information about request filtering through endpoints is available at the Wordpress documentation page: <https://developer.wordpress.org/rest-api/reference/>.

Even though most examples consist of data requests, REST endpoints may represent any CRUD (Create, Read, Update, Delete) operation (e.g. edit or delete a post).

While there are a lot of predefined REST endpoints for the Wordpress standard data types, the advantages of this API come from the ability to register new endpoints to your custom data types. When registering an endpoint, you can specify which data is provided as well as how it is structured in the REST response. You can add or omit fields.

The content of the STAR Market are modelled by defining Custom Post Types⁵ to represent each type of content. This approach allows to defined specific data structures for representing that information of each type of resource. Since are used post types other than the default “Post” type, some variations to the REST API paths are required to access the content. The table below shows the corresponding REST API path for each type of resource:

Table 1: Paths of the REST APIs STAR Market resources

Resource Name	REST API Path
Assets	https://www.market.star-ai.eu/wp-json/wp/v2/assets
Success Stories	https://www.market.star-ai.eu/wp-json/wp/v2/success-stories
STAR Courses	https://www.market.star-ai.eu/wp-json/wp/v2/star-courses
Workshops	https://www.market.star-ai.eu/wp-json/wp/v2/workshops
STAR Book	https://www.market.star-ai.eu/wp-json/wp/v2/book
External Courses	https://www.market.star-ai.eu/wp-json/wp/v2/courses

4.3.2 Authentication

Wordpress provides two authentication methods⁶. The first uses cookies for web browser access and the second one, suited for third-party application access, requires the request to include the username and password. Also, third-party authentication plugins may be used to allow additional methods.

One can control who has access to what by requesting authentication. By default, REST API access follows the website permissions. This means that any registered and logged in user has the same REST permissions as defined in the Wordpress settings. One can allow or deny access to specific users by their username or IP address using the white and blacklisting. Any public post data is accessible to any unregistered user unless their IP is on the blacklists.

Upon login, cookies are set so that users have access to the authorized data without providing their credentials until their session times out.

⁵ <https://developer.wordpress.org/plugins/post-types/>

⁶ <https://developer.wordpress.org/rest-api/using-the-rest-api/authentication/>

5 Conclusion

This document is the final version of the “Report on Integration and Collaboration with AI4EU”. It presents activities undertaken by STAR towards the integration and collaboration with AI4EU and later on with the AI4Europe/AIoD platform. In this aspect both the participation in events and meetings was presented in the two Deliverables as also the inputs provided by STAR in the AI4Europe/AIoD platform as also the creation of the API by STAR that enables third-party marketplaces (including the STAR marketplace) to access the metadata of the assets of the platform. This facilitates cross-marketing and cross-dissemination actions between STAR and AI4EU towards mutual benefit.

References

Reference	Name of document
[REF-01]	STAR Report on Integration and Collaboration with AI4EU - Initial version
[REF-02]	https://www.ai4europe.eu/