

CEN Workshop on Reference Architecture for AI solutions' application within process industry – the EU project s-X-AIPI experience

Workshop description form

- PART A – Workshop Summary
- PART B – Project Plan



PART A – Workshop SUMMARY

1	WS details	
1.1.	Organization	<input checked="" type="checkbox"/> CEN <input type="checkbox"/> CENELEC <input type="checkbox"/> Joint with <input type="checkbox"/> CEN lead <input type="checkbox"/> CENELEC lead
1.2.	Title	CEN/WS “Reference Architecture for AI solutions’ application within process industry – the EU project s-X-AIPI experience” (select CEN or CLC or leave CEN/CLC in case of joint WS)
1.3.	Scope	<p>This CEN Workshop is proposed to fulfil the objective of translating the knowledge and innovations developed in the s-X-AIPI project into practical, applicable strategies for the process industry. It serves as a critical platform for interaction between project stakeholders—including researchers, industry experts, and end-users. This engagement ensures that the insights garnered from the research are effectively communicated and integrated into industrial practices, while also providing an opportunity for stakeholders to articulate their specific needs and requirements. The workshop will showcase preliminary results from the s-X-AIPI project, highlighting key technological advancements and methodological innovations. These presentations will not only demonstrate the project’s contributions to AI in the process industry but also set the stage for their practical application through the Reference Architecture.</p> <p>As a pivotal outcome of this workshop, the development of a CEN Workshop Agreement (CWA) is anticipated. This CWA will detail a Reference Architecture that encapsulates the core technologies and methodologies pioneered in the s-X-AIPI project. The architecture is designed to be adaptable, ensuring that it can be effectively implemented across various sectors within the process industry.</p> <p>The proposed CWA aims to:</p> <ul style="list-style-type: none"> • Provide a comprehensive framework for the integration and application of AI technologies in process industries. • Foster innovation through the adoption of advanced AI solutions that are in line with current industry standards. • Enhance the operational capabilities of AI systems within energy-intensive industries, ensuring they contribute to efficiency and sustainability goals. <p>A key focus is the contextualization of the MAPE-K methodology within the s-X-AIPI Reference Architecture, exploring how this methodology enables self-adjustment and enhanced decision-making capabilities in industrial operations. The document will include an extensive analysis of relevant Reference Architectures, examining established frameworks like RAMI 4.0, IIRA, and emerging technologies such as FIWARE and IDS RAM 4.0, as well as newer European architectures like BEinCPPS and CAPRI.</p> <p>While maintaining versatility and broad applicability, the Reference Architecture will address specific industrial implementation scenarios, ensuring it meets particular industry needs while facilitating necessary adaptations.</p> <p>The scope limitations are as follows: the CWA will not develop requirements related to the safety of machinery, safety-related requirements are outside the scope, and the document is intended to be informative, complementing rather than replacing existing standards and mandatory production procedures.</p> <p>The Workshop's core objectives include:</p> <ul style="list-style-type: none"> - Establishing a comprehensive framework for AI-enabled self-X technologies in

		<p>process industries.</p> <ul style="list-style-type: none"> - Promoting the integration of advanced autonomic management systems. - Facilitating the adoption of AI solutions that are both innovative and compliant with European standards. <p>By aligning the Reference Architecture with industry standards and stakeholder requirements, this initiative will enhance the capabilities and reach of AI applications, ensuring that technological solutions are both innovative and responsive to the evolving needs of the process industry.</p>	
1.4.	Does this WS stem from an EU Research project?	<input checked="" type="checkbox"/> YES Name of the project: s-X-AIPI Grant number: 101058715 End date 2025-04-30 <input type="checkbox"/> NO	
1.5.	Financial support	<input checked="" type="checkbox"/> EU Research project <input type="checkbox"/> EC/EFTA Grant reference: Type here <input type="checkbox"/> Other Specify, if needed: Type here	
1.6.	WS Proposer/Proposed Chair WS proposer	Name: Organization: Postal address: Email: Phone:	Daniel Gómez Martín CARTIF Parque Tecnológico de Boecillo, 205.47151, Boecillo (Valladolid) Spain dangom@cartif.es +34 983 54 65 0

		Webpage: Contact person (name and email):	www.cartif.es/en/home/ Daniel Gómez Martín dangom@cartif.es
1.7.	WS Secretariat	Organization: Postal address: Email: Phone: Webpage: WS Secretary name: Email: Phone:	UNE, Spanish Association for Standardization C/ Génova, 6. 28004 Madrid info@une.org (+34) 915 294 900 www.une.org Amanda Suo asuo@une.org (+34) 645 836 326
1.8.	CEN and CENELEC Management Centre (CCMC) contact	Organization: Postal address: Webpage: CCMC Project Manager name: Email: Phone:	CEN and CENELEC Rue de la Science 23B -1040 Brussels, Belgium www.cencenelec.eu Claire VAN THIELEN cvanthielen@cencenelec.eu +3225500831
1.9.	Tentative date and place of the Kick-off Meeting	Date: Feb 14th, 2025, 10:00 – 12:00 CEST	Place: Online
1.10.	Does the proposed Workshop fall within the scope of existing CEN and/or CENELEC Technical Bodies?¹	<input type="checkbox"/> <input checked="" type="checkbox"/>	YES Specify: Type here NO
1.11.	Are there other Technical Bodies or Joint Advisory and Coordination Groups potentially interested in the Workshop? ²	<input checked="" type="checkbox"/> <input type="checkbox"/>	YES Specify: CEN-CLC JTC 21 “Artificial Intelligence” and CEN/TC 310 “Advanced Manufacturing Technologies” NO
1.12.	Are the following aspects affected?	Safety matters Management system aspects Conformity assessment aspects Security matters	YES ³ <input type="checkbox"/> NO ⁷ <input checked="" type="checkbox"/> YES ⁴ <input type="checkbox"/> NO <input checked="" type="checkbox"/> YES ⁵ <input type="checkbox"/> NO <input checked="" type="checkbox"/> YES ⁶ <input type="checkbox"/> NO ⁸ <input checked="" type="checkbox"/>
		Add information/explanations if Management System aspects and Conformity Assessment aspects are affected: Type here	

¹ Part A and Part B of this form shall be sent by the WS secretary to the secretary of the Technical Bodies identified in this section to inform them about the creation of the WS and register any possible objection within 30 days (45 during the holiday period).

² Part A and Part B of this form should be sent by the WS secretary to the Bodies identified in this section to inform them about the creation of the WS.

³ Work on the proposed CEN and/or CENELEC Workshop shall not be initiated.

⁴ The CEN and/or CENELEC Workshop proposal shall be submitted to the CEN/CENELEC BT(s) for decision.

⁵ CEN-CENELEC Internal Regulations - Part 3, Clause 33 applies.

⁶ For projects dealing with security matters the security risk analysis provided in Annex I shall be carried out.

⁷ See Note 2 in CEN-CENELEC Guide 29, Clause 3.

⁸ See Note 2 in CEN-CENELEC Guide 29, Clause 3.

2	WS Deliverables		
2.1.	CWA #1		
2.1.1	Title	<input checked="" type="checkbox"/> <input type="checkbox"/>	Same as WS title (1.2) Other: Type here
2.1.2	Scope		<p>The planned CEN Workshop Agreement (CWA) will articulate the preliminary design of the Reference Architecture, specifically tailored for deploying AI-enabled self-X solutions within the Process Industry. This document delineates the architecture's framework and demonstrates its application across diverse industrial scenarios, emphasizing its adaptability and potential for broad implementation.</p> <p>The primary objectives of this CWA include:</p> <ul style="list-style-type: none"> • Provide a comprehensive framework for AI-enabled self-X technologies in process industries. • Promote the integration of advanced autonomic management systems. • Facilitate the adoption of AI solutions that are both innovative and compliant with European standards. <p>A significant focus is placed on contextualizing the MAPE-K methodology within the s-X-AIPI Reference Architecture. This includes a detailed exploration of how this methodology underpins the autonomic features of the AI systems, enabling self-adjustment and improved decision-making capabilities within industrial operations.</p> <p>An extensive analysis of relevant Reference Architectures is provided, including established frameworks like RAMI 4.0, IIRA, and emerging technologies such as FIWARE and IDS RAM 4.0. The document also examines newly developed architectures in the European context, like BEinCPPS and CAPRI, highlighting their relevance and integration into the s-X-AIPI architecture.</p> <p>Applicability: While the Reference Architecture is designed to be versatile and generic, sufficient attention is given to its application in selected industrial scenarios. This ensures that the architecture not only supports a wide range of applications but also meets specific industry needs, facilitating tailored adaptations where necessary.</p> <p>The scope of this CWA does not encompass the definition of safety-related requirements. Additionally, this document is intended to be informative, aimed at augmenting existing standards rather than replacing or simplifying mandatory production procedures. It seeks to provide a structured approach to integrating AI technologies in process industries, enhancing operational efficacy and innovation without compromising established procedural standards.</p>
2.1.3	Does the proposed CWA conflict with a published EN	<input type="checkbox"/> <input checked="" type="checkbox"/>	YES Specify: Type here NO In case the answer is 'yes', the development of the CWA shall be stopped

PART B – Project Plan

1 Status of the project plan

Draft project plan for public commenting (Version 1.0).

This draft project plan is intended to inform the public of a new Workshop. Any interested party can take part in this Workshop and/or comment on this draft project plan.

Please send any requests to participate or comments by e-mail to asuo@une.org.

All those who have applied for participation or have commented on the project plan by the deadline will be invited to the kick-off meeting of the Workshop February 14th 2025.

2 Workshop proposer and potential Workshop participants

2.1 Workshop proposer

The proposer of this CEN Workshop is the S-X-AIPI project, funded by Horizon 2020 programme under Grant agreement n. 101058715 and coordinated by:

Daniel Gómez Martín

CARTIF - Parque Tecnológico de Boecillo, 205.47151, Boecillo (Valladolid) Spain

e-mail: dangom@cartif.es

Daniel Gómez Martín is also the main contact point for the CEN Workshop.

The CEN national member holding the Workshop secretariat is:

UNE, Spanish Association for Standardization - C/ Génova, 6. 28004 Madrid Spain

Amanda Suo

e-mail: asuo@une.org

2.2 Potential participants

This CWA will be developed in a Workshop (temporary body) that is open to any interested party. The participation of other experts would be helpful and is desired. It is recommended that:

- Academic and research bodies
- Funded European Projects (i.e. Horizon 2020, Horizon Europe)
- Industry and commerce
- Non-governmental organizations (NGO)
- Standards application

take part in the development of this CWA.

3 Workshop objectives and scope

3.1 Workshop background

This workshop is created by initiative of the s-X-AIPI project. It is a 3-year (2022-2025) project funded by the European Union's Horizon Europe Framework Programme for Research and Innovation under Grant Agreement No **101058715**. It brings together 14 partners from 6 different European countries (Spain, Germany, Austria, Serbia, Italy and Greece).

The s-X-AIPI project endeavour is to research, develop, test, and validate a bespoke suite of trustworthy self-X AI technologies tailored for process industries. This initiative aims to bridge the gap between AI capabilities and traditional automation processes, ensuring that AI tools are both accessible and effective across various industrial applications. The project's core objectives include:

- Providing state-of-the-art AI-based sustainability tools to existing process industries and their workforce.
- Enhancing the longevity and user-friendliness of AI applications to minimize reliance on specialized technical skills.
- Deploying trustworthy AI technologies effectively within process industries.

At the heart of this project lies the integration of AI with an Autonomic Manager, utilizing the MAPE-K framework (Monitoring, Analyzing, Planning, Execution over a shared Knowledge base) to foster the development of self-improving AI systems. This approach facilitates a practical "learning by doing" model, where continuous adaptations enhance the system's efficacy in real-time applications. The project is distinguished by its incorporation of an AI data pipeline equipped with autonomic computing capabilities, designed to support four realistic use cases in the process industry sectors of asphalt, steel, aluminium, and pharmaceuticals.

A significant aspect of the s-X-AIPI toolset is its focus on accommodating the diverse skill levels of workers, integrating self-adaptation capabilities that respect and enhance the human-in-the-loop role. This approach ensures that the AI technologies developed are not only advanced but also aligned with the practical needs and profiles of the workforce involved.

The primary outcome of the s-X-AIPI project is to cultivate a portfolio of AI technologies that are:

- Trustworthy and integrated into an open-source toolkit for widespread industrial and research application.
- Autonomous, minimizing the need for human intervention in the development and operational processes.
- Broadly integrated across actual process industry value chains, demonstrating the versatile applicability of the developed technologies.

This CEN Workshop is proposed to fulfil the objective of translating the knowledge and innovations developed in the s-X-AIPI project into practical, applicable strategies for the process industry. It serves as a critical platform for interaction between project stakeholders—including researchers, industry experts, and end-users. This engagement ensures that the insights garnered from the research are effectively communicated and integrated into industrial practices, while also providing an opportunity for stakeholders to articulate their specific needs and requirements.

The workshop will showcase preliminary results from the s-X-AIPI project, highlighting key technological advancements and methodological innovations. These presentations will not only demonstrate the project's contributions to AI in the process industry but also set the stage for their practical application through the Reference Architecture.

As a pivotal outcome of this workshop, the development of a CEN Workshop Agreement (CWA) is anticipated. This CWA will detail a Reference Architecture that encapsulates the core technologies and methodologies pioneered in the s-X-AIPI project. The architecture is designed to be adaptable, ensuring that it can be effectively implemented across various sectors within the process industry.

The proposed CWA aims to:

- Provide a comprehensive framework for the integration and application of AI technologies in process industries.
- Foster innovation through the adoption of advanced AI solutions that are in line with current industry standards.
- Enhance the operational capabilities of AI systems within energy-intensive industries, ensuring they contribute to efficiency and sustainability goals.

By aligning the Reference Architecture with industry standards and stakeholder requirements, the CWA intends to enhance the capabilities and reach of AI applications. This alignment will ensure that the technological solutions developed are not only innovative but also directly responsive to the evolving needs of the process industry.

This workshop will not develop requirements related to safety of machinery.

No legal issues related to this proposal have been identified. The modelling process can provide an estimate of the final product performance according to applicable standards or legislation, but it is not a substitute for the usual conformity assessment processes. But it can be considered useful for meeting the requirements of the applicable regulation, for example, the Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL LAYING DOWN HARMONISED RULES ON ARTIFICIAL INTELLIGENCE (ARTIFICIAL INTELLIGENCE ACT) AND AMENDING CERTAIN UNION LEGISLATIVE ACTS.

4 Workshop programme

4.1 General

The kick-off meeting is planned to take place on February 14th 2025 as virtual meeting.

All the Workshop meetings (kick-off meeting and Workshop meetings and web conferences) is expected to be held, during which the content of the CWA(s) will be presented, discussed and approved.

The working language (language of meetings, minutes, etc.) of the WS will be English. The CWA will be written in English.

4.2 Workshop schedule



Table 1: Workshop schedule (preliminary)

CEN Workshop	M01 Oct'24	M02 Nov24	M03 Dec'24	M04 Jan'25	M05 Feb'24	M06 Mar'24	M08 Apr'24	M09 May'24
Initiation								
1. Workshop description form submission and TC response								
2. Open commenting period on draft project plan (mandatory)								
Operation								
3. Kick-off meeting								
4. CWA(s) development								
5. CWA(s) finalized and approved by Workshop participants								
Publication								
6. CWA(s) publication								
Dissemination (see 6)								
Milestones					K	K	V	
							V	
							A	
							P	
							D	

5 Resource planning

The administrative costs of CEN Workshop Secretariat will be covered by resources from the H2020 project S-X-AIPI GA n° 101058715.

6 Workshop structure and rules of cooperation

The workshop will be led by a chair or vice-chair, while the project leader will support them in the organization.

The CEN Workshop Chair is responsible for ensuring that the development of the CWA follows the principles and content of the adopted project plan and the requirements of the CEN Guide 29. The CEN Workshop Chair may take decisions on the conduct of the CEN Workshop based on the comments expressed by the participants according to the CWA rules.

The workshop secretariat is responsible for the organization and management of the workshops according to the CEN Guide 29.

CEN Workshop participants draft the CWA and take in consideration the comments after the public commenting phase. CEN Workshop participants are the CWA proposers (the members of S-X-AIPI project), plus other relevant stakeholder, identified by the proposer.

6.1 Participation in the Workshop

The Workshop will be constituted during the course of the kick-off meeting. By approving this project plan, the interested parties declare their willingness to participate in the Workshop and will be formally named as Workshop participants, with the associated rights and duties. Participants at the kick-off meeting who do not approve the project plan are not given the status of a Workshop participant and are thus excluded from further decisions made during the kick-off meeting and from any other decisions regarding the Workshop.

As a rule, the request to participate in the Workshop is closed once it is constituted. The current Workshop participants shall decide whether any additional members will be accepted or not.

Any new participant in the Workshop at a later date is decided on by the participants making up the Workshop at that time. It is particularly important to consider these aspects:

- a. expansion would be conducive to shortening the duration of the Workshop or to avoiding or averting an impending delay in the planned duration of the Workshop;
- b. the expansion would not result in the Workshop taking longer to complete;
- c. the new Workshop participant would not address any new or complementary issues beyond the scope defined and approved in the project plan;
- d. the new Workshop participant would bring complementary expertise into the Workshop in order to incorporate the latest scientific findings and state-of-the-art knowledge;
- e. the new Workshop participant would actively participate in the drafting of the manuscript by submitting concrete, not abstract, proposals and contributions;
- f. the new Workshop participant would ensure wider application of the CWA.

All Workshop participants who voted for the publication of the CWA or its draft will be named as authors in the European Foreword, including the organizations which they represent. All Workshop participants who voted against the publication of the CWA, or who have abstained, will not be named in the European Foreword.

6.2 Workshop responsibilities

The Workshop Chair is responsible for content management and consensus building. The Workshop Chair is supported by the Workshop Vice-Chair (if any) and the responsible Workshop secretariat, whereby the Workshop secretariat will always remain neutral regarding the content of the CWA(s). Furthermore, the Workshop secretariat shall ensure that CEN-CENELEC's rules of procedure, rules of presentation, and the principles governing the publication of CWA(s) have been observed. Should a Workshop Chair no longer be able to carry out her/his duties, the Workshop secretariat shall initiate the election of a new Workshop Chair. The list below covers the main tasks of the Workshop Chair. It is not intended to be exhaustive.

- Content related contact point for the Workshop
- Presides at Workshop meetings
- Ensures that the development of the CWA respects the principles and content of the adopted project plan
- Manages the consensus building process, assesses when the Workshop participants have reached agreement on the final CWA, on the basis of the comments received
- Ensures due information exchange with the Workshop secretariat
- Represents the Workshop and its results to exterior

The Workshop secretariat, provided by a CEN and/or CENELEC Member, is responsible for organizing and leading the kick-off meeting, in consultation with the Workshop proposer. Further Workshop meetings and/or web conferences shall be organized by the Workshop secretariat in consultation with the Workshop Chair. The list below covers the main tasks of the Workshop secretariat. It is not intended to be exhaustive.

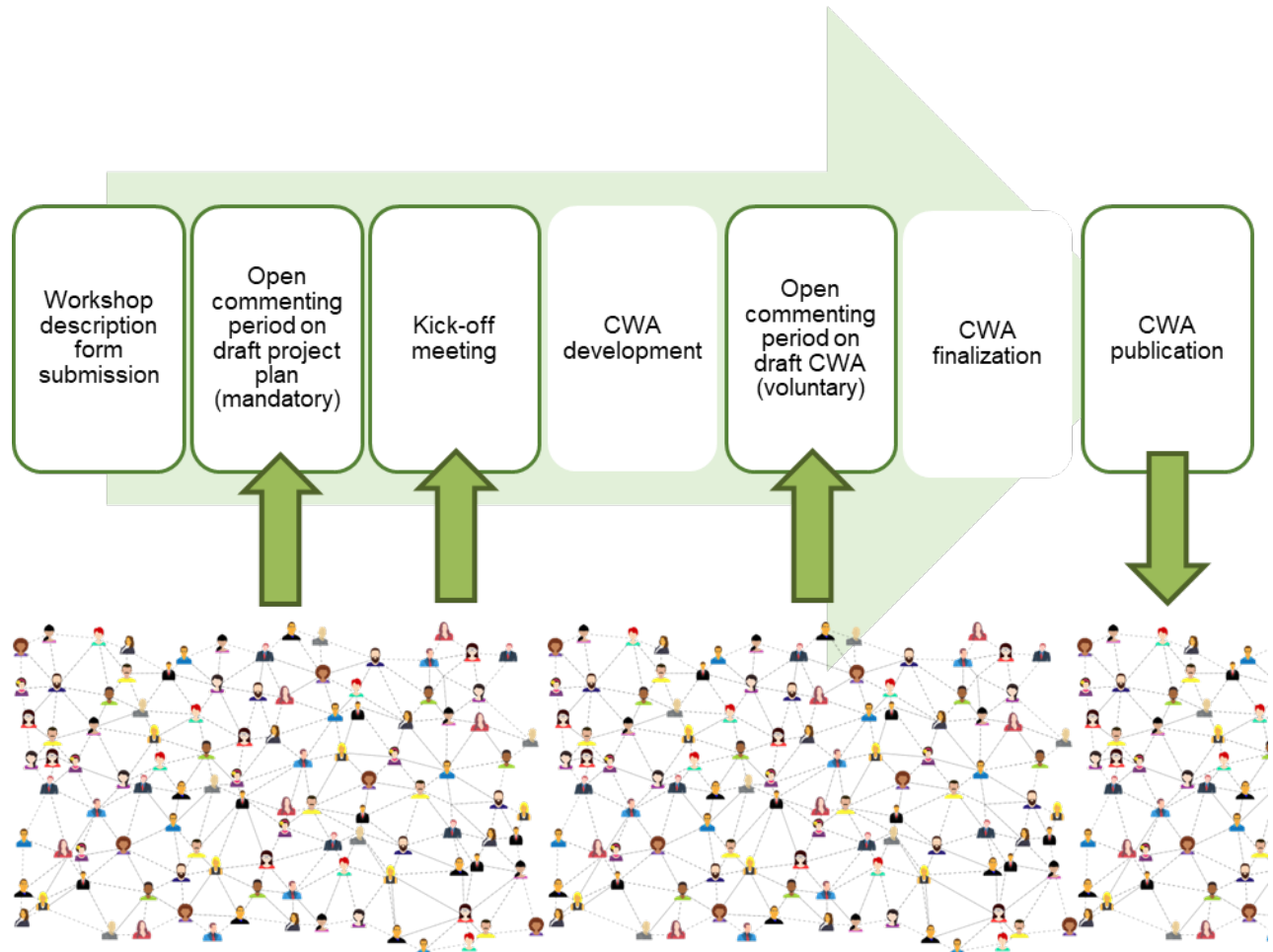
- Administrative and organizational contact point for the Workshop
- Ensures that the development of the CWA respects the principles and content of the adopted project plan and of the requirements of the CEN-CENELEC Guide 29
- Formally registers Workshop participants and maintains record of participating organizations and individuals
- Offers infrastructure and manages documents and their distribution through an electronic platform
- Prepares agenda and distributes information on meetings and meeting minutes as well as follow-up actions of the Workshop
- Initiates and manages CWA approval process upon decision by the Workshop Chair
- Interfaces with CEN-CENELEC Management Centre (CCMC) and Workshop Chair regarding strategic directions, problems arising, and external relationships
- Advises on CEN-CENELEC rules and brings any major problems encountered (if any) in the development of the CWA to the attention of CEN-CENELEC Management Centre (CCMC)
- Administrates the connection with relevant CEN or CENELEC/TCS

6.3 Decision making process

The CEN and/or CENELEC Workshop Chair is responsible for ensuring that the development of the CWA follows the principles and content of the project plan described in this document and the requirements of CEN-CENELEC Guide 29. The CEN and/or CENELEC Workshop Chair may take decisions on the conduct of the CEN and/or CENELEC Workshop on the basis of the comments expressed by the participants and of CEN-CENELEC Guide 29.

If Workshop participants cannot be present in the meetings when the CWA or its draft is adopted, an alternative means of including them in the voting procedure shall be used.

7 Dissemination and participation strategy



Proposal form submission

The Workshop proposal will be disseminated to the following relevant stakeholders and bodies for consultation:

- standards committee, working group etc.
- publisher of technical rules
- sector forum
- focus group
- coordination group
- others (S-X-AIPI sister projects)

Open commenting period on draft project plan

The project plan will be disseminated to the following relevant stakeholders and bodies for commenting:

- standards committee, working group etc.
- publisher of technical rules

- sector forum
- focus group
- coordination group
- others (S-X-AIPI sister projects)

In addition to the CCMC website, the project plan and the date of the kick-off meeting will be advertised on the S-X-AIPI website (<https://s-x-aipi-project.eu/>) to raise awareness. Interested parties are requested to contribute either through commenting of the project plan (short term) or through Workshop participation (long term).

Open commenting period on draft CWA

The commenting phase is not compulsory in this case and it can be added. Decision on the submission of the draft CWA to public commenting phase can be agreed at a later stage, during the works of the CEN/WS.

CWA publication

The final CWA will be disseminated to the following relevant stakeholders and bodies:

- standards committee, working group etc.
- publisher of technical rules
- sector forum
- focus group
- coordination group
- others (S-X-AIPI sister projects)

In addition to the CCMC website, the final CWA will be advertised on:

- sector specific newsletter
- social media, such as
 - Facebook
 - Instagram
 - LinkedIn
 - X
- Research Gate
- EC Newsroom
- Others