MOdel based coNtrol framework for Site-wide OptimizatiON of data-intensive processes

D8.6 Report on the contributions to standardization

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Version	Review Date	Reviewed by	Summary of comments

Table of Contents

1 Introduction

Standardization has been included in the MONSOON project with the aim of facilitating the acceptance and utilisation by the market of the developed solutions. Other objectives are to provide information about useful existing standards covering the needs of the different working packages, ensure compatibility and interoperability with what already exists in the market through standards, as well as to use the standardization system as a tool for dissemination of the project results and interaction with the market stakeholders. In addition to using existing standards, the standardization system is a way to promote that some innovative result, not yet standardized, of those developed in the project becomes some kind of normative document and can become in the future a reference standard for the sector, increasing the impact in the long term.

To meet the above objectives, within the MONSOON project there is a specific Task 8.3 - Standardization, divided into the following subtasks:

- SubTask 8.3.1: Identification of related applicable existing standards;
- SubTask 8.3.2: Collaboration and communication with the relevant Technical Committees;
- SubTask 8.3.3: Contribution to the on-going and future standardization developments.

1.1 Scope

This deliverable contains a description of the different activities related to standardisation that have been carried out in the MONSOON project, namely:

- Dissemination of the project within the related standardisation committees;
- Contributions to documents of standardisation bodies of the knowledge generated in the project;
- Interaction with other European projects;
- Relevant standards used in the solution developed.

1.2 Related documents

ID	Title	Reference	Version	Date
D8.5	Report on the standardization landscape and applicable standards		1.3	2017-03-31
D8.9	Updated Report on the standardization landscape and applicable standards		2.0	2019-01-30
D6.1	Test and Integration Plan		1.1	2017-03-31
D2.6	Final Requirements and Architecture Specifications		1.0	2018-12-12
D5.8	Final Life Cycle Management plugin		0.5	2019-07-22
D2.7	Initial Cross-sectorial Domain Model		1.0	2017-07-26
CEN-CENELEC GUIDE 29	CEN/CENELEC Workshop Agreements		Edition 1	November 2014

2 Collaboration and communication with the relevant Technical Committees

2.1 General

This chapter details the activities carried out under SubTask 8.3.2: Collaboration and communication with the relevant Technical Committees.

2.2 Selection of the relevant technical committees

The first step to be followed is the selection of the most relevant technical committees to be contacted. The *D8.5 Report on the standardization landscape and applicable standards* deliverable contains a detailed study on the relevant existing standards and standards under development currently in the International Standardization System, which are relevant for the MONSOON project, organized according to the technical committees that develop them.

Due to the complexity of the MONSOON project, the number of standards, projects and associated committees identified in the D8.5 deliverable is very numerous, although not all have the same level of relevance. There are standards (and their associated committees) that are useful to the project at the "user" level but will not be impacted by the project results. Other committees, on the other hand, work directly in fields of activity in which the MONSOON project results could be relevant, so the distribution of project information should be carried out in the latter ones.

Table 1 contains a list of all committees identified in deliverable D8.5 and their assessment of suitability for distributing project information.

Table 1 - List of Technical Committees and relevance assessment for distribution of information

Technical Committee	Scope	Suitable for distribution
IEC TC 65 Industrial-process measurement, control and automation CENELEC TC 65X Industrial-process measurement, control and automation	To prepare international standards for systems and elements used for industrial-process measurement and control concerning continuous and batch processes. To co-ordinate the standardization of those features of related elements which affect suitability for integration into such systems. The work of standardization outlined above is to be carried out in the international fields for equipment and systems operating with electrical, pneumatic, hydraulic, mechanical or other systems of measurement and/or control.	YES
ISO/TC 184 Automation systems and integration	Standardization in the field of automation systems and their integration for design, sourcing, manufacturing, production and delivery, support, maintenance and disposal of products and their associated services. Areas of standardization include information systems, automation and control systems and integration technologies.	YES
ISO/TC 226 Materials for the production of primary aluminium (Pitch, solid carbonaceous materials, petroleum coke)	Standardization in the field of materials for the production of primary aluminium, including aluminium oxide, cryolite, aluminium fluoride, sodium fluoride, carbonaceous products and ceramic materials.	YES

Technical Committee	Scope	Suitable for distribution
IEC TC 2 Rotating machinery	Standardization in the field of rotating electrical machines without limitations of voltage, output or dimensions with the exception of the following: • Traction motors within the scope of TC 9: Electricrailwayequipment; • Motors and generators within the scope of TC 69: Electric road vehicles and electric industrial trucks; • Motors and generators for use in cars and commercial vehicles; • Motors and generators for use in aeronautics or space applications.	NO
ISO/TC 108 Mechanical vibration, shock and condition monitoring	Standardization in the fields of mechanical vibration and shock and the effects of vibration and shock on humans, machines, vehicles (air, sea, land and rail) and stationary structures, and of the condition monitoring of machines and structures, using multidisciplinary approaches.	NO
IEC TC 56 Dependability	To prepare international standards in the field of dependability, in all appropriate technological areas, including those not normally dealt with by IEC Technical Committees. Dependability covers the availability performance and its influencing factors: reliability performance, maintainability performance and maintenance support performance (including management of obsolescence). The standards provide systematic methods and tools for the dependability assessment and management of equipment, services and systems throughout their life cycles.	NO
ISO/TC 69 Applications of statistical methods	Standardization in the application of statistical methods, including generation, collection (planning and design), analysis, presentation and interpretation of data.	NO
ISO/TC 61 Plastics CEN TC 249 Plastics	Standardization of nomenclature, methods of test, and specifications applicable to materials and products in the field of plastics, excluding rubber and lac.	YES

Technical Committee	Scope	Suitable for distribution
ISO/IEC JTC 1/SC 7 Software and systems engineering	Standardization in the area of software and systems engineering that meets market and professional requirements. These standards cover the processes, supporting tools and supporting technologies for the engineering of software products and systems. Systems engineering, whose origin is traceable to industrial engineering, is defined as an interdisciplinary approach governing the total technical and managerial effort required to transform a set of customer needs, expectations, and constraints into a solution and to support that solution throughout its life. SC7, whose scope is Software and Systems Engineering, can thus be described as a horizontal committee who produces generic standards that are technology agnostics and independent of the application domain. These standards are principally focused on process models and good practices (Methods and techniques).	NO
ISO/IEC JTC 1/SC 27 IT Security techniques	Development of standards for the protection of information and ICT. This includes generic methods, techniques and guidelines to address both security and privacy aspects.	NO
ISO/IEC JTC 1/SC 38 Cloud Computing and Distributed Platforms	Standardization in the area of Cloud Computing and Distributed Platforms including but not limited to: • Service Oriented Architecture (SOA); • Service Level Agreement; • Interoperability and Portability; • Data and their Flow Across Devices and Cloud Services.	NO
ISO/IEC JTC 1/WG 9 Big Data	Standardization of foundational standards for Big Data, including reference architecture and vocabulary standards. This Working Group develops horizontal standards for Big Data. Big Data standards related to specific fields of application should be developed within the technical committee dealing with that field of application.	NO

2.3 Communication with technical committees

Once the standardization committees to which to send the information were decided, a specific material with basic information about the project was elaborated. This material was written in such a way that it was as small as possible and at the same time attractive, informing the committees of the essential characteristics of the project and of the ways to be informed of the evolution of the project or to have a more active participation.Figure 1[PB1] shows the summary report drafted.

Figure 1 – MONSOON Summary report for distribution among standardization technical committees

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PROJECT DATA

Name	MOdel based coNtrol framework for Site-wide OptmizatiON of data-intensive processes
Acronym	MONSOON
Call	H2020-IND-CE-2016-17
Grant Agreement	723650
Period	2016-10-01 / 2019-09-30
Partners	ISTITUTO SUPERIORE MARIO BOELLA SULLE TECNOLOGIE DELL'INFORMAZIONE E DELLE TELECOMUNICAZIONI FRAUNHOFER GESELLSCHAFT ZUR FORDERUNG DER ANGEWANDTEN FORSCHUNG EV ETHNIKO KENTRO EREVNAS KAI TECHNOLOGIKIS ANAPTYXIS TECHNICAL UNIVERSITY KOSICE ALUMINIUM PECHINEY CAPGEMINI TECHNOLOGY SERVICES GLNPLAST SA ASOCIACION ESPAÑOLA DE NORMALIZACION LIFE CYCLE ENGINEERING SRL KUNSTSTOFF-INSTITUT FUER MITTELSTAENDISCHE WIRTSCHAFT NRW GMBH PROBAYES SAS

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RATIONALE

Process industry is characterized by intense use of raw resources and energy, thus providing a context where even small optimizations can lead to high absolute savings both in terms of economic and environmental costs, if they can prove to offer predictable and replicable results. Predictive modelling techniques can be especially effective in optimizing processes in such context, but their application is not straightforward for several reasons including e.g., the high cost of integrating large number of new sensors or actuators into legacy production equipment, intrinsic difficulties in monitoring physical parameters in harsh conditions, interoperability issues among existing IT systems in use, difficulties in monitoring data-intensive processes in a scalable fashion, difficulties in fusing and correlating information collected at different SCADA levels, challenges in defining and computing meaningful KPIs to ease decision-making, etc. As a consequence, the deployment of model-based predictive functions in such production environments at a sustainable cost or with sufficient reliability is not always feasible, resulting in optimization potentials remaining untapped.

In past markets characterized by lower international competition, stable demand, relatively low labour cost and high abundance of raw materials, industry was able to remain viable just through progressive improvements in production technology, organization and logistics. The change in global competition and resources availability calls instead for a drastic re-invention and re-design of production processes and sites. In other types of production environment which are more flexible by nature, new sites can be devised which take into consideration such challenges by design. This is however not possible in capital intensive process industries, where initial investments for new production sites are prohibitive. For this reason, enabling benefits by integrating innovations in the installed process base is a fundamental step to help process industries transitioning from the current model oriented to the production of goods by consuming resources, to newer "circular" models. In this perspective, resource, cost and environmental sustainability is considered, monitored and optimized at all times, resulting in benefits for industries and society as a whole.

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PROJECT OBJECTIVES

The project aims at establishing data-driven methodology and tools to support identification and exploitation of optimization potentials. This is achieved by applying model based predictive controls to perform plant and site wide optimization of production processes, by working in multi-scale fashion at different layers of the SCADA pyramid.

MONSOON pursues the following set of ambitious cross-sectorial technical objectives:

- An effective multi-scale control methodology suitable for plant- and site-wide applications in heterogeneous production environments to improve process efficiency and reduce usage of resources;
- An integrated real-time and dependable infrastructure easing adaptation of heterogeneous systems in monitoring and control of data-intensive production processes;
- Distributed plant- and site-wide models and mapping techniques;
- Application of data-driven processing techniques suitable to support real-time control;
- Research and develop innovative, multi-level, plant-wide Analytics and Visualizations for the detection of complex patterns in plants processes;
- A novel model based development environment to facilitate design, development, integration, deployment and testing of predictive control algorithms;
- Symmetric plant and site-wide Life Cycle Management Tools integrated with the existing control infrastructure.

MONSOON will also provide semantic framework, which will extend standardized methodologies for the data analytics such CRISP-DM and SEMMA. The main goal of the envisioned framework is to formalize data analytics process and provide a common communication language between domain experts and data scientists. Semantic framework will support whole data analytics process - from the phase of problem and data understanding, where the data scientists need a deep knowledge of the business objectives and modelled phenomena acquired from the stakeholders and domain experts; to the phase of model evaluation and deployment, where the stakeholders and domain experts need to interpret the results of the data analysis.

The cross-sectorial MONSOON solution will be developed and evaluated in two industrial pilot sites, to assess its acceptance and usability by its intended end-users and for its potential effectiveness and impact on resource optimization:

- **Aluminium production industry**, the selected scenario will be focused on predictive monitoring of a large smelter, where the increased amount of collected data from low-level

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control systems will be exploited for data-driven predictive control, leading to earlier detection of anomalies and identification of potential optimization gains.

- **Plastic injection industry**, the selected uses will focus on enriching existing injection moulding equipment with additional data-intensive in-mould sensors, and on the integration of extracted results with information from higher levels of the SCADA pyramid, leading to a faster and more precise identification of potential production problems.

ADDITIONAL INFORMATION AND TAKING PART

MONSOON Web Portal

The project web portal constitutes the main tool for the dissemination of MONSOON, serving, among others, the purposes described below:

- Provides general information about MONSOON project (vision, objectives, actions) and the origins of consortium (partners, H2020 funding).
- Constitutes the public repository for MONSOON project results (deliverables, other results) and for dissemination materials (publications, presentations, brochures, promotional videos, newsletters, press releases etc.).
- Presents news and events related to the MONSOON project.

MONSOON web portal is available on https://www.spire2030.eu/monsoon

The External Stakeholder Group

The External Stakeholder Group is a group of independent professional experts, not part of the MONSOON consortium, which have recognized knowledge in the industrial field, with expertise also on the business and regulation aspect of the sector.

Members of the External Stakeholder Group can benefit from:

- An early access to the results of the project;
- The involvement in the co-design and early validation of the MONSOON components, taking into account the needs of their respective industrial sector.

The participation in the External Stakeholder Group is open.

For more information, please contact jjimenez@une.org.

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The information was sent to the selected standardisation committees during December 2017.

Additional interaction with *CEN/TC 310 Advanced automation technologies and their applications* took place during the task related to contribution to standardization. See Chapter 3 for more information.

3 Contribution to the on-going and future standardization developments

3.1 General

This chapter details the activities carried out under SubTask 8.3.3: Contribution to the on-going and future standardization developments.

In order to give long-term value to the results of the project and for these results to be used within the industrial sector, it is desirable that some of them be subjected to the standardisation process and some type of normative document be generated. This normative development must comply with the procedures and requirements of transparency and openness of the standardisation bodies, which means that external parties to the consortium members must be considered.

This task can be accomplished in different ways, depending on the case:

1. If, during the development of the project, gaps have been identified that are not covered by standards andwhere it would have been useful to have them, this information can be gathered and the technical committees responsible for these identified needs can be informed so that they can include them in their future standardization programs. The standardisation committees continuously monitor the standardisation needs of the market and this information may be useful to them. However, there is no guarantee that these identified needs will materialize into standards in the future, so a more active approach is desirable;

2. Contributing to a draft standard currently under development in some technical standardization committee. If, during the task of identifying standards and standards under development, a draft standard in preparation has been identified, to the content of which the experts of the project could contribute, it is possible to contribute the knowledge generated during the project to said draft standard. However, the process of elaboration of the standards is iterative and usually long due to the high level of international consensus it requires, making it difficult to coordinate the European Project timeframe with the International/European standard development stages, which could introduce unacceptable delays.

3. To directly propose the elaboration of a normative document led by the experts of the project. This option allows the project experts to take the initiative for the development of the document, within the limits imposed by the operating procedures of the standardisation body where the document is to be developed. There are different types of normative documents produced by standardisation bodies (see subclause 2.4 of deliverable D8.5). As can be seen in table 3 of the D8.5 deliverable, the development timeframe of the Standard, Technical Specification and Technical Report document types are incompatible with the development times of a European project, so the Workshop Agreement document type is the appropriate one.

At this point it is important to highlight that the development of a normative document in a standardisation body must conform to the procedures of that standardisation body, which may sometimes lead to the final approval of that document not being possible if the necessary level of consensus within the standardisation body is not achieved.

3.2 Procedure for the development of the CWA

As highlighted in the previous section, Workshop Agreement type documents are the most suitable for translating the results of European projects into normative documents. The proposal can be launched in an international standardisation body (ISO/IEC) or in a European body (CEN/CENELEC). In the case of the MONSOON project, the proposal has been decided to be launched in the European standardisation bodies (CEN/CENELEC) because of its geographical proximity. In addition, the CEN/CENELEC Workshops operating rules allow the participation of non-European entities in these groups, so there is no limitation at all.A CWA (CEN/CENELEC Workshop Agreement) is a document agreed by the participants of a Workshop, which is designed to meet an immediate need and form the basis for future standardization activity. The stakeholder involvement limits itself to those directly interested in the subject. The direct participation of interested parties and the rapid development opportunities offered by a CWA are considered to be particularly attractive for European research projects.In any case, the development of a CWA must follow strict rules that guarantee the credibility of the standardisation system.

The following are the steps taken within the MONSOON project to develop a CWA (CEN/CENELEC Workshop Agreement).

3.2.1 Selection of the topic on which to develop the CWA

The first step is to select a suitable topic on which to develop the CWA. This step is very important because the selected topic must meet the following conditions:

1. It must be a significant contribution of the MONSOON project;
2. It must comply with the CEN/CENELEC CWA development rules so as to maximize the possibilities of success;

The starting point for the selection of the topic on which to develop the CWA has been the list of *Intellectual Property and knowledge* content developed within the MONSOON projects. This list contains the most significant results of the MONSOON project and is suitable to fulfil the condition of item 1) above. From this list of topics, the experts have selected a "short list" of topics, so that UNE as a standardisation expert could check in deep that the selected topics meet the conditions of item 2) above and maximise the possibilities of success.

The topic on which a CWA can be developed has some restrictions, namely:

1. A CWA shall not conflict with an existing European Standard;
2. A CWA shall not address issues with significant health and safety implications;
3. A CWA is not suitable to support European legislative requirements.

The list of candidate topics was checked against these requirements. Table 2 shows the result of the assessment.

Table 2 -Short list of candidate topics to be covered by the CWA

#	Name of the *IP and knowledge* result	Short description of the result	Assessment

1	Multi-scale control methodology	Data-driven methodology (based on machine and deep learning algorithms) to perform large-scale data analysis for predictive control to potentially improve work organization, **HSEwork** conditions, training and knowledge development	No conflicting standard identified in CEN/CENELEC. Not possible to cover Health and Safety issues.
2	Predictive alert in operation	Models and Methodology to predict process drifts and trigger alarms (trend analysis, deep learning, machine learning techniques)	EN 62682:2015 Management of alarms systems for the process industries (Not directly applicable, it allows for "Advanced alarming techniques" (No specific standard identified). No conflicting standard identified in CEN/CENELEC.
3	Real-time infrastructure to deal with heterogeneous systems in the control of data-intensive product	Dynamic ICT infrastructure to support the monitoring of data-intensive flows and distributed control. Resource-aware software connectors to integrate existing process industry systems and allow them to synchronize their key information in real-time with the overall site-wide models.	ICT networks for industry are covered by CENELEC TC 65X Standards.
4	Semantic framework	Proposal for the standard to formalize data analysis process for predictive control and maintenance and simplify communication between the domain experts and data scientists.	Possible conflicting standards within CLC/SR 56 Dependability
5	Environmental alerts based on deep learning or machine learning results	Awareness of the environmental issues linked to process or equipment deviation, thanks to predictive control and data analysis/mining leading to process optimization	CEN-CENELEC/WS REEMAIN on Methodology for Resource and Energy Efficiency Manufacturing https://www.cencenelec.eu/news/workshops/Pages/WS-2017-006.aspx
6	Packaging of the predictive functions	Proposal for the standard for packaging of the predictive functions for the deployment and integration in the production environment.	No conflicting standard identified in CEN/CENELEC

7	Integrated interpretations of machine learning models	A module allowing online interpretation of machine learning model decisions	No conflicting standard identified in CEN/CENELEC

Based on the above evaluation, the Consortium decided to develop the CWA on topic #2.

3.2.2 Launch of the CWA development process

Once the topic on which to develop the CWA was decided, the process was launched within the European standardisation organisations, led by UNE as a member of CEN/CENELEC.

The first step in the CWA development process is the drafting of a Project Plan. The Project Plan is a document that contains all relevant information about the document to be developed, and that is used to disseminate the project among CEN/CENELEC members and external parties. The Project Plan must contain the following information:

1. **Background to the Workshop**. General information regarding the context in which the Workshop (WS) is created, including:
    a. **Market relevance**. It includes a rationale for the need of the market for which the CWA is intended, to be covered with the document;
    b. **Legal environment**. This section contains a study of the European legal framework applicable to the sector in which the CWA is to be developed, and which should be respected in the content of the CWA. As stated in subclause 3.2.1, a CWA cannot be used to show compliance with European Regulation, and this section should be used to justify that a document is not being developed in a heavily regulated sector.
    c. **Standardization activities.**Study of possible standardization activities within the same field of application of the CWA, including concerned standardization committees. This section will be used to decide whether the restrictions on the development of the CWA have been complied with and to identify the standardization committees to which to request authorization for development and invite participation in the development.

2. **Workshop proposers and Workshop participants**. Information about the proposer of the Workshop and an initial list of participants.

3. **Workshop scope and objectives**. A description of the topic on which the CWA will be developed.

4. **Workshop programme.**An initial estimation of the meetings and drafts needed to finalize the CWA.

5. **Workshop structure**. Information about the structure of the Workshop, if necessary.

6. **Resource requirements**. An estimation of the costs associated with the operation of the WS and how they will be financed. The main cost of running a WS is the secretariat cost, which in the case of CWA developed in the framework of European research projects is covered by the national standardisation body that is part of the project.

7. **Contact points**. Secretariat and Chairman contact information.

A first draft of the Project Plan was drawn up and submitted to CEN/CENELEC technical services for evaluation.

In addition to the Project Plan, a self-assessment form needs to be completed. This form contains a series of questions that determine the process of managing the WS within CEN/CENELEC, depending on some characteristics of the project.

The draft Project Plan and the self-assessment form were slightly modified in several meetings with CEN/CENELEC, to strictly adapt them to their criteria. See Annex A for the final version of both documents.The final version of the Project Plan is formally approved during the WS Kick-off meeting (see subclause 3.2.4).

In the Project Plan, the Technical Committee *CEN/TC 310 Advanced automation technologies and their applications* had been identified as the relevant committee.The Scope of CEN TC 310 is the standardization in the field of automation systems and technologies and their application and integration to ensure the availability of the standards required by industry for design, sourcing, manufacturing and delivery, support, maintenance and disposal of products and their associated services. Areas of standardisation may include enterprise modelling and system architecture, information and its supporting systems, robotics for fixed and mobile robots in industrial and specific non-industrial environments, automation and control equipment and software, human and mechanical aspects, integration technologies and system operational aspects. These standards may utilise other standards and technologies beyond the scope of TC310, such as machines, equipment, information technologies, multi-media capabilities, and multi-modal communications networks.

According to the self-assessment form, if a WS is going to develop a CWA whose topic falls within the field of activity of a technical committee, the technical committee must be consulted. UNE sent the Project Plan to CEN/TC 310 and it was discussed at its meeting on 5th March 2019. The CEN TC 310 committee confirmed that:

- The CWA project fell within its field of activity;
- There was no conflicting European EN standard;
- They were not opposed to the launch of the project;
- They wanted to be informed of the progress of the project.

See extract from REPORT OF THE 61st MEETING OF CEN/TC 310 HELD VIA WEBEX/TELEPHONE CONFERENCE ON 5th MARCH 2019 in Annex A.

3.2.3 Workshop announcement and CEN/CENELEC Technical Boards distribution

Once the Project Plan had been agreed with CEN/CENELEC and the CEN/TC 310 technical committee had given its approval, the Workshop was set up and the kick-off meeting date was announced on the CEN/CENELEC web site. CCMC (CEN/CENELEC Management Center) posted the draft project plan for a public commenting period of 30 days, to allow for an expression of interest in participating in the Workshop.

Full information about the WS is available in the following link:
https://www.cencenelec.eu/news/workshops/Pages/TN-2019-009.aspx

In parallel, the information about the WS was sent for information to the CEN/CENELEC Technical Boards. The CEN/CENELEC Technical Boards (BTs) control the full standards programme and promote its speedy execution by the Technical Committees (TC), the CEN-CENELEC Management Centre (CCMC), and other bodies. Their key responsibilities are to advise on all matters concerning the organization, the working procedures, coordination and planning of standards work, to approve technical policies and strategies, to examine and decide on proposals for new projects.

The members of CEN/CENELEC BTs are:

- Chairperson;
- Secretariat;
- One permanent delegate from each CEN/CENELEC National Member;
- Observers:
    - one delegate from each Partner Organization;
    - representatives of the EC and EFTA Secretariat;
    - Sector Rapporteurs;
    - other organizations, subject to contractual agreements, e.g. Associated Bodies;
    - experts from TCs and BT Working Groups upon invitation from the Chairperson.

This representation ensures that information is distributed to all European Standardisation Bodies members of the EU (34 countries), EFTA members (4 countries) and other organisations.

See document *BT N 11565 - New CEN-CENELEC Workshop _Monsoon - Predictive management of data intensive industrial processes* in Annex A.

3.2.4 WS Kick-off meeting and next steps

After 30 days of public announcement, the kick-off meeting was held in Turin on 17th May 2019 in Torino (Italy).

During this meeting, the final Project Plan was approved, with a slight modification of the title of the CWA, to reflect more accurately the content of it. See the approved minutes of the kick off meeting in Annex A for more information.

As agreed during the kick off meeting, a first draft of the CWA was prepared and sent to the CEN TC 310 technical committee for consideration and inputs.Subsequently, this draft evolved as the related project deliverables became available.

3.2.5 CWA publication and availability

The final draft of the CWA was sent to CEN for publication on XX-XX-XXXX[PB2].

Once published, the documents of the European standardisation bodies CEN/CENELEC can be purchased through the national member organisations. In the case of CWA documents developed in European projects receiving public funding, UNE has a policy of defraying the CEN/CENELEC fee to make these documents available free of charge, as a measure to ensure maximum dissemination of the knowledge generated in the projects.

4 Interaction with another EU Projects

4.1 HARMONI "Harmonised assessment of regulatory bottlenecks and standardisation needs for the process industry"

HARMONI project (Grant agreement 768755) aims at bringing together all the relevant stakeholders of the process industry to jointly identify, analyse and propose solutions to the regulatory bottlenecks and standardisation needs that hamper their innovation processes and the market uptake of their results, necessary to move towards a more sustainable and competitive European process industry.

In order to achieve HARMONI's overarching goal, the consortium will develop and apply a methodology for ensuring an effective collaboration of the 8 sectors involved in SPIRE PPP to elaborate the solutions to the

common challenges they face due to non-technological barriers, such as regulatory issues or the lack of European Standards when trying to improve their resource efficiency.

In addition, HARMONI will analyse, compare and propose recommendations to trigger the transferability of technical solutions among and beyond the SPIRE sectors.

The project activities will result in an optimized EU regulatory and standardisation framework that facilitates and supports innovation in the process industry; a better participation of the SPIRE community in the EU regulatory and procedures, thus providing the most adequate input to the regulatory authorities; an earlier and more active involvement of the SPIRE community in the EU standardisation process; and an overall better environment to maximize transferability rates of technologies across SPIRE sectors.

MONSOON industrial partners have contributed to the Step 1 (Collection of relevant data) of HARMONI project through a survey campaign and interviews.

Full information about HARMONI project is available in https://www.spire2030.eu/harmoni.

4.2 BRIDGIT2 "Bridge the gap between standardization, research and innovation communities"

BRIDGIT2 project, co-financed by the EC and EFTA (Grant Agreement SA/CEN/GROW/E:FTA/OOQ/2017-09), starting December 2017 and finishing 2020, will build further on the main outputs and results of its predecessor, the BRIDGIT project. This project is seeking for the research and innovation community to fully engage with standardization. The project is also collecting evidences that standardization facilitates the market uptake of outcomes from H2020 and earlier framework programmes and thus also should have has an important role to play in FP9.

The MONSOON project has contributed to the BRIDGIT2 project by collaborating in its interview campaign to transfer its experience with standardisation. MONSOON's contribution is reflected in the report *Market Study on Standardisation in EU Framework Programmes - Final Study Report (December 2018)*.This report is not yet available online, figure 2 shows an extract of its content.

Figure 34 - Timescales of standardisation and projects

% of replies to the statement "In our project, standardisation process was/is adapted to the project timeframe" - Audience 1 and 2

Project insight – The H2020 MONSOON project – Audience 1[42]

In the field of process manufacturing, the MONSOON project aims to establish data-driven methodology to support the identification and exploitation of optimisation potentials by applying model-based predictive controls so as to perform plant and site-wide optimisation of production process.

In MONSOON, the timescales of standardisation processes were not a problem because activities were calibrated to be feasible during the project. Partners indeed made the choice to deliver a CWA instead of another deliverable, because it can be elaborated in a period of 10-12 months.

By looking at the qualitative information draw from the interviews, the main reasons advanced by the interviewees to motivate their disagreement with the statement "In our project, the timeframe of standardisation activities was adapted to the project timeframe" are:

[42] MOdel based coNtrol framework for Site-wide OptimizatiON of data-intensive processes - https://www.spire2030.eu/monsoon

Market Study on standardisation in EU Framework Programmes 60 | 138

Field Study Report | CEIS - EY

Figure 2 – Extract from the Market Study on Standardisation in EU Framework Programmes - Final Study Report (December 2018)

5 Relevant standards used

5.1 General

This chapter contains a list of the most relevant standards used in the solution developed in the MONSOON project.

The use of standards has as objectives:

- To facilitate the acceptance and utilisation by the market of the developed solutions;
- To provide information about useful existing standards covering the needs of the project;
- To ensure compatibility and interoperability with solutions existing in the market.

5.2 Most relevant standards used

5.2.1 OPC Unified Architecture

OPC is the interoperability standard for the secure and reliable exchange of data in the industrial automation space and in other industries. It is platform independent and ensures the seamless flow of information among devices from multiple vendors. OPC UA (Unified Architecture) is a platform-independent standard through which various kinds of systems and devices can communicate by sending Messages between Clients and Servers over various types of networks. It supports robust, secure communication that assures the identity of Clients and Servers and resists attacks. OPC UA defines sets of Services that Servers may provide, and individual Servers specify to Clients what Service sets they support. Information is conveyed using OPC UA-defined and vendor-defined data types, and Servers define object models that Clients can dynamically discover. Servers can provide access to both current and historical data, as well as Alarms and Events to notify Clients of important changes. OPC UA can be mapped onto a variety of communication protocols and data can be encoded in various ways to trade off portability and efficiency.

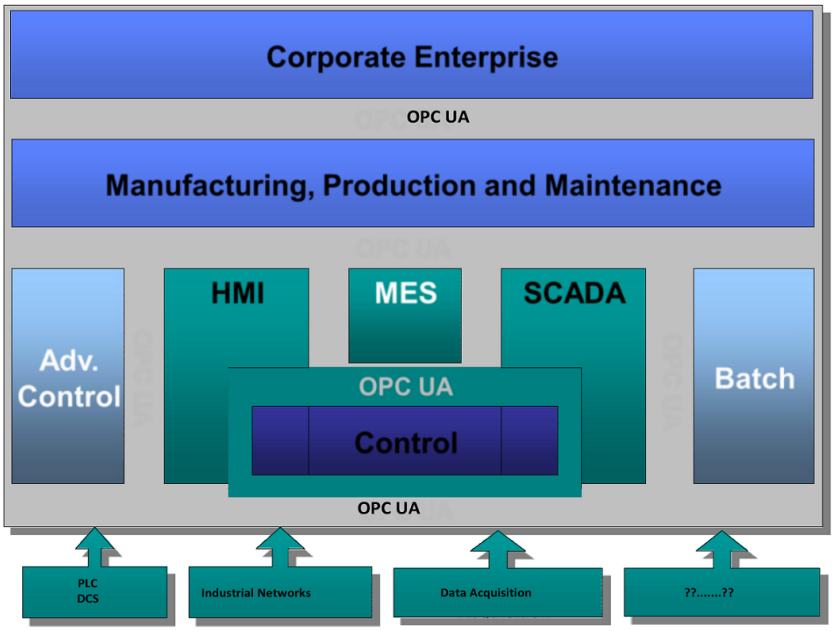

Figure 3 – OPC UA target applications

OPC UA is developed by The OPC Foundation (www.opcfoundation.org) and standardized under IEC 62541 OPC Unified Architecture family of standards.

According to various market studies (see for example https://opcfoundation.org/wp-content/uploads/2018/02/ARC-Report-OPC-Installed-Base-Insights.pdf), OPC UA is becoming the leading technology in the industrial automation sector, with 47 million automation devices installed worldwide including OPC technology in 2018 and an estimation of 45 percent annual growth for at least the next five years.

The MONSOON platformcan communicate with OPC UA devices through a specific connector developed at the Devices Integration Layer.

See deliverable *D2.6 Final Requirements and Architecture Specifications*, subclause 4.3.2.3 Virtual Process Industries Resources Adapter for more information about available connectors.

5.2.2 Euromap 63

EUROMAP 63 Data exchange interface for Injection moulding machines is a Recommendation drafted jointly by Euromap (Europe´s Association for plastics and rubber machinery manufacturers) and SPI (Society of Plastic Industry, USA) in 2000. It stablishes a protocol for communication with plastic injection machinery, using simple communication structures, which establishes an economical host computer interface using standard data processing hardware and software.

The new version of this standard, Euromap 77 (2018) has evolved to OPC-UA, but Euromap 63 is still being used in machinery already installed across the world, in industries that may be potential customers of the platform developed by MONSOON since one of the specific domains in which the platform has been demonstrated is the plastic injection sector.

The MONSOON platform can communicate with Euromap 63 devices through a specific connector developed at the Devices Integration Layer.

See deliverable *D2.6 Final Requirements and Architecture Specifications*, subclause 4.3.2.3 Virtual Process Industries Resources Adapter for more information about available connectors.

5.2.3 ISO 14040:2006 Environmental management -- Life cycle assessment -- Principles and framework

Organizations around the world, as well as their stakeholders, are becoming increasingly aware of the need for environmental management, socially responsible behaviour, and sustainable growth and development.

ISO 14040:2006 describes the principles and framework for life cycle assessment (LCA) including the definition of the goal and scope of the LCA, the life cycle inventory analysis (LCI) phase, the life cycle impact assessment (LCIA) phase, the life cycle interpretation phase, reporting and critical review of the LCA, limitations of the LCA, the relationship between the LCA phases, and conditions for use of value choices and optional elements.It is part of ISO 14000 family of standards, which have been adopted as national standards in many countries around the world.

The Life Cycle Assessment tool developed within the MONSOON project has been developed following ISO 14040, providing a selected number of environmental KPI and a customized database with relevant materials, operations, etc.

See deliverable *D5.8 Final Life Cycle Management plugin* for more information.

5.2.4 ISO/IEC 25010:2011 Systems and software engineering -- Systems and software Quality Requirements and Evaluation (SQuaRE) -- System and software quality models

Software products and software-intensive computer systems have many stakeholders including those who develop, acquire, use, or who are customers of businesses using software-intensive computer systems. Comprehensive specification and evaluation of the quality of software and software-intensive computer systems is a key factor in ensuring value to stakeholders. This can be achieved by defining the necessary and desired quality characteristics associated with the stakeholders' goals and objectives for the system. This includes quality characteristics related to the software system and data as well as the impact the system has on its stakeholders. It is important that the quality characteristics are specified, measured, and evaluated whenever possible using validated or widely accepted measures and measurement methods. The quality models in this International Standard can be used to identify relevant quality characteristics that can be further used to establish requirements, their criteria for satisfaction and the corresponding measures.

Among other quality models, the ISO 25010 model is the most recent and comprehensive one and has been followed in the quality assurance and validation process of the MONSOON platform.

See deliverable *D6.1 Test and Integration Plan*, subclause 3.1.1Quality Models for more information.

5.2.5 ISO 22400 Automation systems and integration -- Key performance indicators (KPIs) for manufacturing operations management

Using key performance indicators (KPIs) for manufacturing operations management is motivated by the possibility to use them to improve the value creation processes of an enterprise. Measuring performance enables an enterprise to quantify aspects of all its activities. ISO 22400 focuses on performance measures found to be particularly meaningful for the realization of operational performance improvement. These performance measures can be achieved through combining various measurements from operations and forming what are called KPIs. The monitoring of performance is specific to identified objectives of the enterprise, and KPIs are most useful when their values can be used to identify trends relative to certain operational objectives. An International Standard for KPIs is beneficial for comparing enterprise operations over extended periods of time and for comparing similar operations of enterprises within an industry.

See deliverable *D2.7 Initial Cross-sectorial Domain Model*, subclause 5.2.2 KPIs for more information.

5.3 Other standards used

The following table contains other standards used during the development of the MONSOON platform.

Table 3 -Other standards used in the MONSOON project

Number/Name/version	Title
ISO 9241-210:2019	Ergonomics of human-system interaction -- Part 210: Human-centred design for interactive systems
ISO/IEC/IEEE 42010:2011	Systems and software engineering -- Architecture description
ISO/IEC 20922:2016	Information technology -- Message Queuing Telemetry Transport (MQTT)
ANSI/ISA-95	Enterprise-Control System Integration
RDF 1.1	Resource Description Framework (RDF)
PMML	Predictive Model Markup Language
BPMN v2.0	Business Process Model and Notation

CRISP-DM	Cross Industry Standard Process for Data Mining
OGC SensorThings API	OGC SensorThings API
SKOS	Simple Knowledge Organization System

6 Topics not covered

This chapter contains some standards that have not been considered in the MONSOON project but that should be considered in other similar projects in the future.

6.1 EN IEC 62443 Security for industrial automation and control systems

Cybersecurity is one of the fundamental concerns in the digitization of all sectors. For the industrial environment, IEC TC 65 has developed the *IEC 62443 Security for industrial automation and control systems series of standards*, which are being adapted to the European context with the EN IEC 62443 series of standards.

Currently, this set of European standards consists of the following standards and projects:

Table 4 -EN IEC 62443 Series of standards

Standard	Title
EN IEC 62443-2-4:2019	Security for industrial automation and control systems - Part 2-4: Security program requirements for IACS service providers
EN IEC 62443-2-4:2019/A1:2019	Security for industrial automation and control systems - Part 2-4: Security program requirements for IACS service providers
EN IEC 62443-3-3:2019	Industrial communication networks - Network and system security - Part 3-3: System security requirements and security levels
EN IEC 62443-4-1:2018	Security for industrial automation and control systems - Part 4-1: Secure product development lifecycle requirements
EN IEC 62443-4-2:2019	Security for industrial automation and control systems - Part 4-2: Technical security requirements for IACS components
prEN IEC 62443-2-1:2019	Security for industrial automation and control systems - Part 2-1: Security program requirements for IACS asset owners
prEN 62443-3-2:2018	Security for industrial automation and control systems - Part 3-2: Security risk assessment and system design

An industrial automation and control systemis defined in these standards as the collection of personnel, hardware, software, procedures and policies involved in the operation of the industrial process and that can affect or influence its safe, secure and reliable operation.The MONSOON platform provides recommendations to the plant operators but does not control directly plant equipment, so it cannot affect its operation and would not be included in the above definition. But in the next evolution of this kind of projects, where they can be considered as part of the automation and control system according to the above definition, this series of standards shall be taken into account.

This series of standard is going to be integrated in the *UNECE Cybersecurity Regulatory Framework* and it is used to show compliance with the *Network & Information Security (NIS) Directive*.

7 Conclusions

The following conclusions can be drawn from the previous chapters:

- The MONSOON platform has been developed taking into account the most relevant standards used in the industrial sector, so it should be easy to integrate with existing and future manufacturing plants;
- Standards related to Smart Manufacturing are currently under a deep revision process within International/European Standardization Organizations, so the standards identified within this project shall be revised in the future;
- In Europe, and all across the world, new ICT-related regulatory requirements are emerging (Privacy, Cybersecurity, application of Artificial Intelligence to safety-related products, etc.). These requirements and the associated standards shall be checked in the future within this kind of projects.

Annex A Documents related with CWA development

Figure 4 – Extract from CEN TC 310 Meeting Minutes

Document: CEN/TC 310 N 1885

EUROPEAN COMMITTEE FOR
STANDARDIZATION COMITTE EUROPEEN
DE NORMALISATION EUROPAISCHES
KOMITEE FUR NORMUNG

Date: 2019-04-04

Secretariat of CEN/TC 310
Advanced automation technologies and their applications

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REPORT OF THE 61st MEETING OF CEN/TC 310 HELD VIA WEBEX/TELEPHONE CONFERENCE ON 5th MARCH 2019

1. OPENING OF THE 61st MEETING

The Chair welcomed all delegates to the meeting and confirmed this would be his last meeting as CEN/TC 310 Chair as he will be retiring at the end of May 2019.

2. ROLL CALL OF DELEGATES AND APOLOGIES FOR ABSENCE

All attendees participated by WebEx and/or telephone.

The Chair welcomed the participation of new attendees; Mario Tucci (Italy) and Steven Carter (UK).

Apologies were also noted from Mr Meinolf Gröpper (Germany) and Mr Torpor Holm (Sweden). In addition, it was reported Mr David Chen (France/CEN/TC 310/WG 1 Convenor) would not be participating and as a result David Shorter will report on WG1 activities in his place.

A complete list of delegates/attendees is attached to the end of this report - see Annex A (also available as N1878).

3. ADOPTION OF THE AGENDA

The draft agenda N1881 was adopted. It was reported item 7 would be covered first, followed by item 8.4, before taking all other agenda items in the order presented on the agenda.

4. APPOINTMENT OF THE DECISION COMMITTEE

No decision committee appointed. Any decisions taken will be submitted to the wider TC by correspondence.

5. APPROVAL OF THE REPORT OF THE 59TH PLENARY MEETING AND FOLLOW UP OF ACTIONS

The report of the 60th plenary meeting (**N1861**) was approved with no modifications. In relation to actions from the previous plenary meeting, it was reported these have been followed up/completed as indicated in N1861, Annex B.
Secretary note: Any updates on outstanding actions listed in N1861 Annex B yet to be completed will be noted in Annex B of this report (highlighted in red).

5.1. Call for future Chair of TC310 (N1874)

As a result of the retirement of Howard Mason at the end of May 2019, plans are in place to find a replacement Chair as per call for nominations document, N1874, open until end March 2019. The Chair reported that the UK has submitted a nomination, Mr Steven Carter, to be considered as a candidate for the position of TC Chair. No other nominations were reported at the meeting however the Secretary confirmed that shortly after the

1

March 2019 but the Secretary confirmed no further correspondence on this has been received and an action has been noted to contact CCMC to check process for TC input into CEN-CENELEC FG AI.
ACTION: Secretary

9.2.1. CWA-NATEDA

There were no further updates to report with respect to the Consultation on CWA Nano Indentation Test Data (NATEDA) apart from the comments already submitted to NEN on behalf of TC 310 and notified to TC310 via email 25.10.18.

9.2.2. CEN Workshop 'Predictive management of data intensive industrial processes' (N1880)

The TC discussed the new Workshop proposal (from UNE) on 'Predictive management of data intensive industrial processes' as circulated in N1880. It was agreed the CWA does fall within the scope of TC 310 although noted the TC are not working on standardisation on this topic. There were no objections to the CWA being launched. The Secretary would inform UNE/CCMC of the result of TC310 discussions on the proposal.
ACTION: Secretary

Secretary note: Secretary informed UNE/CMMC of the outcome of discussion at the meeting and will keep the TC informed of progress of this workshop as and when received. In addition, the Chair provided the following comments on behalf of TC310, with respect to similar work taking place in ISO/TC 108/SC 5 to UNE: "*international work that appears relevant in providing the raw information to which predictive algorithms could be applied. MIMOSA has developed specifications in ISO/TC 108/SC 5 that look at machine tool diagnostics, and these are being applied in the oil and gas industry by ISO/TC 184/WG 6. Through life product support include operational and maintenance feedback is covered within the data model in ISO 1303-239 (PLCS).*"
The proposed workshop Secretary from UNE acknowledged this recommendation and reported that 'standards from ISO/TC 108 were included in UNE report to the Consortium on useful standards (Deliverable D8.5, downloadable from https://www.spire2030.eu/monsoon)'.

9.3. Draft Proposal on a CEN-CENELEC-ETSI Coordination Group on Smart Manufacturing (N1880)

The TC discussed the Draft Proposal on a CEN-CENELEC-ETSI Coordination Group on Smart Manufacturing request received via DIN to create a coordination group on Industrie 4.0 on European level as circulated in N 1880. There was concern raised with respect to overlap and how this group aligns with other smart manufacturing coordinating groups at international level. Following discussions TC 310 agreed to welcome the need for coordination involving European stakeholders but highlighted the fact that many of the international coordination activities have strong European participation already. A suggestion was put forward for a workshop to be set up to review coordination at European level within the International environment. This would align with how CEN/TC 310 works (to coordinate with International environment as a means of working globally). Secretary to feedback result of discussion on N1880 to Meinolf Gröpper for DIN.
ACTION: Secretary

9.4 CEN/CENELEC liaison reports

9.4.1 CEN/TC 438 Additive manufacturing
9.4.2 CEN/TC 442 Building Information Modelling (BIM)

No updates were provided. Jean Brange would continue as link.

9.5 e-Business Co-ordination Group (eBCG)
9.5.1 Report from 2019-02-13 telecon H G Mason

Chair gave brief verbal report following the teleconference he participated in on 13.2.19;
- CEN digital transformation collaborative authority (ISO/IEC) to be piloted this year

6

Figure 5– Informative document shared in CEN/CENELEC BTs

CEN Reference: BT N 11565
CENELEC Reference: BT162/DG11277/INF

Simultaneous circulation to CEN and CENELEC TECHNICAL BOARDS

BT by correspondence	**Common Agenda item:**
For information	**Issue date:**

SUBJECT

New CEN-CENELEC Workshop 'Monsoon - Predictive management of data intensive industrial processes'

BACKGROUND

CCMC has received a draft Project Plan for a new CEN-CENELEC Workshop on 'Predictive management of data intensive industrial processes'.

The Workshop is proposed within the context of the Task 8.3 – "Standardization" of the MONSOON (MOdel based coNtrol framework for Site-wide OptmizatiON of data-intensive processes) project which received funding from the European Union's Horizon 2020 research and innovation programme (call H2020-IND-CE-2016-17).

The aim of the forthcoming Workshop is to develop a CWA on predictive management of intensive industrial processes, containing a methodology detailing the techniques that should be employed (machine/deep machine learning techniques or trend analysis techniques), through the different steps to be followed, and with the aim to predict process or equipment drifts and trigger alarms and potentially help to improve overall equipment effectiveness (OEE) or the workshop performances.

Draft Project Plan

The draft Project Plan of the Workshop can be found in Annex 1.

Self-Assessment

The Self-Assessment is provided in Annex 2. The four conditions under which there is a need for the agreement of the BT members before proceeding with the process to launch a Workshop were analysed:

- the Workshop will not deal with safety matters, which is stated in the project plan and was further explained by the proposed Secretary, Mr José Antonio JIMÉNEZ CABALLERO (UNE):

  "The objective of the CWA is to predict process or equipment drifts and trigger alarms related to the performance of the equipment that could have an impact on the quality of produced items, not related to safety issues. In addition, changes in

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the manufacturing equipment parameters for correcting this drifts will be set by an operator if considered suitable, in no case it is an automatic decision that could lead the machine to an unsafe state."

- the proposed Workshop does not deal with conformity assessments aspects;
- the proposed Workshop does not deal with management systems aspects;
- the proposed CWA falls within the scope of CEN/TC 310 'Advanced automation technologies and their applications'. Following the discussion on the CWA at the plenary meeting of CEN/TC 310 on 2019-03-05, the TC concluded that it is not working on a standardisation document on this topic and has no objections to the CWA being launched.

CCMC requested the Secretariat to ensure that CEN/TC 310 is involved in the work on CWA, that the CWA is not in conflict with standards of CEN/TC 310 and does not deal with safety aspects.

Therefore, there is no need for a CEN-CENELEC BT decision.

Kick-off meeting

The kick-off meeting of the Workshop will be held on 17th of May 2019 in Turino, ITALY.

The Workshop will be also announced on the CEN-CENELEC website at:

https://www.cencenelec.eu/news/workshops/Pages/default.aspx

Secretariat

UNE will provide the Workshop secretariat, subject to formal approval of the Project Plan during the kick-off meeting.

Should you have any comments on the launching of this CEN-CENELEC Workshop or on its proposed Project Plan, you are invited to contact Joanna Frankowska (jfrankowska@cencenelec.eu) or José Antonio JIMÉNEZ CABALLERO (jjimenez@une.org)

2019-04-04 – JF

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Figure 6– Approved minutes of the kick off meeting of Workshop "Predictive control and maintenance of data intensive industrial processes"

CEN-CENELEC WORKSHOP MONSOON- Predictive control and maintenance of data intensive industrial processes

Secretariat: Mr. José Antonio Jiménez Caballero (UNE)

Tel. (+34) 914 325 958. Fax: (+34) 913 104 596 jjimenez@une.org

Draft minutes of the CEN-CENELEC WS MONSOON Kick off meeting

17th May – 10:30

LINKS Foundation premises

Torino (Italy)

1 OPENING OF THE MEETING

Joanna Frankowska introduces himself and welcomes the participants.

2 ROLL CALL OF PARTICIPANTS

The participants attending the meeting are:

Joanna Frankowska (CEN/CENELEC Management Centre)

José Antonio Jiménez (UNE)

Claudio Pastrone (LINKS Foundation)

Rosaria Rossini (LINKS Foundation)

Andre Augé (Rio Tinto)

Vincent Maigron (Rio Tinto)

Dimosthenis Ioannidis (CERTH/ITI)

Nikolaos Kolokas (CERTH/ITI)

Vincent Bonnivard (Probayes)

Ruben Schlutter (KUNSTSTOFF-INSTITUT FUER MITTELSTAENDISCHE WIRTSCHAFT NRW GMBH)

Davide Caporale (KUNSTSTOFF-INSTITUT FUER MITTELSTAENDISCHE WIRTSCHAFT NRW GMBH)

Alexander Schneider (FRAUNHOFER GESELLSCHAFT ZUR FORDERUNG DER ANGEWANDTEN FORSCHUNG EV)

Martin Sarnovsky (TECHNICAL UNIVERSITY KOSICE)

Peter Bednár (TECHNICAL UNIVERSITY KOSICE)

José Antonio Jiménez indicates that he has sent an invitation to experts from CEN/TC 310 Advanced automation technologies and their applications for joining this meeting by teleconference. In any case, the participation in this WS is open at any time, so more experts can join the group in the future.

3 ADOPTION OF THE AGENDA

The agenda is adopted without modifications.

4 PRESENTATION OF WORKSHOP CONCEPT

Joanna Frankowska makes a presentation about the European Standardization Organizations, the different kinds of normative documents and specifically about CEN/CENELEC workshops and CWA deliverables.

(See document CEN_CENELEC WS concept _Monsoon kick off meeting.pdf).

During the presentation, at the point explaining the conditions to be part of the Workshop, Joanna indicates the participants must sign a Registration Form assigning the exploitation rights of individual contributions to Workshop deliverables to CEN.

This point raises some concerns among the participants. Some of them must consult their legal affairs department before signing this kind of documents.

Jose Antonio Jimenez states that, after reading the registration form, the assignment of exploitations rights only refers to editorial contributions to the documents, and that the item (d) of the registration form states the participants can exploit their own copyrightable contribution for their own purposes.

In any case, if any participant has doubts on the registration form, they can be sent to CEN for clarifying them.

5 BACKGROUND TO THE WORKSHOP

Claudio Pastrone introduces the project MONSOON, the European project within which this workshop will develop a CWA.

(Presentation available among the meeting documentation).

Jose Antonio Jiménez indicates that the abovementioned presentation describes the whole project, but only a small part of it will be covered by this workshop.

Then, Nikolaos Kolokas and Vincent Bonnivard make a presentation on the specific topic on which the CWA will be developed, as specified in the Project Plan submitted to CEN. The presentation includes a demonstration in real time of the results obtained.

6 OFFICIAL ESTABLISHMENT OF THE WORKSHOP

6a) Appointment of Workshop Chairman and Confirmation of the Secretariat

Joanna Frankowska initiates the election process for the Chairmanship. The announced candidate in the project plan is Claudio Pastrone, Project Leader of the MONSOON project.

Claudio Pastrone is appointed as Chairman unanimously.

At this point, Joanna Frankowska asks José Antonio Jiménez whether UNE confirms his willingness to serve as secretary. Mr. Jimenez confirms he will be the secretary of this WS and that the participation is free of charge for the participants.

The Secretariat is confirmed.

6b) Discussion on title and scope

José Antonio Jiménez introduces briefly the Project Plan, which have been available on CEN/CENELEC website for one month.

In regard of the title and scope, the participants consider that the current title "Predictive management of data intensive industrial processes" is too wide, because only "predictive control and maintenance" will be dealt with in the CWA.

The final title of the WS and the scope of the CWA will be modified to "Predictive control and maintenance of data intensive industrial processes", which states more accurately the content of the deliverable.

6c) Discussion and approval of the WS Project Plan

The Project Plan is reviewed.

The timeframe of clause 5 of the project plan is revised and slightly modified.

The final Project Plan is approved with the abovementioned modifications.

6d) Organisation of the work

The work should fit the timeframe stated in clause 5 of the project plan. A first draft of the CWA should be available by June the 7th, and the first Plenary meeting will be held during the last week of June by teleconference. No more physical meetings are planned.

6e) Planning of the meetings, follow-up actions

Next actions:

- A first draft of the CWA should be available by June the 7th;
- The Secretary will share this draft with CEN/TC 310 experts;
- The participants must send the Registration Form signed to the Secretary. If they have any question about the statements of the registration form, it will be submitted to CEN for clarification.

7 A.O.B

No additional issues.

8 END OF THE MEETING

Figure 7–CWA self-assessment form

Annex A
(informative)
Template for the self-assessment

Title of the proposed CWA:

Monsoon - Predictive management of data intensive industrial processes

1. Does the proposed CWA conflict with an EN or an HD for CENELEC?

☒ NO

☐ YES → **WARNING**: Work on the proposed CWA shall not be initiated.

2. Does the proposed CWA intend to define requirements related to safety matters?

☒ NO

☐ YES Is the proposed CWA within the scope of

☐ CEN? → The CWA proposal shall be submitted to CEN/BT for decision.

☐ CENELEC? → **WARNING**: Work on the proposed CWA shall not be initiated.

3. Is the scope of the proposed CWA within the scope of an existing CEN/CENELEC technical body?

☐ NO

☒ YES → The relevant CEN/CENELEC technical body shall be consulted on the CWA proposal:

- If this technical body responds positively and sees no harm in the CWA being developed, the CWA proposal may be processed.
- If the technical body is opposed to a CWA being launched, the CWA proposal shall be submitted to the CEN/CENELEC BT(s) for decision.

4. Does the proposed CWA intend to define requirements related to management system aspects?

☒ NO

☐ YES → The CWA proposal shall be submitted to the CEN/CENELEC BT(s) for decision.

5. Does the proposed CWA intend to define requirements related to conformity assessment aspects?

☒ NO

☐ YES → CEN/CENELEC Internal Regulations - Part 3, clause 6.7 applies.

If all these questions are answered NO, the CWA proposal may be processed.

If not, special conditions apply as given above.

PALOMA GARCÍA

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Figure 8– Final Project Plan for the WS Workshop on "MONSOON - Predictive control and maintenance of data intensive industrial processes"

CENELEC

2019-05-17

DRAFT

Project Plan for the CEN/CENELEC Workshop on "MONSOON - Predictive control and maintenance of data intensive industrial processes"

1. Status of the Project Plan

Final Project Plan approved at the Kick-off meeting of the Workshop.

2. Background to the Workshop

This workshop is created under the Task 8.3 – "Standardization" of the MONSOON (MOdel based coNtrol framework for Site-wide OptmizatiON of data-intensive processes) project. This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 723650 (call H2020-IND-CE-2016-17).

The MONSOON project aims at establishing data-driven methodology and tools to support identification and exploitation of optimization potentials. This is achieved by applying model based predictive controls to perform plant and site wide optimization of production processes, by working in multi-scale fashion at different layers of the SCADA pyramid.

MONSOON pursues the following set of ambitious cross-sectorial technical objectives (please consider that the following are the objectives of the whole MONSOON project, but only the topic described under Item "4. Workshop scope and objectives" in page 3 of this document is to be covered by the CWA to be developed within the WS):

- An effective multi-scale control methodology suitable for plant- and site-wide applications in heterogeneous production environments to improve process efficiency and reduce usage of resources;
- An integrated real-time and dependable infrastructure easing adaptation of heterogeneous systems in monitoring and control of data-intensive production processes;
- Distributed plant- and site-wide models and mapping techniques;
- Application of data-driven processing techniques suitable to support real-time control;
- Research and develop innovative, multi-level, plant-wide Analytics and Visualizations for the detection of complex patterns in plants processes;

Draft PP version 1.0 Page

CENELEC

- A novel model-based development environment to facilitate design, development, integration, deployment and testing of predictive control algorithms;
- Symmetric plant and site-wide Life Cycle Management Tools integrated with the existing control infrastructure.

The cross-sectorial MONSOON solution will be developed and evaluated in two industrial pilot sites, to assess its acceptance and usability by its intended end-users and for its potential effectiveness and impact on resource optimization, namely a primary aluminium production plant and a plastic injection plant.

The SubTask 8.3.3: "Contribution to the on-going and future standardization developments" within the MONSOON project is aimed at making an effective contribution to the Standardization system, in such a way that the findings of the project can be used by the European industry and also as a mean of involving external experts not being part of the Consortium.

In order to match the timeframe of the MONSOON project and the timeframe for developing the different types of standardization documents, the development of a CWA within a Workshop has been selected.

Market relevance

Process industry are characterized by intense use of raw resources and energy, thus providing a context where even small optimizations can lead to high absolute savings both in terms of economic and environmental costs, if they can prove to offer predictable and replicable results.

Predictive modelling techniques can be especially effective in optimizing processes in such context, but their application is not straightforward for several reasons including e.g., the high cost of integrating large number of new sensors or actuators into legacy production equipment, intrinsic difficulties in monitoring physical parameters in harsh conditions, interoperability issues among existing IT systems in use, difficulties in monitoring data intensive processes in a scalable fashion, etc.

New production plants can be designed from the beginning taking into account these new techniques for processes optimization, but for capital intensive process industries, where initial investments for new production sites are prohibitive, a cost effective and reliable solution as provided by the MONSOON project is desirable, in such a way they can improve their processes and continue to make profitable the investment and be competitive with the new facilities.

Legal environment

No legal issues related to this proposal have been identified due the following reasons:

- Data collected from the production plant are related to physical quantities of the production process, no personal identification information will be collected or generated in any case;
- The predictive management is aimed at triggering alarms related to the process in such a way small deviations affecting the production can be detected in advance, but these alarms

Draft PP version 1.0 Page

CENELEC

are not related to safety. Plant and machinery safety is covered by the existing systems within the plant.

Standardization activities

The scope of the CWA to be developed is within the scope of CEN/TC 310 Advanced automation technologies and their applications.

The CWA does not conflict with CEN/TC 310 published standards or projects of standards under development.

Following CEN/CENELEC Guide 29, CEN/TC 310 has been consulted and has no objections to the CWA being launched.

3. Workshop proposers and Workshop participants

The workshop proposers are part of the members of the MONSOON Consortium, namely:

- LINKS FOUNDATION
- FRAUNHOFER GESELLSCHAFT ZUR FORDERUNG DER ANGEWANDTEN FORSCHUNG EV
- ETHNIKO KENTRO EREVNAS KAI TECHNOLOGIKIS ANAPTYXIS
- TECHNICAL UNIVERSITY KOSICE
- ALUMINIUM PECHINEY
- ASOCIACION ESPAÑOLA DE NORMALIZACION
- KUNSTSTOFF-INSTITUT FUER MITTELSTAENDISCHE WIRTSCHAFT NRW GMBH
- PROBAYES SAS

The Workshop participation will be open to all interested parties.

4. Workshop scope and objectives

The aim of the Workshop is to develop a CWA on Predictive control and maintenance of data intensive industrial processes, containing a methodology detailing the techniques that should be employed (machine/deep machine learning techniques or trend analysis techniques), through the different steps to be followed, and with the aim to predict process or equipment drifts and trigger alarms and potentially help to improve overall equipment effectiveness (OEE) or the workshop performances.

This CWA will not define requirements related to safety aspects.

Draft PP version 1.0 Page

CENELEC

The CEN/CENELEC Workshop Agreement is the proposed approach due to the following advantages:
- Agility: The time frames for the other standardization options do not match the planned schedule for this project.
- The Workshop Agreement provides the sought acknowledge of the industry across the EU by submitting the technical specification to the workshop process providing openness in process and visibility to all market players.
- The Workshop Agreement assures the involvement of the industry (laboratories, component and manufacturers, integrators, application developers) as the workshop is open to anyone, including non-European participants. The opportunity to participate is widely advertised in advance by CEN/CENELEC and its member bodies.
- The Workshop Agreement guarantees that the different views of the stakeholders interested in the document are considered.
- The Workshop Agreement ensures availability of information to all parties, enquiry among participants, involvement of CEN/CENELEC members during acceptance, and in summary a fully open and transparent process.

5. Workshop programme

The CWA will be drafted and published in English.

The planned timeframe for the CWA development is the following:

Description	Time	Place	Duration
Announcement of the CEN/WS on CEN website	April 2019	N/A	30 days' notice
CEN/WS Kick Off of Workshop	May 17th, 2019	Torino	1 day
First draft of the CWA deliverable	June 7th	N/A	N/A
Circulation of 1st Draft CWA and collection of comments	June 7th	N/A	15 days
CEN/WS 1st Plenary Meeting	Last week June 2019	Teleconference	1 day
2nd Draft of the CWA deliverable	Last week June 2019	N/A	N/A

Draft PP version 1.0 Page

CENELEC

Circulation of 2nd Draft CWA and collection of comments	Last week June 2019	N/A	15 days
CEN/WS 2nd Plenary Meeting	July 2019	Teleconference	1 day
3rd Draft of the CWA deliverable	July 2019	N/A	N/A
Circulation of 3rd Draft CWA and collection of comments	July 2019	N/A	15 days
CEN/WS 3rd and final Plenary Meeting (final version/approval of deliverable)	September 2019	Teleconference	1 day
Publication of CWA deliverable after editorial check	October/November 2019	N/A	N/A
* The Time-plan is subjected to be modified in relation to the drafting process of the CWA and to the eventual decision on the submission of the document to 60-days commenting phase.			

6. Workshop structure

The Workshop will operate under the CEN/CENELEC rules for the CEN/CENELEC Workshop Agreement. A Workshop Chair will manage the Workshop. The Chairman will be appointed at the kick-off meeting.

The responsibility of the Workshop Chair is to preside at Workshop plenary meetings, to ensure the Workshop develops according to the Project Plan and to manage the consensus building process.

Under the responsibility of the Workshop Chair, the Secretariat will support the Workshop in all its activities.

7. Resource requirements

All costs related to the participation of interested parties in the Workshop's activities must be borne by themselves.

The workshop secretariat will be carried out by the Spanish Association for Standardisation, UNE.

Draft PP version 1.0 Page

CENELEC

8. Contact points

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Draft PP version 1.0 Page

List of tables