



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

D8.9 - Updated Report on the standardization landscape and applicable standards

Deliverable ID	D8.9
Deliverable Title	Updated Report on the standardization landscape and applicable standards
Work Package	WP8 – Dissemination, Exploitation and Standardization
Dissemination Level	PUBLIC
Version	2.0
Date	2019-01-30
Status	draft
Lead Editor	UNE
Main Contributors	Jose Antonio JIMENEZ (UNE)

Published by the MONSOON Consortium



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 723650.

Document History

Version	Date	Author(s)	Description
1.0	2019-01-18	José Antonio Jiménez Caballero (UNE)	First draft of the document
2.0	2019-01-30	José Antonio Jiménez Caballero (UNE)	Modification of Chapter 4.

Internal Review History

Version	Review Date	Reviewed by	Summary of comments
1.0	2019-01-25	Vincent Maigron (RIOTINTO)	Modification of Chapter 4

Table of Contents

Document History	2
Internal Review History	2
Table of Contents	3
1 Introduction.....	4
1.1 Scope	4
1.2 Related documents.....	4
2 Overview of the international standardization system.....	5
3 Standardization activities related to MONSOON project	5
3.1 Methodology	5
3.2 Industrial-process measurement, control and automation standards.....	5
3.3 Production of primary aluminium	8
3.4 Plastic moulding injection technology	9
3.5 Information technology.....	10
4 Conclusions.....	12
List of tables.....	14

1 Introduction

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 at the time it was released within the Monsoon project(M6).

Nevertheless, new projects of standards are launched constantly and projects under development considered as interesting before are finished, so the final text of the standard is available.

Additionally, during the development of the project new aspects where the use of standards can be suitable can appear, and, therefore, new standards can be added.

For both reason, an update of the deliverable D8.5 has been considered appropriate.

The structure of chapters/subchapters of the base document D8.5 has been maintained for an easier identification of the places where the changes have been included. Missing subchapters and tables means they do not contain changes with respect to the deliverable D8.5.

1.1 Scope

This deliverable contains an update of the lists of standards and standards under development contained in the deliverable D8.5.

This deliverable shall be read in conjunction with deliverable D8.5.

This deliverable includes some of the standards identified by the IEC SEG 7 Smart Manufacturing group, as far as they are applicable to the Monsoon project.

1.2 Related documents

ID	Title	Reference	Version	Date
D8.5	Report on the standardization landscape and applicable standards		1.3	2017-03-31

2 Overview of the international standardization system

This chapter does not contain changes with respect to deliverable D8.5.

3 Standardization activities related to MONSOON project

3.1 Methodology

This chapter does not contain changes with respect to deliverable D8.5.

3.2 Industrial-process measurement, control and automation standards

3.2.1 IEC TC 65 Industrial-process measurement, control and automation

3.2.1.3 IEC TC 65 standards and standards under development relevant for MONSOON

Table 1 - IEC TC 65 standards and standards under development relevant for MONSOON

Reference	Title
IEC 62657-1:2017	Industrial communication networks - Wireless communication networks - Part 1: Wireless communication requirements and spectrum considerations
IEC 62657-2:2017	Industrial communication networks - Wireless communication networks - Part 2: Coexistence management
IEC 62443-4-1:2018	Security for industrial automation and control systems - Part 4-1: Secure product development lifecycle requirements
IEC 62443-2-4:2015/AMD1:2017	Amendment 1 - Security for industrial automation and control systems - Part 2-4: Security program requirements for IACS service providers
IEC PAS 63088:2017	Smart manufacturing - Reference architecture model industry 4.0 (RAMI4.0)
IEC TS 62832-1:2016	Industrial-process measurement, control and automation - Digital factory framework - Part 1: General principles
Standards under development	
PNW 65-717	Security for industrial automation and control systems – Part 2-2: IACS protection levels
IEC 62443-2-1 ED2	Security for industrial automation and control systems - Part 2-1: Security program requirements for IACS asset owners
IEC 62443-3-2 ED1	Security for industrial automation and control systems - Part 3-2: Security risk assessment and system design
IEC 62443-4-2 ED1	Security for industrial automation and control systems - Part 4-2: Technical security requirements for IACS components
IEC 62832-2 ED1	Industrial-process measurement, control and automation - Digital Factory framework - Part 2: Model elements
IEC 62832-3 ED1	Industrial-process measurement, control and automation - Digital Factory framework Part 3: Application of Digital Factory for life cycle management of production systems

Reference	Title
IEC 62657-2/AMD1 ED2	Industrial communication networks - Wireless communication networks - Part 2: Coexistence management
IEC 62657-3 ED1	Industrial communication networks - Wireless communication networks - Part 3: Formal description of the automated coexistence management and application guidance
IEC 62657-4 ED1	Industrial communication networks - Wireless communication networks - Part 4: Coexistence management with central coordination of wireless applications
IEC TR 62541-1 ED3	OPC unified architecture - Part 1: Overview and concepts
IEC TR 62541-2 ED3	OPC unified architecture - Part 2: Security Model
IEC 62541-3 ED3	OPC unified architecture - Part 3: Address Space Model
IEC 62541-4 ED3	OPC Unified Architecture - Part 4: Services
IEC 62541-5 ED3	OPC Unified Architecture - Part 5: Information Model
IEC 62541-6 ED3	OPC unified architecture - Part 6: Mappings
IEC 62541-7 ED3	OPC unified architecture - Part 7: Profiles
IEC 62541-8 ED3	OPC Unified Architecture - Part 8: Data Access
IEC 62541-9 ED3	OPC Unified Architecture - Part 9: Alarms and conditions
IEC 62541-10 ED3	OPC Unified Architecture - Part 10: Programs
IEC 62541-11 ED2	OPC Unified Architecture - Part 11: Historical Access
IEC 62541-12 ED1	OPC Unified Architecture Specification: Part 12 - Discovery
IEC 62541-13 ED2	OPC Unified Architecture - Part 13: Aggregates
IEC 62541-14 ED1	OPC Unified Architecture – Part 14: PubSub

3.2.2 ISO/TC 184 Automation systems and integration

3.2.2.3 ISO/TC 184 Standards and standards under development relevant for MONSOON

Table 2 - ISO/TC 184 Standards and standards under development relevant for MONSOON

Reference	Title
ISO/TR 23087:2018	Automation systems and integration - The Big Picture of standards
ISO/TS 8000-1:2011	Data quality -- Part 1: Overview
ISO 8000-100:2016	Data quality -- Part 100: Master data: Exchange of characteristic data: Overview
ISO 8000-110:2009	Data quality -- Part 110: Master data: Exchange of characteristic data: Syntax, semantic encoding, and conformance to data specification
ISO 8000-115:2018	Data quality -- Part 115: Master data: Exchange of quality identifiers: Syntactic, semantic and resolution requirements
ISO 8000-120:2016	Data quality -- Part 120: Master data: Exchange of characteristic data: Provenance
ISO 8000-130:2016	Data quality -- Part 130: Master data: Exchange of characteristic data: Accuracy
ISO 8000-140:2016	Data quality -- Part 140: Master data: Exchange of characteristic data: Completeness
ISO/TS 8000-150:2011	Data quality -- Part 150: Master data: Quality management framework
ISO 8000-2:2018	Data quality -- Part 2: Vocabulary
ISO/TS 8000-311:2012	Data quality -- Part 311: Guidance for the application of product data quality for shape (PDQ-S)
ISO/TS 8000-60:2017	Data quality -- Part 60: Data quality management: Overview
ISO 8000-61:2016	Data quality -- Part 61: Data quality management: Process reference model
ISO 8000-62:2018	Data quality -- Part 62: Data quality management: Organizational process maturity assessment: Application of standards relating to process assessment
ISO 8000-8:2015	Data quality -- Part 8: Information and data quality: Concepts and measuring
ISO 22400-1:2014	Automation systems and integration -- Key performance indicators (KPIs) for manufacturing operations management -- Part 1: Overview, concepts and terminology
ISO/TR 22400-10:2018	Automation systems and integration -- Key performance indicators (KPIs) for manufacturing operations management -- Part 10: Operational sequence description of data acquisition
ISO 22400-2:2014	Automation systems and integration -- Key performance indicators (KPIs) for manufacturing operations management -- Part 2: Definitions and descriptions
ISO 22400-2:2014/Amd 1:2017	Automation systems and integration -- Key performance indicators (KPIs) for manufacturing operations management -- Part 2: Definitions and descriptions -- Amendment 1: Key performance indicators for energy management
ISO 20140-1:2013	Automation systems and integration -- Evaluating energy efficiency and other factors of manufacturing systems that influence the environment -- Part 1: Overview and general principles

Reference	Title
ISO 20140-2:2018	Automation systems and integration -- Evaluating energy efficiency and other factors of manufacturing systems that influence the environment -- Part 2: Environmental performance evaluation process
ISO 20140-5:2017	Automation systems and integration -- Evaluating energy efficiency and other factors of manufacturing systems that influence the environment -- Part 5: Environmental performance evaluation data
ISO 15746-2:2017	Automation systems and integration -- Integration of advanced process control and optimization capabilities for manufacturing systems -- Part 2: Activity models and information exchange
ISO 15531-44:2017	Industrial automation systems and integration -- Industrial manufacturing management data -- Part 44: Information modelling for shop floor data acquisition
Standards under development	
ISO/AWI 8000-64	Data quality -- Part 64: Data quality management: Organizational process maturity assessment: Application of the Test Process Improvement method
ISO/AWI 8000-66	Data quality -- Part 66: Part 66: Data quality management: Assessment indicators for data processing in manufacturing operations
ISO/AWI TS 8000-65	Data quality -- Part 65: Data quality management: Process measurement questionnaire
ISO/DIS 8000-116	Data quality -- Part 116: Master data: Exchange of quality identifiers: Application of ISO 8000-115 to authoritative legal entity identifiers
ISO/DIS 8000-63	Data quality -- Part 63: Data quality management: Process measurement
ISO/NP TS 8000-81	Data quality -- Part 81: Data quality assessment methods: Profiling
ISO/NP 8000-51	Data quality -- Part 51: Part 51: Data governance: exchange of data policy statements
ISO/DIS 20140-1	Automation systems and integration -- Evaluating energy efficiency and other factors of manufacturing systems that influence the environment -- Part 1: Overview and general principles
ISO/DIS 20140-3	Automation systems and integration -- Evaluating energy efficiency and other factors of manufacturing systems that influence the environment -- Part 3: Environmental performance evaluation data aggregation process
ISO/NP 11354-3	Advanced automation technologies and their applications -- Requirements for establishing manufacturing enterprise process interoperability -- Part 3: Requirements for information and communication technology-enabled enterprise interoperability

3.3 Production of primary aluminium

3.3.1 ISO/TC 226 Materials for the production of primary aluminium (Pitch, solid carbonaceous materials, petroleum coke)

This chapter does not contain changes with respect to deliverable D8.5.

Deliverable nr.	D0.0 8.9
Deliverable Title	Updated Report on the standardization landscape and applicable standards
Version	0.0–2019-01-30

3.3.2 IEC TC 2 Rotating machinery

This chapter does not contain changes with respect to deliverable D8.5.

3.3.3 ISO/TC 108 Mechanical vibration, shock and condition monitoring

3.3.3.3 ISO/TC 108 Standards and standards under development relevant for MONSOON

Table 3 - ISO/TC 108 Standards and standards under development relevant for MONSOON

Reference	Title
ISO 17359:2018	Condition monitoring and diagnostics of machines -- General guidelines
ISO 13373-9:2017	Condition monitoring and diagnostics of machines -- Vibration condition monitoring -- Part 9: Diagnostic techniques for electric motors

3.3.4 IEC TC 56 Dependability

This chapter does not contain changes with respect to deliverable D8.5.

3.3.5 ISO/TC 69 Applications of statistical methods

3.3.5.3 ISO/TC 69 Standards and standards under development relevant for MONSOON

Table 4 - ISO/TC 69 Standards and standards under development relevant for MONSOON

Reference	Title
Standards under development	
ISO/NP 13053-1	Systems for process improvement -- Lean & Six Sigma -- Part 1: Methodology
ISO/NP 13053-2	Systems for process improvement -- Lean & Six Sigma -- Part 2: tools and techniques

3.4 Plastic moulding injection technology

3.4.1 ISO/TC 61 Plastics

3.4.1.3 ISO TC 61 Standards and standards under development relevant for MONSOON

Table 5 - ISO TC 61 Standards and standards under development relevant for MONSOON

Reference	Title
ISO 20457:2018	Plastics moulded parts -- Tolerances and acceptance conditions

3.4.2 EUROMAP

3.4.2.2 EUROMAP Technical Recommendations relevant for MONSOON

Table 6 - EUROMAP Technical Recommendations relevant for MONSOON

Reference	Title
EUROMAP 82.1	OPC UA interfaces for plastics and rubber machinery – Peripheral devices – Temperature control devices
EUROMAP 83	OPC UA Interfaces for Plastics and Rubber Machinery - General type definitions

3.5 Information technology

3.5.1 ISO/IEC JTC 1/SC 7 Software and systems engineering

3.5.1.2 ISO/IEC JTC 1/SC 7 Standards and standards under development relevant for MONSOON

Table 7 - ISO/IEC JTC 1/SC 7 Standards and standards under development relevant for MONSOON

Reference	Title
ISO/IEC/IEEE 12207:2017	Systems and software engineering -- Software life cycle processes
ISO/IEC/IEEE 26515:2018	Systems and software engineering -- Developing information for users in an agile environment
ISO/IEC/IEEE 24748-1:2018	Systems and software engineering -- Life cycle management -- Part 1: Guidelines for life cycle management
ISO/IEC/IEEE 24748-2:2018	Systems and software engineering -- Life cycle management -- Part 2: Guidelines for the application of ISO/IEC/IEEE 15288 (System life cycle processes)
ISO/IEC/IEEE 29148:2018	Systems and software engineering -- Life cycle processes -- Requirements engineering
ISO/IEC 29155-1:2017	Systems and software engineering -- Information technology project performance benchmarking framework -- Part 1: Concepts and definitions
ISO/IEC/IEEE 24748-5:2017	Systems and software engineering -- Life cycle management -- Part 5: Software development planning
ISO/IEC 20741:2017	Systems and software engineering -- Guideline for the evaluation and selection of software engineering tools

3.5.2 ISO/IEC JTC 1/SC 27 IT Security techniques

3.5.2.2 ISO/IEC JTC 1/SC 27 Standards and standards under development relevant for MONSOON

Table 8 - ISO/IEC JTC 1/SC 27 Standards and standards under development relevant for MONSOON

Reference	Title
ISO/IEC 21878:2018	Information technology -- Security techniques -- Security guidelines for design and implementation of virtualized servers
ISO/IEC 29147:2018	Information technology -- Security techniques -- Vulnerability disclosure

Reference	Title
ISO/IEC 27005:2018	Information technology -- Security techniques -- Information security risk management
ISO/IEC TR 27103:2018	Information technology -- Security techniques -- Cybersecurity and ISO and IEC Standards
ISO/IEC TS 19249:2017	Information technology -- Security techniques -- Catalogue of architectural and design principles for secure products, systems and applications

3.5.3 ISO/IEC JTC 1/SC 38 Cloud Computing and Distributed Platforms

3.5.3.3 ISO/IEC JTC 1/SC 38 Standards and standards under development relevant for MONSOON

Table 9 - ISO/IEC JTC 1/SC 38 Standards and standards under development relevant for MONSOON

Reference	Title
ISO/IEC TR 22678:2019	Information technology -- Cloud computing -- Guidance for policy development
ISO/IEC TR 23186:2018	Information technology -- Cloud computing -- Framework of trust for processing of multi-sourced data
ISO/IEC 19086-2:2018	Cloud computing -- Service level agreement (SLA) framework -- Part 2: Metric model
ISO/IEC 19941:2017	Information technology -- Cloud computing -- Interoperability and portability
ISO/IEC 19944:2017	Information technology -- Cloud computing -- Cloud services and devices: Data flow, data categories and data use
ISO/IEC 19086-3:2017	Information technology -- Cloud computing -- Service level agreement (SLA) framework -- Part 3: Core conformance requirements

3.5.4 ISO/IEC JTC 1/WG 9 Big Data

3.5.4.1 Scope

The WGISO/IEC JTC 1/WG 9 Big Data has been included in a new technical committee ISO/IEC JTC 1/SC 42 Artificial Intelligence.

The scope of this new technical committee is the Standardization in the area of Artificial Intelligence, to serve as the focus and proponent for JTC 1's standardization program on Artificial Intelligence and to provide guidance to JTC 1, IEC, and ISO committees developing Artificial Intelligence applications.

3.5.4.2 Structure

ISO/IEC JTC 1/SC 42 Artificial Intelligence has the following structure:

- ISO/IEC JTC 1/SC 42/AHG 1 Dissemination and Outreach
- ISO/IEC JTC 1/SC 42/JWG 1 Joint Working Group ISO/IEC JTC1/SC 42 - ISO/IEC JTC1/SC 40: Governance implications of AI
- ISO/IEC JTC 1/SC 42/SG 1 Computational approaches and characteristics of artificial intelligence systems

- ISO/IEC JTC 1/SC 42/WG 1 Foundational standards
- ISO/IEC JTC 1/SC 42/WG 2 Big Data
- ISO/IEC JTC 1/SC 42/WG 3 Trustworthiness
- ISO/IEC JTC 1/SC 42/WG 4 Use cases and applications

3.5.4.3 ISO/IEC JTC 1/SC 42 Standards and standards under development relevant for MONSOON

Table 106 - ISO/IEC JTC 1/SC 42 Standards and standards under development relevant for MONSOON

Reference	Title
ISO/IEC TR 20547-2:2018	Information technology -- Big data reference architecture -- Part 2: Use cases and derived requirements
ISO/IEC TR 20547-5:2018	Information technology -- Big data reference architecture -- Part 5: Standards roadmap
Standards under development	
ISO/IEC NP 38507	Information technology -- Governance of IT -- Governance implications of the use of artificial intelligence by organizations
ISO/IEC NP TR 24030	Information technology -- Artificial Intelligence (AI) -- Use cases
ISO/IEC NP TR 24029-1	Artificial Intelligence (AI) -- Assessment of the robustness of neural networks -- Part 1: Overview
ISO/IEC NP TR 24028	Information technology -- Artificial Intelligence (AI) -- Overview of trustworthiness in Artificial Intelligence
ISO/IEC NP TR 24027	Information technology -- Artificial Intelligence (AI) -- Bias in AI systems and AI aided decision making
ISO/IEC NP 23894	Information Technology -- Artificial Intelligence -- Risk Management
ISO/IEC WD 23053	Framework for Artificial Intelligence (AI) Systems Using Machine Learning (ML)
ISO/IEC WD 22989	Artificial intelligence -- Concepts and terminology
ISO/IEC AWI TR 20547-1	Information technology -- Big data reference architecture -- Part 1: Framework and application process
ISO/IEC DIS 20547-3	Information technology -- Big data reference architecture -- Part 3: Reference architecture
ISO/IEC FDIS 20546	Information technology -- Big data -- Overview and vocabulary

4 Conclusions

Add the following to Chapter 4 of deliverable D8.5.

Smart Manufacturing is a strategic issue for ISO and IEC, and this fact is leading to an intense standardization activity within the affected Technical Committees, mainly *IEC TC 65 Industrial-process measurement, control and automation* and *ISO TC 184 Automation systems and integration*.

The most relevant changes on the standards included in this deliverable are:

Deliverable nr.	D0.0 8.9
Deliverable Title	Updated Report on the standardization landscape and applicable standards
Version	0.0–2019-01-30

- IEC 62541 OPC Unified Architecture (Series of standards)

OPC UA is applicable to manufacturing software in application areas such as Field Devices, Control Systems, Manufacturing Execution Systems and Enterprise Resource Planning Systems. These systems are intended to exchange information and to use command and control for industrial processes. OPC UA defines a common infrastructure model to facilitate this information exchange.

OPC UA specifies the following:

- the information model to represent structure, behaviour and semantics;
- the message model to interact between applications;
- the communication model to transfer the data between end-points;
- the conformance model to guarantee interoperability between systems.

OPC UA 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.

OPC UA is becoming the most used standard for communications within the automation and Smart Manufacturing markets.

MONSOON is using OPC UA.

- IEC 62443 Security for industrial automation and control systems (Series of standards)

Industrial automation and control systems operate within a complex environment. Organizations are increasingly sharing information between business and industrial automation systems, and partners in one business venture may be competitors in another. However, because industrial automation and control systems equipment connect directly to a process, loss of trade secrets and interruption in the flow of information are not the only consequences of a security breach. The potential loss of life or production, environmental damage, regulatory violation, and compromise to operational safety are far more serious consequences.

The use of joint ventures, alliance partners, and outsourced services in the industrial sector is one of the identified threats to security of the industrial automation and control system considered in the IEC 62443 series of standards. MONSOON can fall within this category.

- Artificial Intelligence

Since the publication of Deliverable D8.5, a new technical committee ISO/IEC JTC 1/SC 42 Artificial Intelligence has been created. Nevertheless, the standardization activity has just started, and the AI specific projects of standards are at a very initial stage and cannot be used as reference document for the time being.

List of tables

Table 4 - IEC TC 65 standards and standards under development relevant for MONSOON..... 5

Table 5 - ISO/TC 184 Standards and standards under development relevant for MONSOON 7

Table 8 - ISO/TC 108 Standards and standards under development relevant for MONSOON 9

Table 10 - ISO/TC 69 Standards and standards under development relevant for MONSOON..... 9

Table 11 - ISO TC 61 Standards and standards under development relevant for MONSOON..... 9

Table 12 - EUROMAP Technical Recommendations relevant for MONSOON 10

Table 13 - ISO/IEC JTC 1/SC 7 Standards and standards under development relevant for MONSOON 10

Table 14 - ISO/IEC JTC 1/SC 27 Standards and standards under development relevant for MONSOON..... 10

Table 15 - ISO/IEC JTC 1/SC 38 Standards and standards under development relevant for MONSOON..... 11

Table 16 - ISO/IEC JTC 1/SC 42 Standards and standards under development relevant for MONSOON..... 12