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

D8.5 - Report on the standardization landscape and applicable standards

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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 currently in the International Standardization System, which are relevant for the Monsoon project.

The objective of including the standardization in the project is to facilitate the acceptance and utilisation by the market of the developed solutions. Other objectives are to provide starting information for other WPs, 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 the dissemination of the project results and the interaction with the market stakeholders.

This document contains:

- an overview of the international standardization system;
- a detailed list of the standards and standards under development relevant for the Monsoon project, broken down into the following:
    - Industrial-process measurement, control and automation
    - Production of primary aluminium
    - Plastic moulding injection technology
    - Information technology (not related to industrial environments, included in the first indent)

1.1 Scope

This document contains a list of standards and standards under development relevant for the Monsoon project.
This document has been developed by task *T8.3 Standardization*, corresponding to the *WP8 Dissemination, Exploitation and Standardization*.
No further official updates of this document are foreseen in the project plan.
A final report on standardization activities, *D8.6 Report on the contributions to standardization*, will be delivered at M36, containing the collaboration and communication activities within relevant technical committees and the contribution to the on-going and future standardization developments for standardization gaps identified during the project development.

1.2 Related documents

D2.2 - Process Industry Domain Analysis and Use Cases.

D2.5 - Initial Requirements and Architecture Specifications.

D4.3 – Initial Big Data Storage and Analytics Platform.

D6.1 – Test and Integration Plan.

2 Overview of the international standardization system

Standards are voluntary technical documents that set out requirements for a specific item, material, component, system or service, or describe in detail a particular method, procedure or best practice. Standards provide people and organizations with a basis for mutual understanding and are used as tools to facilitate communication, measurement, commerce and manufacturing. The initiative to develop a standard is taken by interested stakeholders who consider that a particular standard could address specific needs. Standards are developed and defined through a process of sharing knowledge and building consensus

among technical experts nominated by interested parties and other stakeholders - including businesses, consumers and environmental groups, among others. These experts are organized in Technical Committees (TCs), which are subdivided in Subcommittees (SCs) or Working Groups (WGs). These TCs are included in the structure of the Standardization Organizations (National, European and International level, with the respective mirror committees) and work following their internal regulations.

2.1 International Standardization Organizations

International Standardization Organizations develop worldwide applicable, market-driven standards, in a multi-stakeholder environment which ensures that a wide range of technical views are represented, including those relating to social and economic interests. While not subjected to a specific jurisdiction, International standards have an important contribution to facilitating international trade. This contribution has been recognized by the World Trade Organization (WTO) and the organizations cited below follow the Code of Good Practice for the Preparation, Adoption and Application of Standards of the WTO Agreement on Technical Barriers to Trade.
Table 1 shows the three International Standardization Organizations.

Table 1 - International Standardization Organizations

International Standardization Organization	ISO is an independent, non-governmental international organization with a membership of 163 national standards bodies. ISO develops standards mainly in fields not related to electrotechnology nor telecommunications.
International Electrotechnical Commission	IEC is a not-for-profit, non-governmental organization with a membership of 84 national standards bodies. IEC develops standards in fields related to electrotechnology.
International Telecommunication Union	ITU is the United Nations specialized agency for information and communication technologies. It is based on public-private partnership and currently has a membership of 193 countries and almost 800 private-sector entities and academic institutions.

2.2 European Standardization Organizations

The European Standardization system plays a major role in the EU Single Market, enabling the free circulation of goods among 28 countries. The European standardization system relies on a single standard model. European standards are identically adopted by all their National Members and any national conflicting standard is withdrawn. European standards facilitate compliance with EU harmonization legislation, hence the entry and free circulation of goods in the EU Single Market, based on a set of requirements equally applicable in all Member States of the European Union.
European Standardization Organizations work closely with their international level counterparts, in order to avoid duplication of efforts and promote global relevance of standards. As a result of this, 31% of CEN standards are identical to ISO standards and 72% of CENELEC standards are identical to IEC standards.
CEN, CENELEC and ETSI have been officially recognized by the European Union and by the European Free Trade Association (EFTA) as being responsible for developing standards at European level.
Table 2 shows the three European Standardization Organizations.

Table 2 - European Standardization Organizations

European Committee for Standardization	CEN is a non-profit association whose members are the national standards bodies of 33 European countries. It develops standards in fields not related to electrotechnology nor telecommunications. It is the counterpart at European level of ISO.
European Committee for Electrotechnical Standardization	CENELEC is a non-profit association whose members are the national standards bodies of 33 European countries. It develops standards in fields related to electrotechnology. It is the counterpart at European level of IEC.
European Telecommunications Standards Institute	ETSI is a non-profit organization with more than 800 member organizations worldwide. It develops standards for Information and Communications Technologies (ICT).

2.3 National Standardization Organizations

The national standardization organizations (NSO) are the organizations officially recognized at national level as being able to represent all standardization interests in their country. They are responsible for developing national standards in their countries and they are the members of ISO, IEC, CEN and CENELEC (note that ITU and ETSI have a different membership policy). National stakeholders interested in standardization activities are able to take part in the process at European or International level through their national standardization organization.

The legal status of national standardization organizations varies from one country to another. The most typical status is a private non-profit organization whose members are national business associations and companies, but sometimes the NSO is a part of the Public Administration.
As stated in subclause 2.2, at European level the European Standardization System guarantees that European Standards are identically adopted by all the national standardization organizations and any national conflicting standard is withdrawn. This means the national catalogues of standards have a big level of coherence across Europe.

2.4 Standardization documents

Standardization organizations develop different types of documents, which have different level of consensus and drafting timeframes. The most widespread document is the "Standard", a normative document developed and approved by the members of the organization according to strict consensus procedures. Other types of documents are Technical Specifications (TS), Technical Reports (TR) and Workshop Agreements (WA), which have lower level of consensus and a faster drafting timeframe. These last kinds of documents can be further processed to become an International Standard if the market has reached a suitable level of consensus.
Table 3 shows the different kinds of documents developed by international, European and national standardization organizations and the main characteristics of them.

Table 3 - Characteristics of different standardization documents

Type	International code	European code	National code	Main characteristics
Standard	ISO IEC	EN	UNE, NF, BS, DIN, etc. When adopting: UNE-EN, NF-EN, UNE-ISO, NF-ISO, etc.	Elaboration: 3 years 2 steps of member approval European: compulsory national adoption Revision: every 5 years
Technical Specification	ISO/TS IEC/TS	CEN/TS CLC/TS	When adopting: UNE-CEN/TS, NF-CEN/TS, UNE-ISO/TS, NF-ISO/TS, etc.	Elaboration: 21 months 1 step of member approval or internal approval in TC European: optional national adoption Revision: at 3 years (upgrading to EN or deletion)
Technical Report	ISO/TR IEC/TR	CEN/TR CLC/TR	When adopting: UNE-CEN/TR, NF-CEN/TR, UNE-ISO/TR, NF-ISO/TR, etc.	Elaboration: free timeframe Internal approval in TC European: optional national adoption No revision required
Workshop Agreement	IWA	CWA	Variable	Elaboration: free timeframe (usually few months) Internal approval in the Workshop European: optional national adoption Revision: at 3 years (upgrading to EN or deletion)

3 Standardization activities related to MONSOON project

This chapter contains the current standardization landscape relevant for the MONSOON project. Subclause 3.1 explains the methodology followed for identifying the relevant standards, standards under development and TC, and from subclause 3.2 onwards the identified ones for each field of interest.

3.1 Methodology

The MONSOON project is complex and the number of relevant standards can be large. The approach followed in this report to identify the standards and standards under development applicable has been the following:

1) **Identification of the relevant Technical Committees within International Standardization Organizations**
   Standardization work is developed by groups of experts, within technical committees (TCs). TCs are made up of representatives of industry, NGOs, governments and other stakeholders. Each TC has a well-defined field of activity, the "Scope". The first step has been the identification of the TCs the Scope of which can be relevant for MONSOON project.
   These identified technical committees are the place where dissemination activities and contributions to the on-going and future standardization developments have to be placed.

2) **Identification of the relevant international standards and standards under development within relevant international TCs**
   Although the Scope of a TC can be relevant for this project, not the whole catalogue of standards of the TC is relevant. The second step has been the identification of the relevant standards within each identified TC.

3) **Identification of the relevant Technical Committees within European Standardization Organizations**
   Once the relevant international TC has been identified, the next step is the identification of the parallel European TC, the "mirror" committee, if any. The European mirror committee is responsible for the revision of the international standardization work within the European context, for example, for adequacy of the standards to European Regulations.
   Although usually there is a European mirror committee for an international TC, sometimes very specific European TCs are not mirrorized at international level, so it is also necessary to search into European Standardization Organizations looking for these specific European committees.
   These identified technical committees are the place where dissemination activities and contributions to the on-going and future standardization developments have to be placed.

4) **Identification of the relevant European standards and standards under development within relevant European TCs**
   Once the relevant international standards have been identified, it is necessary the identification of the correspondent European standard, if any. If there is a correspondent European standard, it should be used instead of the international version, because European standards can contain specific clauses which are necessary to adapt the international standard to the European Regulation, for example.
   Although international and European standards are usually developed in parallel, there may be a European standard without a correspondent international standard (a European "homeground" standard), so it is necessary to search into the standard catalogue of the European relevant TC looking for these specific European standards.

The above-mentioned methodology has been applied to the following fields:

- Industrial-process measurement, control and automation;
- Production of primary aluminium;
- Plastic moulding injection technology;
- Information technology.

3.2 Industrial-process measurement, control and automation standards

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

3.2.1.1 Scope

- 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.

3.2.1.2 Structure

The Scope of IEC TC 65 is so wide (currently 396 published standards, 56 standards under development) that it has been broken down into four more specific subcommittees, namely:

- **IEC SC 65A System aspects**
  Scope
  To prepare standards regarding the generic aspects of systems used in industrial-process measurement and control: operational conditions (including EMC), methodology for the assessment of systems, functional safety, etc.
  Horizontal Safety Function
  Functional safety of electrical/electronic/programmable electronic systems (which would encompass safety-related software).

- **IEC SC 65B Measurement and control devices**
  Scope
  Standardization in the field of specific aspects of devices (hardware and software) used in industrial process measurement and control, such as measurement devices, analyzing equipment, actuators, and programmable logic controllers, and covering such aspects as interchangeability, performance evaluation, and functionality definition.

- **IEC SC 65C Industrial networks**
  Scope
  To prepare standards on Digital Data Communications sub-systems for industrial-process measurement and control as well as on instrumentation systems used for research, development and testing purposes.

- **IEC SC 65E Devices and integration in enterprise systems**
  Scope
  To prepare international standards to specify digital representation of device properties and functions, methodologies and applications supporting automation of engineering processes, including diagnostic and maintenance techniques.

CENELEC CLC/TC 65X Industrial-process measurement, control and automation is the *IEC TC 65* mirror committee at European level. No relevant differences have been identified between both technical committees, so only information about IEC TC 65 has been included in this subclause to avoid unnecessary duplication of information.

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

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

Reference	Title
IEC TS 62443-1-1:2009	Industrial communication networks - Network and system security - Part 1-1: Terminology, concepts and models
IEC 62443-2-1:2010	Industrial communication networks - Network and system security - Part 2-1: Establishing an industrial automation and control system security program
IEC TR 62443-2-3:2015	Security for industrial automation and control systems - Part 2-3: Patch management in the IACS environment
IEC 62443-2-4:2015	Security for industrial automation and control systems - Part 2-4: Security program requirements for IACS service providers
IEC TR 62443-3-1:2009	Industrial communication networks - Network and system security - Part 3-1: Security technologies for industrial automation and control systems
IEC 62443-3-3:2013	Industrial communication networks - Network and system security - Part 3-3: System security requirements and security levels
IEC PAS 62443-3:2008	Security for industrial process measurement and control - Network and system security
IEC 62708:2015	Documents kinds for electrical and instrumentation projects in the process industry
IEC TR 62794:2012	Industrial-process measurement, control and automation - Reference model for representation of production facilities (digital factory)
IEC 61512-1:1997	Batch control - Part 1: Models and terminology
IEC 61512-2:2001	Batch control - Part 2: Data structures and guidelines for languages
IEC 61512-3:2008	Batch control - Part 3: General and site recipe models and representation
IEC 61512-4:2009	Batch control - Part 4: Batch production records
IEC 62682:2014	Management of alarm systems for the process industries
IEC 61499-1:2012	Function blocks - Part 1: Architecture
IEC 61499-2:2012	Function blocks - Part 2: Software tool requirements
IEC 61499-4:2013	Function blocks - Part 4: Rules for compliance profiles
IEC TS 62603-1:2014	Industrial process control systems - Guideline for evaluating process control systems - Part 1: Specifications
IEC TS 61804-1:2003	Function blocks (FB) for process control - Part 1: Overview of system aspects
IEC 61804-2:2006	Function blocks (FB) for process control - Part 2: Specification of FB concept

Reference	Title
IEC 61804-3:2015	Function Blocks (FB) for process control and Electronic Device Description Language (EDDL) - Part 3: EDDL syntax and semantics
IEC 61804-4:2015	Function blocks (FB) for process control and electronic device description language (EDDL) - Part 4: EDD interpretation
IEC 61804-5:2015	Function blocks (FB) for process control and electronic device description language (EDDL) - Part 5: EDDL Builtin library
IEC TR 61804-6:2012	Function blocks (FB) for process control - Electronic device description language (EDDL) - Part 6: Meeting the requirements for integrating fieldbus devices in engineering tools for field devices
IEC 61987-1:2006	Industrial-process measurement and control - Data structures and elements in process equipment catalogues - Part 1: Measuring equipment with analogue and digital output
IEC 61987-10:2009	Industrial-process measurement and control - Data structures and elements in process equipment catalogues - Part 10: List of Properties (LOPs) for Industrial-Process Measurement and Control for Electronic Data Exchange - Fundamentals
IEC 61987-11:2012	Industrial-process measurement and control - Data structures and elements in process equipment catalogues - Part 11: List of Properties (LOP) of measuring equipment for electronic data exchange - Generic structures
IEC 61987-12:2016	Industrial-process measurement and control - Data structures and elements in process equipment catalogues - Part 12: Lists of properties (LOPs) for flow measuring equipment for electronic data exchange
IEC 61987-13:2016	Industrial-process measurement and control - Data structures and elements in process equipment catalogues - Part 13: Lists of properties (LOP) for pressure measuring equipment for electronic data exchange
IEC 61987-14:2016	Industrial-process measurement and control - Data structures and elements in process equipment catalogues - Part 14: Lists of properties (LOP) for temperature measuring equipment for electronic data exchange
IEC 62264-1:2013	Enterprise-control system integration - Part 1: Models and terminology
IEC 62264-2:2013	Enterprise-control system integration - Part 2: Object and attributes for enterprise-control system integration
IEC 62264-3:2007	Enterprise-control system integration - Part 3: Activity models of manufacturing operations management
IEC 62264-4:2015	Enterprise-control system integration - Part 4: Objects models attributes for manufacturing operations management integration
IEC 62264-5:2016	Enterprise-control system integration - Part 5: Business to manufacturing transactions
IEC PAS 62264-6:2016	Enterprise-control system integration - Part 6: Messaging Service Model
IEC 62337:2012	Commissioning of electrical, instrumentation and control systems in the process industry - Specific phases and milestones
IEC 62381:2012	Automation systems in the process industry - Factory acceptance test (FAT), site acceptance test (SAT), and site integration test (SIT)

Reference	Title
IEC 62382:2012	Control systems in the process industry - Electrical and instrumentation loop check
IEC TR 62541-1:2016	OPC unified architecture - Part 1: Overview and concepts
IEC TR 62541-2:2016	OPC unified architecture - Part 2: Security Model
IEC 62541-3:2015	OPC unified architecture - Part 3: Address Space Model
IEC 62541-4:2015	OPC Unified Architecture - Part 4: Services
IEC 62541-5:2015	OPC Unified Architecture - Part 5: Information Model
IEC 62541-6:2015	OPC unified architecture - Part 6: Mappings
IEC 62541-7:2015	OPC unified architecture - Part 7: Profiles
IEC 62541-8:2015	OPC Unified Architecture - Part 8: Data Access
IEC 62541-9:2015	OPC Unified Architecture - Part 9: Alarms and conditions
IEC 62541-10:2015	OPC Unified Architecture - Part 10: Programs
IEC 62541-11:2015	OPC Unified Architecture - Part 11: Historical Access
IEC 62541-13:2015	OPC Unified Architecture - Part 13: Aggregates
IEC 62541-100:2015	OPC Unified Architecture - Part 100: Device Interface
IEC 62714-1:2014	Engineering data exchange format for use in industrial automation systems engineering - Automation markup language - Part 1: Architecture and general requirements
IEC 62714-2:2015	Engineering data exchange format for use in industrial automation systems engineering - Automation markup language - Part 2: Role class libraries
Standards under development	
IEC 62443-3-2 ED1	Security for industrial automation and control systems - Part 3-2: Security risk assessment and system design
IEC 62443-4-1 ED1	Industrial communication networks - Security for industrial and control systems - Part: 4-1: Product development requirements
IEC 62443-4-2 ED1	Industrial communication networks - Security for industrial automation and control systems - Part 4-2: Technical security requirements for IACS components
IEC 62890 ED1	Life-cycle management for systems and products used in industrial-process measurement, control and automation

3.2.2 ISO/TC 184 Automation systems and integration

3.2.2.1 Scope

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.
This TC has currently 810 published standards and 37 standards under development.

3.2.2.2 Structure

ISO/TC 184 has the following working groups and subcommittees:

- ISO/TC 184/AG Advisory group
- ISO/TC 184/WG 6 OGI (Oil and Gas Interoperability)
- ISO/TC 184/SC 1 Physical device control
- ISO/TC 184/SC 4 Industrial data
- ISO/TC 184/SC 5 Interoperability, integration, and architectures for enterprise systems and automation applications

CEN/TC 310 Advanced automation technologies and their applications has not been considered relevant due it has a very small number of standards published, mainly developed at ISO level.

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

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

Reference	Title
ISO 11354-1:2011	Advanced automation technologies and their applications -- Requirements for establishing manufacturing enterprise process interoperability -- Part 1: Framework for enterprise interoperability
ISO 11354-2:2015	Advanced automation technologies and their applications -- Requirements for establishing manufacturing enterprise process interoperability -- Part 2: Maturity model for assessing enterprise interoperability
ISO 14258:1998	Industrial automation systems -- Concepts and rules for enterprise models
ISO 15531-1:2004	Industrial automation systems and integration -- Industrial manufacturing management data -- Part 1: General overview
ISO 15531-31:2004	Industrial automation systems and integration -- Industrial manufacturing management data -- Part 31: Resource information model
ISO 15531-32:2005	Industrial automation systems and integration -- Industrial manufacturing management data: Resources usage management -- Part 32: Conceptual model for resources usage management data
ISO 15531-42:2005	Industrial automation systems and integration -- Industrial manufacturing management data -- Part 42: Time Model
ISO 15531-43:2006	Industrial automation systems and integration -- Industrial manufacturing management data -- Part 43: Manufacturing flow management data: Data model for flow monitoring and manufacturing data exchange
ISO 15531-44:2010	Industrial automation systems and integration -- Industrial manufacturing management data -- Part 44: Information modelling for shop floor data acquisition
ISO 15704:2000	Industrial automation systems -- Requirements for enterprise-reference architectures and methodologies
ISO 15745-1:2003	Industrial automation systems and integration -- Open systems application integration framework -- Part 1: Generic reference description

Reference	Title
ISO 15745-2:2003	Industrial automation systems and integration -- Open systems application integration framework -- Part 2: Reference description for ISO 11898-based control systems
ISO 15745-3:2003	Industrial automation systems and integration -- Open systems application integration framework -- Part 3: Reference description for IEC 61158-based control systems
ISO 15745-4:2003	Industrial automation systems and integration -- Open systems application integration framework -- Part 4: Reference description for Ethernet-based control systems
ISO 15745-5:2007	Industrial automation systems and integration -- Open systems application integration framework -- Part 5: Reference description for HDLC-based control systems
ISO 15746-1:2015	Automation systems and integration -- Integration of advanced process control and optimization capabilities for manufacturing systems -- Part 1: Framework and functional model
ISO 15926-1:2004	Industrial automation systems and integration -- Integration of life-cycle data for process plants including oil and gas production facilities -- Part 1: Overview and fundamental principles
ISO 15926-2:2003	Industrial automation systems and integration -- Integration of life-cycle data for process plants including oil and gas production facilities -- Part 2: Data model
ISO 16100-1:2009	Industrial automation systems and integration -- Manufacturing software capability profiling for interoperability -- Part 1: Framework
ISO 16100-2:2003	Industrial automation systems and integration -- Manufacturing software capability profiling for interoperability -- Part 2: Profiling methodology
ISO 16100-3:2005	Industrial automation systems and integration -- Manufacturing software capability profiling for interoperability -- Part 3: Interface services, protocols and capability templates
ISO 16100-4:2006	Industrial automation systems and integration -- Manufacturing software capability profiling for interoperability -- Part 4: Conformance test methods, criteria and reports
ISO 16100-5:2009	Industrial automation systems and integration -- Manufacturing software capability profiling for interoperability -- Part 5: Methodology for profile matching using multiple capability class structures
ISO 16100-6:2011	Industrial automation systems and integration -- Manufacturing software capability profiling for interoperability -- Part 6: Interface services and protocols for matching profiles based on multiple capability class structures
ISO 9506-1:2003	Industrial automation systems -- Manufacturing Message Specification -- Part 1: Service definition
ISO 9506-2:2003	Industrial automation systems -- Manufacturing Message Specification -- Part 2: Protocol specification
ISO/TR 10314-1:1990	Industrial automation -- Shop floor production -- Part 1: Reference model for standardization and a methodology for identification of requirements

Reference	Title
ISO/TR 10314-2:1991	Industrial automation -- Shop floor production -- Part 2: Application of the reference model for standardization and methodology
ISO/TS 18876-1:2003	Industrial automation systems and integration -- Integration of industrial data for exchange, access and sharing -- Part 1: Architecture overview and description
ISO/TS 18876-2:2003	Industrial automation systems and integration -- Integration of industrial data for exchange, access and sharing -- Part 2: Integration and mapping methodology
ISO 19440:2007	Enterprise integration -- Constructs for enterprise modelling
Standards under development	
ISO/AWI 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 20140-2	Automation systems and integration -- Evaluating energy efficiency and other factors of manufacturing systems that influence the environment -- Part 2: Environmental performance evaluation process
ISO/CD 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 20140-5	Automation systems and integration -- Evaluating energy efficiency and other factors of manufacturing systems that influence the environment -- Part 5: Environmental performance evaluation data
ISO/DIS 15746-2	Automation systems and integration -- Integration of advanced process control and optimization capabilities for manufacturing systems -- Part 2: Activity models and information exchange
ISO/NP 15746-3	Automation systems and integration -- Integration of advanced process control and optimization capabilities for manufacturing systems -- Part 3: Part 3: Validation and Verification
ISO/CD 15926-12	Industrial automation systems and integration -- Integration of life-cycle data for process plants including oil and gas production facilities -- Part 12: Life cycle integration ontology
ISO/CD 15926-13	Industrial automation systems and integration -- Integration of life-cycle data for process plants including oil and gas production facilities -- Part 13: Integrated lifecycle asset planning
ISO/WD 15926-6	Industrial automation systems and integration -- Integration of life-cycle data for process plants including oil and gas production facilities -- Part 6: Methodology for the development and validation of reference data

3.3 Production of primary aluminium

Within the primary aluminium production domain, three use cases have been selected (from document *D2.2 - Process Industry Domain Analysis and Use Cases*), namely:

- Predictive Anode Quality
- Predictive Maintenance (e.g. main motor of the Paste Plant)
- Electrolysis process optimization: anode behavior on pot

The following subclauses contain the identified standardization technical committees and standards and standards under development relevant for these three use cases.

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

3.3.1.1 Scope

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.

3.3.1.2 Structure

ISO/TC 226 has the following structure:

- ISO/TC 226/WG 1 Pitch
- ISO/TC 226/WG 2 Solid carbonaceous materials
- ISO/TC 226/WG 3 Smelter grade alumina
- ISO/TC 226/WG 4 Smelter grade fluorides
- ISO/TC 226/WG 6 Petroleum coke

ISO/TC 226 is relevant for "Predictive Anode Quality" and "Electrolysis process optimization: anode behavior on pot" use cases for aluminium domain. WG 1, WG 2 and WG 6 are the most relevant ones, because they are focused on raw materials for anode production.

No relevant technical committee has been identified at European level.

3.3.1.3 ISO/TC 226 Standards and standards under development relevant for MONSOON

Table 6 - ISO/TC 226 Standards and standards under development relevant for MONSOON

Reference	Title
ISO 8007-2:1999	Carbonaceous materials used in the production of aluminium -- Sampling plans and sampling from individual units -- Part 2: Prebaked anodes

Most of the standards developed within this TC are purely analytical standards pertaining to the materials chemical/physical properties, which has been considered not relevant for the Monsoon project. Nevertheless, this TC has been considered suitable for dissemination activities.

3.3.2 IEC TC 2 Rotating machinery

3.3.2.1 Scope

To prepare International Standards regarding specifications for rotating electrical machines without limitations of voltage, output or dimensions with the exception of the following:

- Traction motors within the scope of TC 9: Electric railway equipment;
- 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.

3.3.2.2 Structure

IEC TC 2 has the following structure:

- WG 12 Rating, performance and general support
- WG 28 Performance as determined by tests
- WG 31 Efficiency classes
- WG 32 Measurement of stator end winding vibration at form wound windings
- WG 33 Rotating electrical machines – Part 33: Specific technical requirements for hydro generators
- WG 34 Rotating electrical machines – AC adjustable speed rolling mill main motor

IEC TC 2 is relevant for "Predictive Maintenance of main motor of the paste plant" use case for aluminium domain.

CENELEC TC 2 Rotating machinery is the *IEC TC 2* mirror committee at European level. No relevant differences have been identified between both technical committees, so only information about IEC TC 2 has been included in this subclause to avoid unnecessary duplication of information.

3.3.2.3 IEC TC 2 Standards and standards under development relevant for MONSOON

Table 7 - IEC TC 2 Standards and standards under development relevant for MONSOON

Reference	Title
IEC TS 60034-24:2009	Rotating electrical machines - Part 24: Online detection and diagnosis of potential failures at the active parts of rotating electrical machines and of bearing currents - Application guide
IEC TS 60034-27-2:2012	Rotating electrical machines - Part 27-2: On-line partial discharge measurements on the stator winding insulation of rotating electrical machines
Standards under development	
IEC 60034-23 ED1	Rotating electrical machines - Part 23: Repair, overhaul and reclamation

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

3.3.3.1 Scope

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.
Specific areas of current interest include the standardization of:

- Terminology and nomenclature in the fields of mechanical vibration, mechanical shock and condition monitoring;
- Measurement, analysis and evaluation of vibration and shock e.g. signal processing methods, structural dynamics analysis methods, transducer and vibration generator calibration methods, etc.;
- Active and passive control methods for vibration and shock, e.g. balancing of machines, isolation and damping;
- Evaluation of the effects of vibration and shock on humans, machines, vehicles (air, sea, land and rail), stationary structures and sensitive equipment;
- Vibration and shock measuring instrumentation, e.g. transducers, vibration generators, signal conditioners, signal analysis instrumentation and signal acquisition systems;

- Measurement methods, instrumentation, data acquisition, processing, presentation, analysis, diagnostics and prognostics, using all measurement variables required for the condition monitoring of machines;
- Training and certification of personnel in relevant areas.

3.3.3.2 Structure

ISO/TC 108 has the following structure:

- ISO/TC 108/WG 1 Terminology
- ISO/TC 108/WG 24 Condition assessment of structural systems from dynamic response measurements
- ISO/TC 108/WG 28 Vibration materials
- ISO/TC 108/WG 33 Human response to vibration - Measuring instrumentation
- ISO/TC 108/WG 34 Calibration of vibration and shock transducers
- ISO/TC 108/SC 2 Measurement and evaluation of mechanical vibration and shock as applied to machines, vehicles and structures
- ISO/TC 108/SC 3 Use and calibration of vibration and shock measuring instruments
- ISO/TC 108/SC 4 Human exposure to mechanical vibration and shock
- ISO/TC 108/SC 5 Condition monitoring and diagnostics of machine systems
- ISO/TC 108/SC 6 Vibration and shock generating systems

SC 2 and SC 5 are the most relevant groups for "Predictive Maintenance of main motor of the paste plant" use case for aluminium domain.

No relevant technical committee has been identified at European level.

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

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

Reference	Title
ISO 10816-3:2009	Mechanical vibration -- Evaluation of machine vibration by measurements on non-rotating parts -- Part 3: Industrial machines with nominal power above 15 kW and nominal speeds between 120 r/min and 15 000 r/min when measured in situ
ISO 20816-1:2016	Mechanical vibration — Measurement and evaluation of machine vibration — Part 1: General guidelines
ISO 10817-1:1998	Rotating shaft vibration measuring systems -- Part 1: Relative and absolute sensing of radial vibration
ISO 13372:2012	Condition monitoring and diagnostics of machines -- Vocabulary
ISO 13373-1:2002	Condition monitoring and diagnostics of machines -- Vibration condition monitoring -- Part 1: General procedures
ISO 13373-2:2016	Condition monitoring and diagnostics of machines -- Vibration condition monitoring -- Part 2: Processing, analysis and presentation of vibration data
ISO 13373-3:2015	Condition monitoring and diagnostics of machines -- Vibration condition monitoring -- Part 3: Guidelines for vibration diagnosis

Reference	Title
ISO 13374-1:2003	Condition monitoring and diagnostics of machines -- Data processing, communication and presentation -- Part 1: General guidelines
ISO 13374-2:2007	Condition monitoring and diagnostics of machines -- Data processing, communication and presentation -- Part 2: Data processing
ISO 13374-3:2012	Condition monitoring and diagnostics of machines -- Data processing, communication and presentation -- Part 3: Communication
ISO 13374-4:2015	Condition monitoring and diagnostics of machine systems -- Data processing, communication and presentation -- Part 4: Presentation
ISO 13379-1:2012	Condition monitoring and diagnostics of machines -- Data interpretation and diagnostics techniques -- Part 1: General guidelines
ISO 13379-2:2015	Condition monitoring and diagnostics of machines -- Data interpretation and diagnostics techniques -- Part 2: Data-driven applications
ISO 13381-1:2015	Condition monitoring and diagnostics of machines -- Prognostics -- Part 1: General guidelines
ISO 17359:2011	Condition monitoring and diagnostics of machines -- General guidelines
ISO 18129:2015	Condition monitoring and diagnostics of machines -- Approaches for performance diagnosis
ISO 18434-1:2008	Condition monitoring and diagnostics of machines -- Thermography -- Part 1: General procedures
ISO 20958:2013	Condition monitoring and diagnostics of machine systems -- Electrical signature analysis of three-phase induction motors
ISO 21289:2008	Mechanical vibration and shock -- Parameters to be specified for the acquisition of vibration data
ISO 22096:2007	Condition monitoring and diagnostics of machines -- Acoustic emission
ISO 29821-1:2011	Condition monitoring and diagnostics of machines -- Ultrasound -- Part 1: General guidelines
ISO 29821-2:2016	Condition monitoring and diagnostics of machines -- Ultrasound -- Part 2: Procedures and validation
Standards under development	
ISO/DIS 13373-9	Condition monitoring and diagnostics of machines -- Vibration condition monitoring -- Part 9: Diagnostic techniques for electric motors
ISO/NP 18434-2	Condition monitoring and diagnostics of machines -- Thermography -- Part 2: Image interpretation and diagnostics
ISO/PWI 13381-2	Condition monitoring and diagnostics of machines -- Prognostics -- Part 2: Performance based approaches
ISO/PWI 13381-3	Condition monitoring and diagnostics of machines -- Prognostics -- Part 3: Cyclic-driven life usage techniques
ISO/PWI 13381-4	Condition monitoring and diagnostics of machines -- Prognostics -- Part 4: Useful-life-remaining prediction models

3.3.4 IEC TC 56 Dependability

3.3.4.1 Scope

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.
The standards cover generic aspects on reliability and maintainability programme management, testing and analytical techniques, software and system dependability, life cycle costing, technical risk analysis and project risk management. This includes standards related to product issues from component reliability to guidance for engineering dependability of systems, standards related to process issues from technological risk analysis to integrated logistics support and standards related to management issues from dependability program management to managing for obsolescence.
The application of these standards may raise safety related issues, though the standards themselves do not cover safety. They may be applied to business risk analysis but these risk areas are not dealt with by TC 56.

3.3.4.2 Structure

IEC TC 56 has the following structure:

- WG 1 Dependability terminology
- WG 2 Dependability techniques
- WG 3 Management and Systems
- WG 4 Information System

IEC TC 56 is relevant for "Predictive Maintenance of main motor of the paste plant" use case for aluminium domain.

CENELEC SR 56 Dependability is the *IEC TC 56* mirror committee at European level. No relevant differences have been identified between both technical committees, so only information about IEC TC 56 has been included in this subclause to avoid unnecessary duplication of information.

3.3.4.3 IEC TC 56 Standards and standards under development relevant for MONSOON

Table 9 - IEC TC 56 Standards and standards under development relevant for MONSOON

Reference	Title
IEC 60300-1:2014	Dependability management - Part 1: Guidance for management and application
IEC 60300-3-1:2003	Dependability management - Part 3-1: Application guide - Analysis techniques for dependability - Guide on methodology
IEC 60300-3-2:2004	Dependability management - Part 3-2: Application guide - Collection of dependability data from the field
IEC 60300-3-3:2004	Dependability management - Part 3-3: Application guide - Life cycle costing
IEC 60300-3-4:2007	Dependability management - Part 3-4: Application guide - Guide to the specification of dependability requirements

Reference	Title
IEC 60300-3-5:2001	Dependability management - Part 3-5: Application guide - Reliability test conditions and statistical test principles
IEC 60300-3-10:2001	Dependability management - Part 3-10: Application guide - Maintainability
IEC 60300-3-11:2009	Dependability management - Part 3-11: Application guide - Reliability centred maintenance
IEC 60300-3-12:2011	Dependability management - Part 3-12: Application guide - Integrated logistic support
IEC 60300-3-14:2004	Dependability management - Part 3-14: Application guide - Maintenance and maintenance support
IEC 60300-3-15:2009	Dependability management - Part 3-15: Application guide - Engineering of system dependability
IEC 60300-3-16:2008	Dependability management - Part 3-16: Application guide - Guidelines for specification of maintenance support services
IEC 61709:2011	Electric components - Reliability - Reference conditions for failure rates and stress models for conversion

3.3.5 ISO/TC 69 Applications of statistical methods

3.3.5.1 Scope

Standardization in the application of statistical methods, including generation, collection (planning and design), analysis, presentation and interpretation of data.

3.3.5.2 Structure

ISO/TC 69 has the following structure:

- ISO/TC 69/AHG 7 Big Data
- ISO/TC 69/WG 3 Statistical interpretation of data
- ISO/TC 69/SC 1 Terminology and symbols
- ISO/TC 69/SC 4 Applications of statistical methods in product and process management
- ISO/TC 69/SC 5 Acceptance sampling
- ISO/TC 69/SC 6 Measurement methods and results
- ISO/TC 69/SC 7 Applications of statistical and related techniques for the implementation of Six Sigma
- ISO/TC 69/SC 8 Application of statistical and related methodology for new technology and product development

SC 4 and SC 7 subcommittees develop standards related to process management and are relevant for the "Electrolysis process optimization: anode behavior on pot" use case.
No relevant technical committee has been identified at European level.

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

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

Reference	Title
ISO 11462-2:2010	Guidelines for implementation of statistical process control (SPC) -- Part 2: Catalogue of tools and techniques
ISO 13053-2:2011	Quantitative methods in process improvement -- Six Sigma -- Part 2: Tools and techniques
ISO 18404:2015	Quantitative methods in process improvement -- Six Sigma -- Competencies for key personnel and their organizations in relation to Six Sigma and Lean implementation
ISO 22514-2:2017	Statistical methods in process management -- Capability and performance -- Part 2: Process capability and performance of time-dependent process models
ISO 22514-3:2008	Statistical methods in process management -- Capability and performance -- Part 3: Machine performance studies for measured data on discrete parts
ISO 22514-4:2016	Statistical methods in process management -- Capability and performance -- Part 4: Process capability estimates and performance measures
ISO 22514-6:2013	Statistical methods in process management -- Capability and performance -- Part 6: Process capability statistics for characteristics following a multivariate normal distribution
ISO 22514-7:2012	Statistical methods in process management -- Capability and performance -- Part 7: Capability of measurement processes
ISO 22514-8:2014	Statistical methods in process management -- Capability and performance -- Part 8: Machine performance of a multi-state production process

3.4 Plastic moulding injection technology

Within the plastic domain, two use cases have been selected (from document D2.2 - Process Industry Domain Analysis and Use Cases), namely:

- Use case 1: production of coffee capsules
- Use case 2: production of automotive industry parts with metal inserts

The following subclauses contain the identified standardization technical committees and standards and standards under development relevant for these two use cases.

CEN/TC 145 "Plastics and rubber machines" and ISO/TC 270 "Plastics and rubber machines" develop standards in the field of machines used for the preparation and processing of plastics and rubber. Nevertheless, the standards developed within these technical committees deal with the essential safety requirements for moulding machines and don't contain relevant information for this project and both TC haven't been included in this report.

3.4.1 ISO/TC 61 Plastics

3.4.1.1 Scope

Standardization of nomenclature, methods of test, and specifications applicable to materials and products in the field of plastics, excluding rubber and lac.

This TC has currently 680 published standards and 149 standards under development.

3.4.1.2 Structure

ISO/TC 61 has the following structure:

- ISO/TC 61/AHG 1 Future SC on environment/sustainability issues
- ISO/TC 61/WG 3 Tolerances for plastics moulded parts
- ISO/TC 61/SC 1 Terminology
- ISO/TC 61/SC 2 Mechanical behavior
- ISO/TC 61/SC 4 Burning behaviour
- ISO/TC 61/SC 5 Physical-chemical properties
- ISO/TC 61/SC 6 Ageing, chemical and environmental resistance
- ISO/TC 61/SC 9 Thermoplastic materials
- ISO/TC 61/SC 10 Cellular plastics
- ISO/TC 61/SC 11 Products
- ISO/TC 61/SC 12 Thermosetting materials
- ISO/TC 61/SC 13 Composites and reinforcement fibres

ISO TC 61 is relevant for both use cases for plastic domain.

CEN/TC 249 Plastics is the *ISO/TC 61* mirror committee at European level. No relevant differences have been identified between both technical committees, so only information about ISO/TC 61 has been included in this subclause to avoid unnecessary duplication of information.

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

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

Reference	Title
Standards under development	
ISO/CD 20457	Plastics moulded parts -- Tolerances and acceptance conditions

3.4.2 EUROMAP

3.4.2.1 Scope

EUROMAP is the European plastics and rubber machinery industry association. It represents around 1,000 companies manufacturing equipment for the plastics and rubber industry in the field of core machinery (pre-processing, converting, post- processing).
Member associations are located in Austria, France, Germany, Italy, Luxembourg, Spain, Switzerland, Turkey and the United Kingdom.
EUROMAP develops Technical Recommendations applicable to plastics and rubber processing machinery, within its Technical Commission.
EUROMAP Technical Recommendations are relevant for both use cases of the plastic domain.

EUROMAP is not a part of the International Standardization System described in Chapter 2. EUROMAP Technical Recommendations are freely downloadable from its website.

3.4.2.2 EUROMAP Technical Recommendations relevant for MONSOON

Table 12 - EUROMAP Technical Recommendations relevant for MONSOON

Reference	Title
EUROMAP 05	Injection moulding process - Determination of important production data - Manufacturing Report
EUROMAP 17	Protocol for Communication between Plastic Processing Machinery or Central Computer and Peripheral Equipment
EUROMAP 63	Data exchange interface (General + Injection moulding machines)
EUROMAP 66	Protocol for Communication with Peripheral Equipment
EUROMAP 75-1	Device Profile for Measuring Amplifiers
EUROMAP 75-2	Demands on EUROMAP 75 Devices
EUROMAP 75-3	Implementation of Different Realtime Ethernet Systems
EUROMAP 77	Injection Moulding Machines - Data exchange interface for MES

3.5 Information technology

This subclause contains the list of technical committees and standards and standards under development related to Information Technology, which are relevant outside the industrial environment. The information technology standards applicable within the industrial environment have been included in subclause 3.2.

Standardization in the field of Information Technology is developed mostly within the ISO/IEC Joint Technical Committee 1, hereinafter referred as ISO/IEC JTC 1.

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

3.5.1.1 Scope

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).

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

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

Reference	Title
ISO/IEC 12207:2008	Systems and software engineering -- Software life cycle processes
ISO/IEC 14598-5:1998	Information technology -- Software product evaluation -- Part 5: Process for evaluators

Reference	Title
ISO/IEC 14598-6:2001	Software engineering -- Product evaluation -- Part 6: Documentation of evaluation modules
ISO/IEC TS 24748-1:2016	Systems and software engineering -- Life cycle management -- Part 1: Guidelines for life cycle management
ISO/IEC TR 24748-2:2011	Systems and software engineering -- Life cycle management -- Part 2: Guide to the application of ISO/IEC 15288 (System life cycle processes)
ISO/IEC TR 24748-3:2011	Systems and software engineering -- Life cycle management -- Part 3: Guide to the application of ISO/IEC 12207 (Software life cycle processes)
ISO/IEC TS 24748-6:2016	Systems and software engineering -- Life cycle management -- Part 6: System integration engineering
ISO/IEC 25000:2014	Systems and software engineering -- Systems and software Quality Requirements and Evaluation (SQuaRE) -- Guide to SQuaRE
ISO/IEC 25001:2014	Systems and software engineering -- Systems and software Quality Requirements and Evaluation (SQuaRE) -- Planning and management
ISO/IEC 25010:2011	Systems and software engineering -- Systems and software Quality Requirements and Evaluation (SQuaRE) -- System and software quality models
ISO/IEC 25012:2008	Software engineering -- Software product Quality Requirements and Evaluation (SQuaRE) -- Data quality model
ISO/IEC 25020:2007	Software engineering -- Software product Quality Requirements and Evaluation (SQuaRE) -- Measurement reference model and guide
ISO/IEC 25021:2012	Systems and software engineering -- Systems and software Quality Requirements and Evaluation (SQuaRE) -- Quality measure elements
ISO/IEC 25022:2016	Systems and software engineering -- Systems and software quality requirements and evaluation (SQuaRE) -- Measurement of quality in use
ISO/IEC 25023:2016	Systems and software engineering -- Systems and software Quality Requirements and Evaluation (SQuaRE) -- Measurement of system and software product quality
ISO/IEC 25024:2015	Systems and software engineering -- Systems and software Quality Requirements and Evaluation (SQuaRE) -- Measurement of data quality
ISO/IEC 25030:2007	Software engineering -- Software product Quality Requirements and Evaluation (SQuaRE) -- Quality requirements
ISO/IEC 25040:2011	Systems and software engineering -- Systems and software Quality Requirements and Evaluation (SQuaRE) -- Evaluation process
ISO/IEC 25041:2012	Systems and software engineering -- Systems and software Quality Requirements and Evaluation (SQuaRE) -- Evaluation guide for developers, acquirers and independent evaluators
ISO/IEC 25045:2010	Systems and software engineering -- Systems and software Quality Requirements and Evaluation (SQuaRE) -- Evaluation module for recoverability

Reference	Title
ISO/IEC 25051:2014	Software engineering -- Systems and software Quality Requirements and Evaluation (SQuaRE) -- Requirements for quality of Ready to Use Software Product (RUSP) and instructions for testing
ISO/IEC TR 25060:2010	Systems and software engineering -- Systems and software product Quality Requirements and Evaluation (SQuaRE) -- Common Industry Format (CIF) for usability: General framework for usability-related information
ISO/IEC 25062:2006	Software engineering -- Software product Quality Requirements and Evaluation (SQuaRE) -- Common Industry Format (CIF) for usability test reports
ISO/IEC 25063:2014	Systems and software engineering -- Systems and software product Quality Requirements and Evaluation (SQuaRE) -- Common Industry Format (CIF) for usability: Context of use description
ISO/IEC 25064:2013	Systems and software engineering -- Software product Quality Requirements and Evaluation (SQuaRE) -- Common Industry Format (CIF) for usability: User needs report
ISO/IEC 25066:2016	Systems and software engineering -- Systems and software Quality Requirements and Evaluation (SQuaRE) -- Common Industry Format (CIF) for Usability -- Evaluation Report
ISO/IEC TS 30103:2015	Software and Systems Engineering -- Lifecycle Processes -- Framework for Product Quality Achievement
ISO/IEC/IEEE 29119-1:2013	Software and systems engineering -- Software testing -- Part 1: Concepts and definitions
ISO/IEC/IEEE 29119-2:2013	Software and systems engineering -- Software testing -- Part 2: Test processes
ISO/IEC/IEEE 29119-3:2013	Software and systems engineering -- Software testing -- Part 3: Test documentation
ISO/IEC/IEEE 29119-4:2015	Software and systems engineering -- Software testing -- Part 4: Test techniques
ISO/IEC/IEEE 29119-5:2016	Software and systems engineering -- Software testing -- Part 5: Keyword-Driven Testing
ISO/IEC/IEEE 42010:2011	Systems and software engineering -- Architecture description

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

3.5.2.1 Scope

Development of standards for the protection of information and ICT. This includes generic methods, techniques and guidelines to address both security and privacy aspects, such as:

- Security requirements capture methodology
- Management of information and ICT security; in particular information security management systems, security processes, and security controls and services

- Cryptographic and other security mechanisms, including but not limited to mechanisms for protecting the accountability, availability, integrity and confidentiality of information
- Security management support documentation including terminology, guidelines as well as procedures for the registration of security components
- Security aspects of identity management, biometrics and privacy
- Conformance assessment, accreditation and auditing requirements in the area of information security management systems
- Security evaluation criteria and methodology

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

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

Reference	Title
ISO/IEC 15408-1:2009	Information technology -- Security techniques -- Evaluation criteria for IT security -- Part 1: Introduction and general model
ISO/IEC 15408-2:2008	Information technology -- Security techniques -- Evaluation criteria for IT security -- Part 2: Security functional components
ISO/IEC 15408-3:2008	Information technology -- Security techniques -- Evaluation criteria for IT security -- Part 3: Security assurance components
ISO/IEC 18045:2008	Information technology -- Security techniques -- Methodology for IT security evaluation
ISO/IEC 21827:2008	Information technology -- Security techniques -- Systems Security Engineering -- Capability Maturity Model® (SSE-CMM®)
ISO/IEC 27000:2016	Information technology -- Security techniques -- Information security management systems -- Overview and vocabulary
ISO/IEC 27001:2013	Information technology -- Security techniques -- Information security management systems -- Requirements
ISO/IEC 27002:2013	Information technology -- Security techniques -- Code of practice for information security controls
ISO/IEC 27003:2010	Information technology -- Security techniques -- Information security management system implementation guidance
ISO/IEC 27004:2016	Information technology -- Security techniques -- Information security management -- Monitoring, measurement, analysis and evaluation
ISO/IEC 27005:2011	Information technology -- Security techniques -- Information security risk management
ISO/IEC 27009:2016	Information technology -- Security techniques -- Sector-specific application of ISO/IEC 27001 -- Requirements
ISO/IEC 27010:2015	Information technology -- Security techniques -- Information security management for inter-sector and inter-organizational communications
ISO/IEC 27014:2013	Information technology -- Security techniques -- Governance of information security
ISO/IEC 27017:2015	Information technology -- Security techniques -- Code of practice for information security controls based on ISO/IEC 27002 for cloud services

Reference	Title
ISO/IEC 27032:2012	Information technology -- Security techniques -- Guidelines for cybersecurity
ISO/IEC 27033-1:2015	Information technology -- Security techniques -- Network security -- Part 1: Overview and concepts
ISO/IEC 27033-2:2012	Information technology -- Security techniques -- Network security -- Part 2: Guidelines for the design and implementation of network security
ISO/IEC 27033-3:2010	Information technology -- Security techniques -- Network security -- Part 3: Reference networking scenarios -- Threats, design techniques and control issues
ISO/IEC 27033-4:2014	Information technology -- Security techniques -- Network security -- Part 4: Securing communications between networks using security gateways
ISO/IEC 27033-5:2013	Information technology -- Security techniques -- Network security -- Part 5: Securing communications across networks using Virtual Private Networks (VPNs)
ISO/IEC 27033-6:2016	Information technology -- Security techniques -- Network security -- Part 6: Securing wireless IP network access
ISO/IEC 27034-1:2011	Information technology -- Security techniques -- Application security -- Part 1: Overview and concepts
ISO/IEC 27034-2:2015	Information technology -- Security techniques -- Application security -- Part 2: Organization normative framework
ISO/IEC 27034-6:2016	Information technology -- Security techniques -- Application security -- Part 6: Case studies
ISO/IEC 27036-1:2014	Information technology -- Security techniques -- Information security for supplier relationships -- Part 1: Overview and concepts
ISO/IEC 27036-2:2014	Information technology -- Security techniques -- Information security for supplier relationships -- Part 2: Requirements
ISO/IEC 27036-3:2013	Information technology -- Security techniques -- Information security for supplier relationships -- Part 3: Guidelines for information and communication technology supply chain security
ISO/IEC 27036-4:2016	Information technology -- Security techniques -- Information security for supplier relationships -- Part 4: Guidelines for security of cloud services
Standards under development	
ISO/IEC AWI 20547-4	Information technology -- Big data reference architecture -- Part 4: Security and privacy fabric
ISO/IEC CD 19086-4	Information technology -- Cloud computing -- Service level agreement (SLA) framework -- Part 4: Security and privacy

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

3.5.3.1 Scope

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

3.5.3.2 Structure

ISO/IEC JTC 1/SC 38 has the following structure:

- ISO/IEC JTC 1/SC 38/WG 3 Cloud Computing Service Level Agreements (CCSLA)
- ISO/IEC JTC 1/SC 38/WG 4 Cloud Computing Interoperability and Portability (CCIP)
- ISO/IEC JTC 1/SC 38/WG 5 Cloud Computing Data and its Flow (CCDF)

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

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

Reference	Title
ISO/IEC 17788:2014	Information technology -- Cloud computing -- Overview and vocabulary
ISO/IEC 17789:2014	Information technology -- Cloud computing -- Reference architecture
ISO/IEC 17963:2013	Web Services for Management (WS-Management) Specification
ISO/IEC 18384-1:2016	Information technology -- Reference Architecture for Service Oriented Architecture (SOA RA) -- Part 1: Terminology and concepts for SOA
ISO/IEC 18384-2:2016	Information technology -- Reference Architecture for Service Oriented Architecture (SOA RA) -- Part 2: Reference Architecture for SOA Solutions
ISO/IEC 18384-3:2016	Information technology -- Reference Architecture for Service Oriented Architecture (SOA RA) -- Part 3: Service Oriented Architecture ontology
ISO/IEC 19086-1:2016	Information technology -- Cloud computing -- Service level agreement (SLA) framework -- Part 1: Overview and concepts
ISO/IEC 20933:2016	Information technology -- Distributed Application Platforms and Services (DAPS) -- Access Systems
ISO/IEC TR 30102:2012	Information technology -- Distributed Application Platforms and Services (DAPS) -- General technical principles of Service Oriented Architecture
Standards under development	
ISO/IEC DIS 19941	Information technology -- Cloud computing -- Interoperability and portability
ISO/IEC CD 19086-2	Information technology -- Cloud computing -- Service level agreement (SLA) framework -- Part 2: Metric Model
ISO/IEC DIS 19944	Information technology -- Cloud computing -- Cloud services and devices: data flow, data categories and data use
ISO/IEC DIS 19086-3	Information technology -- Cloud computing -- Service level agreement (SLA) framework -- Part 3: Core conformance requirements
ISO/IEC AWI 22123	Information technology -- Cloud computing – Concepts and terminology

3.5.4 ISO/IEC JTC 1/WG 9 Big Data

3.5.4.1 Scope

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.

3.5.4.2 ISO/IEC JTC 1/WG 9 Big Data Standards and standards under development relevant for MONSOON

This WG is a relatively new one and has no standards published yet. The following list contains the standards under development currently.

Table 16 - ISO/IEC JTC 1/WG 9 standards under development relevant for MONSOON

Reference	Title
ISO/IEC CD 20546	Information Technology -- Big Data -- Definition and Vocabulary
ISO/IEC AWI TR 20547-1	Information technology -- Big data reference architecture -- Part 1: Framework and application process
ISO/IEC PDTR 20547-2	Information technology -- Big data reference architecture -- Part 2: Use cases and derived requirements
ISO/IEC AWI 20547-3	Information technology -- Big data reference architecture -- Part 3: Reference architecture

4 Conclusions

After the analysis of the current standardization context at International and European levels, the following conclusions may be drawn:

1. There is a large number of International and European technical committees, as well as of standards and standards under development related to MONSOON project that may be useful for its development and also for its future dissemination. Among the aforementioned technical committees, two categories can be distinguished. On the one side, technical committees which can be used as a source of useful information for the development of the project but where dissemination activities are not foreseen. On the other side, technical committees which can be directly interested in the findings of the MONSOON project and where dissemination activities can be carried out.

2. The technical committees which can be more interested in the results of the MONSOON project are the following:

    - ISO/TC 226 Materials for the production of primary aluminium (Pitch, solid carbonaceous materials, petroleum coke)
    - IEC TC 2 Rotating machinery
    - ISO/TC 108 Mechanical vibration, shock and condition monitoring
    - IEC TC 56 Dependability

- ISO/TC 61 Plastics

These technical committees develop standards in the fields covered by the three use cases, but the MONSOON project will provide results obtained with innovative analysis techniques not contemplated so far in the standards developed within these technical committees.

The following table summarizes the dissemination activities foreseen and a first schedule for their implementation.

Table 17 - Schedule for implementation of the dissemination strategy within standardization technical committees

Action	Technical committee	Responsible	Date
Follow up of TCs standardisation activities	All selected	UNE	Continuous (Month 1-Month 36)
Delivering a first report on MONSOON project to TCs	All selected	UNE	M12
Presentation of the project in TCs meetings	All selected	UNE, partners	Depending on: - whether it is considered suitable by the TC; - TC meeting date.
Information to TCs on workshops and conferences	All selected	UNE	When relevant
New work item proposal to the TC	All selected	UNE, partners	Depending on: - whether considered suitable by the Consortium; - availability of the outcomes of the project.

Acronyms

Acronym	Explanation
CEN	European Committee for Standardization
CENELEC (CLC)	European Committee for Electrotechnical Standardization
EN	European Standard
ETSI	European Telecommunications Standards Institute
IACS	Industrial Automation and Control System
IEC	International Electrotechnical Commission
ISO	International Standardization Organization
ITU	International Telecommunication Union
NSO	National Standardization Organizations
SC	Subcommittee
TC	Technical Committee
TR	Technical Reports
TS	Technical Specification
WG	Working Group
WP	Work Package

List of tables

References

CEN Website (www.cen.eu)

CENELEC Website (www.cenelec.eu)

CEN/CENELEC Projex Online database (projex.cen.eu) (restricted to authorized users)

ISO Website (www.iso.org)

ISO Project Portal (isotc.iso.org) (restricted to authorized users)

IEC Website (www.iec.ch)

EUROMAP Website (www.euromap.org)