

EFPP: European Connected Factory Platform for Agile Manufacturing



European Factory
Platform

WP11: Dissemination, Collaboration and Standardisation

D11.11: Standardisation Plan - Vs: 1.0

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Abstract

The purpose of this EFPP deliverable is to provide a plan for standardisation activities in the EFPP project. This document describes the rationale for standardisation in the EFPP project, lists relevant standards, describes the standardisation plan and provides an overview of general standardisation procedures.

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This deliverable is subject to final acceptance by the European Commission.

Further Information

<https://www.efpf.org>

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Project Partners:



Executive Summary

This document serves as a guide for EFPF partners on how to implement standardisation related activities into their tasks and work packages as well as how research and development in EFPF can contribute to standardisation and/or support ongoing standardisation efforts.

Section 0 of this document is an introduction to the EFPF project and provides information about the context, purpose and structure of this deliverable. Section 1 provides the high-level overview of standardisation activities in EFPF. Section 2 summarises key definitions and glossary for the readers. Section 3 describes some of the well-known standardisation activities in the area of digital manufacturing, Internet of Things, Data Exchange and Cloud Computing – generally the areas that are considered relevant to the EFPF work program. Section 4 highlights the ongoing standardisation activities that are closely related to the RTD activities in EFPF, before presenting the EFPF standardisation plan. Section 5 provides an overview of the general standardisation processes at European and International level. Finally, Section 6 concludes the deliverable.

By presenting the EFPF standardisation plan very early (month 3), we highlight the importance of standardisation in the project and in ongoing digital manufacturing initiatives. This deliverable additionally addresses the need to define a coherent project approach towards standardisation, making it one of the key areas where the project needs to deliver visible impact through a well scoped and agreed plan.

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0 Introduction

0.1 EFPF Project Overview

EFPF – European Connected Factory Platform for Agile Manufacturing – is a project funded by the H2020 Framework Programme of the European Commission under Grant Agreement 825075 and conducted from January 2019 until December 2022. It engages 30 partners (Users, Technology Providers, Consultants and Research Institutes) from 11 countries with a total budget of circa 16M€. Further information can be found at efpf.org.

In order to foster the growth of a pan-European platform ecosystem that enables the transition from “analogue-first” mass production, to “digital twins” and lot-size-one manufacturing, the EFPF project will design, build and operate a federated digital manufacturing platform. The Platform will be bootstrapped by interlinking the four base platforms from FoF-11-2016 cluster funded by the European Commission, early on. This will set the foundation for the development of EFPF Data Spine and the associated toolsets to fully connect the existing platforms, toolsets and user communities of the 4 base platforms. The federated EFPF platform will also be offered to new users through a unified Portal with value-added features such as single sign-on (SSO), user access management functionalities to hide the complexity of dealing with different platform and solution providers.

0.2 Deliverable Purpose

On the topic of standardisation, on one hand, a convergence of thinking is needed as many standardisation efforts recognise similar needs for a networked, interoperable world and at the same time, researchers and technologists are faced with the question which of the increasingly overlapping standards to choose as a reference for any specific platform solution, as is the case of EFPF.

The role of Austrian Standards International (ASI) in EFPF is to assist project partner interfacing with standardisation in order to implement, disseminate and exploit their research through standards, and to achieve maximum benefit from their work.

This document is a part of Work Package 11, Task 11.3 and defines a first standardisation plan for the EFPF project.

0.3 Target Audience

This document is intended to be used by EFPF partners as guidance in standardisation activities.

0.4 Deliverable Context

This document is one of the cornerstones for achieving the project results. Its relationship to other documents is as follows:

- **Consortium Agreement (CA):** Deals with legal aspects between partners
- **Description of Action (DOA):** Provide the foundation for the actual research and technological content of EFPF. Importantly, the Description of Action includes a description of the overall project work plan

0.5 Document Structure

This deliverable is broken down into the following sections:

- **Section 1: Overview of Standardisation Activities** describes the standardisation activities in the areas related to the EFPF project
- **Section 2: Definitions and Glossary** provides an overview of the key terminologies used in the standardisation activities
- **Section 3: Overview of Ongoing Standardisation Activities** describes the ongoing standardisation activities related to the EFPF project
- **Section 4: Standardisation Activities in EFPF** describes the planned standardisation activities in the EFPF project
- **Section 5: General Standardisation Guidelines** describes the guidelines from standardisation organisations
- **Section 6: Summary**

Annexes:

- **Annex A:** Document History
- **Annex B:** First results of the partner survey through the online Excel file

0.6 Document Status

This document is listed in the Description of Action as “public” since it provides general information for the EFPF project.

0.7 Document Dependencies

This document is the first part of further three deliverables within this task and shall be the basis for ongoing regulatory alignment, compliance and standardisation strategies.

0.8 Glossary and Abbreviations

A definition of common terms related to EFPF, as well as a list of abbreviations, is available at: <https://www.efpf.org/glossary>

0.9 External Annexes and Supporting Documents

Annexes and Supporting Documents:

- None

0.10 Reading Notes

- None

1 Overview of Standardisation Activities

1.1 Objectives of the Work Package and Task

This work package (WP11) of EFPF focuses on the effective dissemination and communication of the EFPF platform in relevant communities (e.g. SME clusters, associations) and domains (i.e. research, industry, standardisation).

The task T11.3 (Regulatory Alignment, Compliance and Standardisation Strategies) focuses on the alignment of all project activities and goals with the current regulations as well as on-going standardisation activities.

An important aspect of EFPF is the alignment of project activities and goals with the current regulations and standards. This task ensures compliance with the General Data Protection Regulation (GDPR) of the EFPF platform. It also carries out important interactions with the national and European regulation and standardisation bodies on smart factory automation, data processing and analytics in order to facilitate the sharing of data and standardisation processes.

Within EFPF, standardisation activities are derived by the experts in this area (such as task lead by ASI) to provide two-way communication between EFPF RTD activities and ongoing standardisation activities. Moreover, the task T11.3 promotes the use of “Standardisation guidelines for IST research projects interfacing with ICT standards organisations” by the Cooperation Platform for Research and Standards (COPRAS). In this respect, general information on “Standardisation guidelines for IST research projects interfacing with ICT standards organisations” could be found in the publication of COoperation Platform for Research and Standards (COPRAS) at:

<https://www.w3.org/2004/copras/docu/D15.html>

1.2 Standardisation Objectives

In the EFPF project there is a need for the convergence of diverse tools/solutions towards a networked, interoperable federation. However, researchers and technologists in EFPF are faced with the question which of the increasingly overlapping standards to choose as reference for any specific platform solution. This is a common problem in any domain where there are competing and/or overlapping standards. The approach adopted in EFPF is to closely watch ongoing developments in several standardisation initiatives (see Section 4.4) and through support of experts (such as ASI as core EFPF partner) aligned RTD activities with ongoing standardisation activities with the view to adopt existing standards and where possible contribute towards the development of standards. Based on this approach, a standardisation plan is drafted in Section 4 that elaborates the planned standardisation activities at strategic and tactical levels.

1.3 Scope of Deliverable

This Standardisation Plan (D11.11) cover the following scope:

- Provide common definitions (see Section 2)
- Provide an overview of already defined standardisation activities (see Section 3)
- Provide an overview of standardisation activities related to the project and help in finding out the potential for standardisation activities (see Section 4)

- Provide an overview of the most common standardisation processes and procedures (see Section 5)
- Summarise the deliverable (see Section 6)

Based on this Standardisation Plan (D11.11), the Standardisation Strategy deliverable series D11.7/8/9 “Regulatory Alignment, Compliance and Standardisation Strategies” will be defined in T11.3 during the course of the EFPF project.

2 Definitions and Glossary

The terms standardisation, regulations and directives are used quite often as interchangeable terms by the public, without realising that they have a very different meaning and implications.

The following terms and definitions are intended to clarify the often-misused expressions.

2.1 Terms and Definitions

2.1.1 Standardisation

Standardisation is an activity of establishing, with regard to actual or potential problems, provisions for common and repeated use, aimed at the achievement of the optimum degree of order in a given context.

NOTE 1: In particular, the activity consists of the processes of formulating, issuing and implementing standards.

NOTE 2: Important benefits of standardisation are improvement of the suitability of products, processes and services for their intended purposes, prevention of barriers to trade and facilitation of technological cooperation.

[SOURCE: ISO/IEC Guide 2:2004¹]

Standards can be developed by National, Regional (e.g. European), or International standardisation organisations, by a group of companies (industrial standards, e.g. USB, IEEE) or by companies itself (company standard).

As defined in Regulation (EU) 1025/2012², Article 2 a ‘standard’ means a technical specification, adopted by a recognised standardisation body, for repeated or continuous application, with which compliance is not compulsory.

2.1.2 Regulations

A regulation is a document providing binding legislative rules, that is adopted by an authority.

For example, when the EU intends to make sure that there are common safeguards on goods imported from outside the EU, it issues a regulation that all imports need to accompany with.

NOTE 1: Regulations are adopted by the European Council.

[SOURCE: https://europa.eu/european-union/eu-law/legal-acts_en]

2.1.3 Directives

A directive is a legislative act that sets out a goal that all EU countries must achieve.

However, it is up to the individual countries to devise their own laws on how to reach these goals. One example is the EU consumer rights directive, which strengthen rights for consumers across the EU by eliminating hidden charges and costs on the internet and thus extending the period under which consumers can withdraw from a sales contract.

¹ <https://www.iso.org/standard/39976.html>

² <https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2012:316:0012:0033:EN:PDF>

[SOURCE: https://europa.eu/european-union/eu-law/legal-acts_en]

2.2 Glossary

The following table show a short overview for abbreviations specifically used in connections with standardisation and legislation.

Abbreviation	Description
CEN	European Committee for Standardisation
CENELEC	European Committee for Electrotechnical Standardisation
CWA	CEN and/or CENELEC Workshop Agreement; standardisation deliverable from a CEN and/or CENELEC workshop
EN	standard adopted by CEN or CENELEC
ESO	European Standardisation organisation; The ESO's are CEN, CENELEC and ETSI
ETSI	European Telecommunications Standards Institute
IEC	International Electrotechnical Commission / standards developed by IEC
ISO	International Standardisation Organisation / standards developed by ISO
ITU	International Telecommunication Union
NSB	National Standardisation Body
NWIP	New Work Item Proposal → Proposal for a new work item; is submitted to the TC for approval
SC	Subcommittee, under a technical committee; frequently in large ISO/TCs or IEC/TCs but being phased out in CEN/TCs and CENELEC/TCs. SCs operate more independently than WGs
TR	Technical report developed by CEN, CENELEC, ISO or IEC
TS	Technical specification developed by CEN, CENELEC, ISO or IEC
WG	Working Group to which work is allocated by a Technical committee (TC) based on an approved new work items (NWI) and drafting standardisation deliverables
WI	Work item; specifies among other the title, scope and necessary expertise for developing a standardisation deliverable; the idea can also already be deposited at preliminary work item, which is then further developed into a first full draft before it is activated
SDO	Standards Development Organisation

3 Overview of Ongoing Standardisation Activities

The EFPF project will deliver a federated digital manufacturing platform that interlinks multiple platforms, tools and services through a standardised interoperable Data Spine.

Based on the nature of technical activities in WP3 to WP7, the following aspects of EFPF are considered relevant to the ongoing standardisation and regulation activities:

- Connecting multiple digital manufacturing tools, services and platforms through APIs and service interfaces to realise a federated platform;
- Exchange of data by the diverse tools, systems and platforms that need to be federated through the Data Spine;
- Establishing interconnectivity and interoperability to most widely used industrial data exchange standards and systems;
- Smart contracting in agile value networks through the use of blockchain technology;
- Security and privacy of information exchanged between partners in a collaboration and also the information exchanged through the platform;
- Linkage and interoperability of commonly used security protocols;
- The use of Cloud services for storage and marketplace solutions.

The above activities in EFPF are related but not limited to the following ongoing activities of standardisation and regulatory bodies:

- **Digital / Smart Manufacturing:**
 - ISO/TC 184/ IEC/TC 65/JWG 21 (https://www.iec.ch/dyn/www/f?p=103:14:13855309185134:::FSP_ORG_ID,FS P_LANG_ID:19942,25)
 - IEC/TC 65/WG 23(https://www.iec.ch/dyn/www/f?p=103:14:2468413918083:::FSP_ORG_ID,FS P_LANG_ID:22639,25)
 - IEC System Committee SyC Smart Manufacturing(https://www.iec.ch/dyn/www/f?p=103:186:4410102469972:::FS P_ORG_ID,FSP_LANG_ID:22328,25)
 - OPC(<https://opcfoundation.org/>)
 - IIC for Reference Architecture Model Industry 4.0/Smart manufacturing (<https://www.iiconsortium.org/>);
 - OASIS activities for the Production Planning & Scheduling (<https://www.oasis-open.org/>);
- **Digital Twins:**
 - ISO/TC 184/SC 4 (<https://www.iso.org/committee/54158.html>) and ISO/IEC JTC 1/SC 27 (<https://www.iso.org/committee/45306.html>) for Digital Twin Manufacturing Framework;
- **Integration and Interoperability:**
 - ISO/TC 184/SC 5 for Interoperability, integration, and architectures for enterprise systems and automation applications (<https://www.iso.org/committee/54192.html>)
 - ISO/IEC JTC 1 /SC 41 (<https://www.iso.org/committee/6483279.html>)
 - ETSI TC smartM2M (<https://portal.etsi.org/tb.aspx?tbid=726&SubTB=726>)
 - oneM2M (<http://www.onem2m.org/>)

- IEEE (<https://www.ieee.org/>),
- W3C (<http://www.w3.org/>) and
- AIOTI <https://aioti.eu/>
Initiatives for Internet of Things and related technologies;

- **Blockchain:**
 - ISO/TC 307 (<https://www.iso.org/committee/6266604.html>),
 - IEEE (<https://www.ieee.org/>) and
 - W3C (<http://www.w3.org/>)
For Blockchain and distributed ledger technologies;

- **Cloud Computing:**
 - ISO/IEC JTC 1 /SC 38 (<https://www.iso.org/committee/601355.html>)
 - OASIS (<https://www.oasis-open.org/>) and
 - Open Cloud Consortium (OCC) (<http://opencloudconsortium.org/>)
Activities on Cloud Computing and Distributed Platforms

Based on the preliminary identification of relevant standardisation bodies, as listed above, the task leader ASI conducted a survey of other standardisation initiatives that may be relevant to the EFPF program. Partner contributions in this survey are summarised in Annex B.

4 Standardisation Activities in EFPF

4.1 Standardisation and the Regulatory Implications

For realising the EFPF platform (e.g. interconnectivity and interoperability of services and data through Data Spine) the standardisation and the regulatory implications on distributed (especially cross-border) business and production processes have to be considered. This stream of work will open up opportunities for contributions towards existing and initiation of new standardisation activities. The identified relevancies of EFPF work programme towards ongoing standardisation activities and their implications are considered in this deliverable, particularly in shaping up the Standardisation Plan of the project in Section 4.3.

4.2 Contribution to Standardisation

In standardisation, the development and experimentation of the EFPF platform will contribute towards several standards and regulations. Based on the identification of relevant standardisation and regulatory activities in Section 3, the EFPF contributions are expected to be in the areas of:

- Shop-floor automation, (including production floor planning and scheduling in manufacturing industries, and transactional exchange patterns for operations management contexts),
- Digital twin manufacturing framework,
- Blockchain technology,
- Reference architecture model for Industry 4.0/Smart Manufacturing,
- Cybersecurity,
- Safety in workplace and human machine interactions

The above areas are considered by the task lead ASI while preparing a list of ongoing standardisation activities in Section 4.3. Moreover, during the project the consultations and collaborations with standardisation bodies (such as NIST and DIN) will be carried out to identify other standardisation activities of relevance and interest for EFPF partners.

To make sure that EFPF contributes towards international standardisation through collaborating with European, International and other (e.g. US) standardisation organisations, the relevant technical committees and their specific standards will be studied in T11.3. The outcome of a preliminary study carried out in the project (T11.3) to identify the relevant standards is reported in the Section 4.3. Building on that preliminary study and partner consultations in T11.3, a standardisation plan is presented in Section 4.4. During the lifetime of the EFPF project a detailed study in T11.3 will monitor the execution of the plan and analyse the nature and significance of project contributions in different standardisation initiatives

Note: Further information for the supporting of European Experts contribution to International ICT Standardisation Activities, see <https://www.standict.eu/>.

4.3 Exploitation Towards Standardisation

The standardisation activities in EFPF are designed to focus both on contributing towards standardisation and utilisation of relevant standards. Based on the identification of EFPF relevant standardisation areas in Section 4.2, the leader of the standardisation task T11.3

(ASI) has prepared the table below that list some of the relevant and active standardisation initiatives that EFPF partners can leverage, participate and contribute towards.

(In addition, a questionnaire to identify other standardisation related exploitation routes for EFPF project has been filled up by project partners (see Annex B). The input received from partners is used to shape up the standardisation plan in Section 4.4.)

While preparing the following table, the relevance criteria that have been followed include:

- Relevance of existing technical committees to the objectives of EFPF
- Relevance of existing EN-, ISO- and IEC-Standards within the responsibility and the work programme of the above technical committees
- Relevance of industrial standards and/or EN-, ISO- and IEC-Standards already applied by the partners of the EFPF project (e.g. by service/platform providers)
- Relevance of the overlapping standards which hinder the development of an interoperable EFPF platform/project
- Finally, the need for the necessary standards supporting the development of an interoperable EFPF platform that can support an open ecosystem

<p>Industry 4.0 standards</p>	<ul style="list-style-type: none"> • AIOTI (Alliance for IoT Innovation) WG3 on IoT Standardisation & WG11 on Smart Manufacturing; • oneM2M standards for M2M and the IoT covering many different industries; • IEEE P2413 standard for an IoT Architectural Framework (based in ISO/IEC/IEEE 42010 Systems and software engineering – Architecture description); • RAMI 4.0, IEC PAS 63088:2017, Smart Manufacturing Reference Model(s); (drafted in JWG 21 between IEC/TC 65 and ISO/TC 184); Special attention shall be given to IEC/TC 65/WG 23 dealing with Smart Manufacturing Framework and System Architecture having the potential to become an overlap with the work in JWG 21. • OCF (Open Connectivity Foundation) and ISO/IEC 30118, Information technology and OCF specification; • OPC (Open Platform Communication) Unified Architecture for M2M Communication in Automation; OPC-UA; • OASIS MQTT (Message Queuing Telemetry Transport); OASIS AMQP (Advanced Message Queuing Protocol); • ISO 11354, Advanced automation technologies and their applications -- Requirements for establishing manufacturing enterprise process interoperability (multipart standard) • ISO 15745, Industrial automation systems and integration -- Open systems application integration framework (multipart standard) • ISO 20534 Industrial automation systems and integration, Formal semantic models for the configuration of global production networks; • ISO 22549 Assessment on convergence of informatisation and industrialisation for industrial enterprises (draft); • ISO 23247 Digital Twin manufacturing framework.
<p>Cybersecurity standards</p>	<ul style="list-style-type: none"> • IEC 62443 Industrial communication networks – Network and system security; • ISO/IEC JTC 1/SC 27, IT Security techniques; • ISO 13849 safety requirements and guidance; • ISO/IEC TS 33052:2016 - Information technology -- Process reference model (PRM) for information security management; • ISO/IEC 27017:2015 – Security Techniques – Code of Practice for Information Security Controls Based on ISO/IEC 27002 for Cloud Services; • NIST SP 800-82 – Guide to Industrial Control Systems (ICS) Security; • NIST Cybersecurity Framework – CSF; • ENISA - Information Security and Privacy standards for Small and Medium Enterprises (SMEs);

	<ul style="list-style-type: none"> • ENISA - Procure Secure - A guide to monitoring of security service levels in cloud contracts; • ISO/IEC TS 33052:2016 - Information technology -- Process reference model (PRM) for information security management; • ETSI TS 103 457 CYBER; Trusted Cross-Domain Interface: Interface to offload sensitive functions to a trusted domain.
<p>Cloud Computing and Distributed Platforms Standards</p>	<ul style="list-style-type: none"> • 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

The activities in the above table will be promoted among all EFPF partners in order to raise their awareness and also to promote the uptake and exploitation of the different standards. The task lead (ASI) will carefully monitor the technical activities in the EFPF project with the view to provide necessary support towards the adoption/uptake of existing or development of standards.

NOTE 1: Information about ICT and Standardisation, see <https://ec.europa.eu/digital-single-market/en/standardisation>.

NOTE 2: Information about the 2019 Rolling plan for ICT standardisation, see <https://ec.europa.eu/docsroom/documents/34521>

4.4 EFPF Standardisation Plan

The standardisation plan in EFPF shall follow the recommendations from the Joint MSP/DEI Working Group on standardisation in support of Digitising European Industry³, as provided in its Final Report from November 2018⁴.

In this respect, the standardisation plan in EFPF is to pursue the work in two directions, covering standardisation strategies and tactics.

4.4.1 Strategic

The strategic direction in EFPF is to pursue and support the following activities:

- According to the relevance of their roles in the project, the project partners shall ensure the compatibility and interoperability for their services/solutions and user scenarios/pilots with the relevant standards such as those reported in Section 3 and Section 4.3
- Partners shall support ASI (and NIST - based on their letter of interest and support attached with the DoA) and contribute towards the compliance, application and

³) see <https://ec.europa.eu/digital-single-market/en/news/final-workshop-standardisation-support-digitising-european-industry-initiative-report-and>

⁴ https://ec.europa.eu/newsroom/dae/document.cfm?doc_id=57546

development of standards in the areas of relevance to the EFPF and partner/user activities – details in the following table.

- Partners shall contribute towards the implementation of following recommendations from the Joint MSP/DEI Working Group on standardisation. To align the project with DEI initiative, the recommendation from the joint working group are included in the EFPF Standardisation plan, as follows:
 - Common communications standards and reference architecture for connections between machines (M2M) and with sensors and actuators in a supply chain environment are a basic need and a priority.
 - Specific industrial needs shall be identified during the EFPF project and addressed through the adoption and/or implementation of relevant standards. For examples, standards that support communications on broadband infrastructures and data formats in order to allow for the quick transfer of large volumes of data over networked industries. This could ease the ability to switch between platforms in the EFPF federation. Analysis shall be carried out as how to provide industries with a solution enabling wireless communications without interfering with other wireless networks. In particular, partners shall investigate M2M standards against requirements like real-time capability and close to hardware runtime codes. (Chapter 3.3, Action 1, MSP/DEI Final Report)
 - Improve interoperability and reduce overlap, redundancy and fragmentation. Often there are several standardisation activities ongoing in the same area in parallel. Standardisation activities in EFPF will be encouraged for making standards to work together and integrating existing protocols. Moreover, standards bodies (such as ASI and NIST) should aim for a coordinated approach regarding different reference architectures and measures should be taken to reduce overlap, redundancy and fragmentation. (Chapter 3.3, Action 4, MSP/DEI Final Report)
 - Interoperable and integrated security – project partners shall contribute to activities in Standards Development Organisations (SDOs) working on interoperability standards for security and for linking communication protocols in order to provide end-to-end security for complex manufacturing systems including the span of virtual actors (from devices and sensors to enterprise systems). Standardisation activities should also consider risk management approaches as well as European requirements (Chapter 3.3, Action 5, MSP/DEI Final Report) and NIST Risk Management Framework for Information Systems and Organisations: A System Life Cycle Approach for Security and Privacy⁵
 - The project partners shall participate towards creating a hierarchical catalogue of technical and social measures for assuring privacy protection; supporting SDOs (as identified in Section 3) impacting the DEI domain in general and the advanced manufacturing domain in particular to comment on and prioritize the elements in the catalogue. Digitising industry implies processing of data which includes personal data within the definition of the GDPR. This means, in addition to technical measures to ensure the security of the data, additional technical and social measures are needed in EFPF to protect the privacy of personal data. Such social or non-technical measures will include, e.g. codes of conduct, charters and

⁵ <https://csrc.nist.gov/news/2018/rmf-update-nist-publishes-sp-800-37-rev-2>

certifications, best practice guidelines, collection of evidence of privacy protection assurance, etc. (Chapter 3.3, Action 6, MSP/DEI Final Report)

- Partners shall participate towards the development of standards for ensuring long-term traceability of material to enable re-use and recycling. (Chapter 3.3, Action 9, MSP/DEI Final Report)
- Partners shall periodically review and align their standardisation activities and provide a report for internal and external awareness
- Partners shall support ASI in representing EFPF project within the coordination group on Smart Manufacturing setup by The European Committee for Standardization CEN and its electrotechnical Partner CENELEC together with ETSI (Telecommunication).

4.4.2 Tactical

Based on the above strategic directions and the input received by the EFPF partners in the survey of relevant standards conducted by ASI (in Annex B), the following tactical plan has been drafted to pursue standardisation activities in key areas of the EFPF project. It is important to note that standardisation is primarily driven by the industrial players and their interests; therefore the direct involvement of all project partners is not envisioned in tactical plans.

EFPF Focus Area	Industrial Automation Systems, Product Catalogues
Relevant Technical Committee	ISO/TC 184/SC 4 – Industrial data
Relevant Standards	<ul style="list-style-type: none"> • ISO 10303-236:2006, Industrial automation systems and integration - Product data representation and exchange - Part 236: Application protocol: Furniture catalogue and interior design - and Application modules • ISO 20534:2018, Industrial automation systems and integration -- Formal semantic models for the configuration of global production networks • ISO/AWI 23247, Digital Twin manufacturing framework • IEC 61131 Programmable controllers • IEC 62714 Automation Mark-up Language • IEC 62264 Enterprise-control system integration
EFPF Actions	<ul style="list-style-type: none"> • C2K will adopt and harmonise the above standards in relation to the Factory Connector Architecture (T4.1) to support the building blocks of the EFPF Platform, It will do this by considering the format of data at all levels of the automation model and how this will support interoperability for the platform tools and services. • FOR will track the progress on ISO 20534 to analyse its adoption or application for inter-enterprise data exchange in EFPF platform (e.g. as in T3.5) • CNet will study the standardisation activities on Digital Twin standardisations and Product Data representations due to their relevance with CNet’s commercial activities related to equipment manufacturing

EFPF Focus Area	Enterprise Systems, Interoperability, Integration
Relevant Technical Committee	ISO/TC 184/SC 5 – Interoperability, integration, and architectures for enterprise systems and automation applications
Relevant Standards	<ul style="list-style-type: none"> • ISO/CD 22549-1, Assessment on convergence of informatisation and industrialisation for industrial enterprises -- Part 1: Principles and framework
EFPF Actions	<ul style="list-style-type: none"> • NXW will monitor and adapt the activities of the above TC, due to its implications on automation platforms such as Symphony

EFPF Focus Area	IoT, Device Integration
Relevant Technical Committee	IEC/TC 65/SC 65E - Devices and integration in enterprise systems
Relevant Standards	<ul style="list-style-type: none"> • IEC 62264-1:2013, Enterprise-control system integration -- Part 1: Models and terminology • IEC 62264-2:2015, Enterprise-control system integration -- Part 2: Objects and attributes for enterprise-control system integration • IEC 62264-3:2016, Enterprise-control system integration -- Part 3: Activity models of manufacturing operations management • IEC 62264-4:2016, Enterprise-control system integration -- Part 4: Objects and attributes for manufacturing operations management integration • IEC 62264-5:2016, Enterprise-control system integration -- Part 5: Business to manufacturing transactions • 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 PAS 63088:2017, Smart manufacturing - Reference architecture model industry 4.0 (RAMI4.0)
EFPF Actions	<ul style="list-style-type: none"> • NXW will monitor the outcomes of IEC TC 184/SC 5 and where relevant adopt above standards that have implications on automation platforms • FOR will track this standard to assess how it can support interoperability for the platform tools and services (T3.5, T4.1). IEC 62264 provides a generic model of concepts relevant in manufacturing operations management (MOM) and is at the basis of the B2MML industry standard for information exchange between Enterprise Resource Management and MOM systems. As such, it is relevant context for factory connectivity in EFPF. • FOR actively participates in the German National Mirror Committee for IEC 61499 standardisation. IEC 61499 covers models for networked industrial automation systems and as such provides context to EFPF in relation to factory connectivity (T4.1). • ASI will promote IEC PAS 63088 that provides a reference model for all of EFPF as RAMI 4.0 is at the foundation of Industrie 4.0 standardisation efforts. • CNet will monitor the above standardisation activities on device integration with IoT platforms. The analysis carried out will be used to inform the design of Data Spine (T3.2) and align the development of Data Spine with latest standards on IoT integration.

Relevant Technical Committee	ISO/IEC/JTC 1/SC 41 - Internet of Things and related technologies
Relevant Standards	<ul style="list-style-type: none"> • ISO/IEC 21823-1:2019 - Internet of things (IoT) -- Interoperability for internet of things systems -- Part 1: Framework • ISO/IEC 30141:2018 - Internet of Things (IoT) -- Reference Architecture • ISO/IEC NP 30144 - Information technology -- Sensor network system architecture for power substations • ISO/IEC NP 30147 - Information technology -- Internet of things -- Methodology for trustworthiness of IoT system/service • ISO/IEC NP 30149 - Internet of things (IoT) -- Trustworthiness framework • ISO/IEC NP 30160 - Internet of Things (IoT) -- Application framework for industrial facility demand response energy management • ISO/IEC NP 30161 - Internet of Things (IoT) -- Requirements of IoT data exchange platform for various IoT services • ISO/IEC NP 30162 - Internet of Things (IoT) -- Compatibility requirements and model for devices within industrial IoT systems • ISO/IEC NP 30163 - Internet of Things (IoT) -- System requirements of IoT/SN technology-based integrated platform for chattel asset monitoring supporting financial services • ISO/IEC NP TR 30164 - Internet of things (IoT) -- Edge Computing • ISO/IEC NP 30165 - Internet of Things (IoT) -- Real-time IoT framework
EFPF Actions	<ul style="list-style-type: none"> • NXW will monitor the above standards (e.g. the activities of ISO/IEC JTC 1/SC 41 on real-time IoT framework) based on their implications on automation platforms and relevance to the factory connectivity and IoT relevant task (T4.1) in the EFPF project • SRFG will monitor the ongoing development of Trustworthiness framework in the ISO/IEC NP 30149 - Internet of things (IoT). Cooperation with the ISO/IEC JTC 1/SC 41 will be investigated for knowledge exchange between the technical committee and EFPF task related to Trust Mechanisms (T5.3) • CNet will monitor the above standardisation activities in the realm of IoT and inform the design and development of integration and interoperability mechanisms for IoT sensors and devices in the EFPF platform (T3.2, T4.4)

EFPF Focus Area	Data Interoperability, OPC & Industrie 4.0
Relevant Technical Committee	<ul style="list-style-type: none"> • IEC/TC 65/SC 65E - Devices and integration in enterprise systems • ZVEI SG 'Models and Standards' and Platform Industrie 4.0 working group WG1
Relevant Standards	<ul style="list-style-type: none"> • 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 • Industrie 4.0: Specification Details of the Asset Administration Shell
EFPF Actions	<ul style="list-style-type: none"> • NXW is interested in the adoption of OPC UA standard for machine level communication, particularly in the context of their Symphony platform that will be linked with EFPF • ICE is interested in OPC UA and in particular on how it will be used by the new Administration Shell standard. ICE workflow tool development (T4.6) will support OPC UA based communication for linking multiple shop-floor assets • FOR is an OPC Foundation member, has actively participated in VDMA-led efforts for OPC UA information model standardisation within the VDMA Robotics and Integrated Assembly Solutions Sector Groups and will monitor ongoing activities. FOR will support EFPF partners in the adoption/uptake/alignment of OPC UA with in relevant development tasks (e.g. T3.2, T3.5, T4.1). OPC UA is the core Industrie 4.0 communication protocol for machine connectivity, both with supervisory systems and other machines. Relevant domain specific standard extensions are developed in committees associated with the OPC Foundation before being submitted for formal standardisation. The German Mechanical Engineering Industry Association (VDMA) strongly promotes the use of OPC UA among all its member companies and committees.

EFPF Focus Area	Messaging, Message Exchange
Relevant Technical Committee	ISO/IEC JTC 1 – Information Technology
Relevant Standards	<ul style="list-style-type: none"> • ISO/IEC 19464:2014, Information technology -- Advanced Message Queuing Protocol (AMQP) • ISO/IEC 20922:2016, Information technology -- Message Queuing Telemetry Transport (MQTT) • ISO/IEC 21778:2017, Information technology - The JSON data interchange syntax • ISO/IEC 19845:2015, Information technology - Universal Business Language Version 2.1 (UBL v2.2) • ISO/IEC 30118-1:2018, Information technology - Open Connectivity Foundation (OCF) Specification - Part 1: Core specification
EFPF Actions	<ul style="list-style-type: none"> • AMQP, MQTT and JSON are essential standards for application integration and core context to the building blocks of the EFPF data spine and platform. The uptake, interoperability and/or alignment of these standards will be carried out in the tasks dealing with message exchange in EFPF e.g. (T3.2 - Data Spine) • Considering the cross-platform data model, EFPF platform sees UBL v2.2 a very possible candidate. In NIMBLE project the v2.1 version of the standard has been used; however, UBL always maintains backward compatibility when making minor standard revisions. In the scope of EFPF, the data model of NIMBLE will be upgraded to v2.2. On the other hand, UBL is a very active standard, which improves itself continually. Work has already begun on a future UBL 2.3 with a target publishing date of December 2019. The SDO will collect user requirements or usage scenarios to further develop/improve UBL data models. In the scope of EFPF standardisation activities, SRDC will submit additional user requirements and/or user usage scenarios to UBL community in order to contribute to UBL 2.3 • CNet will monitor the activities related to MQTT (ISO/IEC 20922:2016) due to its importance in the development of Data Spine (T3.2) and also CNet's IoT applications.

EFPF Focus Area	Information Management
Relevant Technical Committee	<ul style="list-style-type: none"> • ISO/IEC JTC 1/SC 7 – Software and systems engineering Object Management Group – Business Process Management Initiative
Relevant Standards	<ul style="list-style-type: none"> • ISO/IEC TS 33052:2016 Information technology - Process reference model (PRM) for information security management • BPMN 2.0 – Ratified by ISO 19510 – Business process modelling
EFPF Actions	<ul style="list-style-type: none"> • ICE has adopted BPMN 2.0 as the modelling notation for workflows. ICE will continue monitor the BPMN 2.0 standard with the aim to adapt their developments in alignment with the standard

EFPF Focus Area	Information Security
Relevant Technical Committee	ISO/IEC JTC 1/SC 7 – Software and systems engineering

Relevant Standards	<ul style="list-style-type: none"> ISO/IEC TS 33052:2016 Information technology - Process reference model (PRM) for information security management
EFPP Actions	<ul style="list-style-type: none"> ICE will investigate this standard and promote its adoption for the development of security reference models (in T6.2)

EFPP Focus Area	Information Security
Relevant Technical Committee	ISO/IEC JTC 1/SC 27 – IT security techniques
Relevant Standards	<ul style="list-style-type: none"> ISO/IEC 27000:2018, 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 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 27017:2015, Security Techniques -- Code of Practice for Information Security Controls Based on ISO/IEC 27002 for Cloud Services ISO/IEC 15408:2009, Common Criteria – Information technology – Security techniques – Evaluation criteria for IT security
EFPP Actions	<ul style="list-style-type: none"> SRFG will consider the above set of Information Security standards for the design of security controls (T6.2) in EFPP. SRFG would also be interested to contribute to any of cloud security standards, e.g. ISO/IEC 27017:2015.

EFPP Focus Area	Data Management
Relevant Technical Committee	ISO/IEC JTC 1/SC 32 – Data management and interchange
Relevant Standards	<ul style="list-style-type: none"> ISO/IEC 6523-1:1998, Information technology -- Structure for the identification of organisations and organisation parts -- Part 1: Identification of organisation identification schemes ISO/IEC 6523-2:1998, Information technology -- Structure for the identification of organisations and organisation parts -- Part 2: Registration of organisation identification schemes
EFPP Actions	<ul style="list-style-type: none"> EFPP partners (SRFG, CERTH, VLC, C2K) will investigate the above standard that provides information on how to identify organisations and organisational parts in data interchange. EFPP tasks on matchmaking (T4.5) and marketplace framework (T3.3) will analyse the use of this standard at company registration phase or when exchanging business messages

EFPP Focus Area	IoT Architecture
Relevant Technical Committee	IEEE – Institute of Electrical and Electronics Engineers
Relevant Standards	<ul style="list-style-type: none"> IEEE P2413, Standard for an Architectural Framework for the Internet of Things (IoT)

EFPP Actions	<ul style="list-style-type: none"> • ICE is interested in future developments of this standard with the view to align the platform/architecture developments in alignment with the standardised approaches • CNet will monitor and promote the uptake of this standard on IoT architecture in the development of Data Spine (T3.2). Monitoring this standard will also benefit CNet commercial activities in the area of IoT devices
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EFPP Focus Area	Cloud Computing
Relevant Technical Committee	ISO/IEC JTC 1/SC 38 – Cloud Computing and Distributed Platforms
Relevant Standards	<ul style="list-style-type: none"> • ISO/IEC 17788:2014, Information technology -- Cloud computing -- Overview and vocabulary
EFPP Actions	<ul style="list-style-type: none"> • The above standard provides a comprehensive vocabulary that is relevant to all types of organisations. There is little potential to further enhance this standard and therefore the activities in EFPP project will focus on the use of this standard terminologies across project documents and dissemination channels.

EFPP Focus Area	Risk Management
Relevant Technical Committee	ISO/TC 262 – Risk Management
Relevant Standards	<ul style="list-style-type: none"> • No specific standard identified
EFPP Actions	<ul style="list-style-type: none"> • Although a working group has been setup by the German Federal Office for Information Security (Bundesamt für Sicherheit in der Informationstechnik (BSI) to focus on the Risk Management topic but there is no current activity in this area. This represents an opportunity for EFPP (particularly the partners involved in the development of Risk Management Tool in T4.4) to support and collaborate with BSI towards the development of standards in this area. One area of interest for EFPP will be to facilitate the exchange of knowledge between BSI and NIST's Risk Management Framework. ASI will facilitate the investigation and collaborations in this area.

EFPF Focus Area	Application Development
Relevant Technical Committee	IPC-CFX (IPC 2-17 – Connected Factory Initiative Subcommittee)
Relevant Standards	<ul style="list-style-type: none"> Software tools for Connected Factory Exchange SDK Version 1.0.5
EFPF Actions	<ul style="list-style-type: none"> The identification of the above standard provides impetus to EFPF (T5.5) to align the relevant application development activities (through the SDK in T5.5) with the IPC-CFX standard. The associated open source “Software tools for Connected Factory Exchange SDK” (Version 1.0.5) will be relevant in this regard. Relevant EFPF partners (e.g. CMS) will also investigate joining the IPC-CFX movement in order to contribute towards the further enhancement/development of the standard e.g. making it relevant to the manufacturing applications to be developed in the EFPF project.

The task leader, ASI will monitor the tactical plans listed above and align or update them based on the monitoring of activities in WP3 to WP7 of the EFPF work program. The activity to monitor and update the tactical plans will be the basis of the Standardisation Strategy deliverable series D11.7/8/9 “Regulatory Alignment, Compliance and Standardisation Strategies” within the context of T11.3.

5 General Standardisation Guidelines

5.1 General

Standardisation is based on a consensus, which reflects the economic and social interests of companies in a sector channelled through their National Standardisation Organisations.

Most standards are initiated by industry. Other standardisation projects can come from consumers, Small and Medium-sized Enterprises (SMEs), researchers, associations or even European legislators.

Besides European Standardisation (CEN, CENELC, ETSI), the international standardisation bodies (ISO, IEC, ITU) are also developing the most accepted standards.

5.2 How Standards are Developed

There are some differences (e.g. guidelines, rules) how standards are developed in ESOs or the International standardisation organisation.

All standardisation bodies (national, European and international) have their well-defined rules for drafting standards related documents.

The following sections present the standardisation processes of CEN (CENELEC) and ISO (IEC) in a brief way. Based on the cooperation agreements (Vienna Agreement between CEN and ISO, Frankfurt Agreement between CENELEC and IEC) and common Internal Regulations, the standardisation processes of CEN, CENELEC, ISO, IEC are harmonised.

Note: Most of the national drafting rules are based on the CEN/CENELEC and ISO/IEC rules.

5.3 Regulations, Standards and Private Specifications

The following figure shows the hierarchy of the legal system in Europe with regards to standardisation activities. This figure highlights cooperation and collaborations as the baseline activities for any standardisation work. In order to organise masses, standards are used for the preparation of regulations, which then provide the basis for the laws. In this respect, the Figure 1 provides the general overview of the relationships between mutual agreements, standards, regulations and laws.

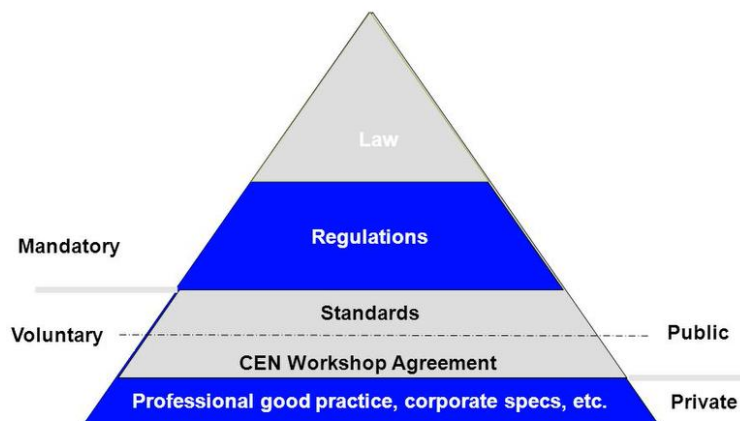


Figure 1: Hierarchy of the legal system. [Source: CEN/CENELEC Management Centre]

5.4 Standardisation Processes

5.4.1 Standardisation Process in Europe – CEN/CENELEC/ETSI

5.4.1.1 General Background

In Europe, standards are developed and agreed by the three officially recognised European Standardisation Organisations: the European Committee for Standardisation (CEN), the European Committee for Electrotechnical Standardisation (CENELEC) and the European Telecommunications Standards Institute (ETSI).

By setting common standards that are applied across the whole of the European single market, CEN and CENELEC ensure the protection of consumers, facilitate cross-border trade, ensure the interoperability of products, encourage innovation and technological development, include environmental protection and enable businesses to grow. Products and services that meet these European Standards (ENs) can be offered and sold in all participating countries. CEN and CENELEC bring together the national standards agencies of 34 countries.

It is important to note that CEN and CENELEC do not distribute or sell standards; they may be purchased from their members in different countries.

The national members of CEN and CENELEC (National Standardisation Bodies) are obliged to implement EN as national standards and to withdraw any conflicting national standards.

5.4.1.2 Basic Reference Documents

The reference document [CEN/CENELEC Internal Regulations](#)⁶ provides the organisational structure, common rules and structure guidelines for drafting CEN and CENELEC standard documents. The various parts of this reference document include:

- Part 1: Organisation and Structure, 2018
- Part 2: Common Rules for Standards Work, 2018
- Part 3: Principles and rules for the structure and drafting of CEN and CENELEC documents (ISO/IEC Directives Part 2:2016, modified), 2017
- Part 4: Certification, 2018 (English, French, German version not available yet)

5.4.1.3 Useful Reference Deliverables

The following deliverables published by CEN/CENELEC provide further insight and guidelines about the standardisation activities in Europe:

- European Standards (EN), for further information: <https://boss.cen.eu/developingdeliverables/EN/Pages/default.aspx>
- Technical Specifications (CEN/TS), for further information: <https://boss.cen.eu/developingdeliverables/TS/Pages/default.aspx>
- Technical Reports (TR), for further information: <https://boss.cen.eu/developingdeliverables/TR/Pages/default.aspx>, and
- CEN Workshop Agreements (CWAs), for further information: <https://boss.cen.eu/developingdeliverables/CWA/Pages/default.aspx>.

⁶ <https://boss.cen.eu/reference%20material/RefDocs/Pages/default.aspx>

5.4.1.4 Standard Drafting Process

The following figure shows the drafting procedure for a European standard.

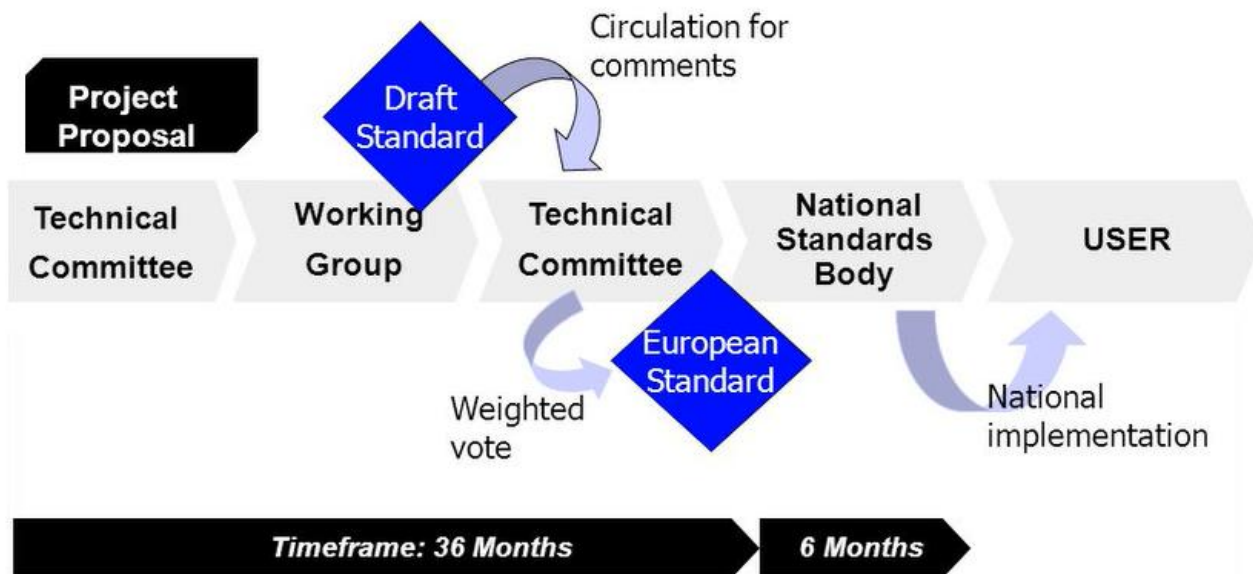


Figure 2: Standardisation process for a European standard
[Source: CEN/CENELEC Management Centre]

5.5 Standardisation Process at International Level – ISO/IEC

5.5.1 General Background

ISO (International Organisation for Standardisation), IEC (International Electrotechnical Commission) and ITU (International Telecommunication Union) are three global organisations that develop International Standards for the World.

When appropriate, ISO, IEC or ITU cooperate to ensure that International Standards fit together seamlessly and complement each other. Joint committees ensure that International Standards combine all relevant knowledge of experts working in related areas.

They create documents that provide requirements, specifications, guidelines or characteristics that can be used consistently to ensure that materials, products, processes and services are fit for their purpose as well as electrical, electronic and related technologies.

ISO and IEC cooperate with CEN and CENELEC in the framework of Vienna (ISO-CEN) and Frankfurt Agreement (IEC-CENELEC). The main objective of these Agreements is to develop together one single standard which becomes an International as well as European Standard.

5.5.2 Basic Reference documents

The [ISO/IEC Directives](#) are published in two parts:

- Part 1: Procedures for the technical work
- Part 2: Principles and rules for the structure and drafting of ISO and IEC documents

Note: ISO, IEC and ISO/IEC Joint Technical Committee (JTC) 1 have published independent supplements to Part 1, which include procedures that are not common.

5.5.3 Standard Drafting Process

The following figure shows the drafting procedure for an International standard.

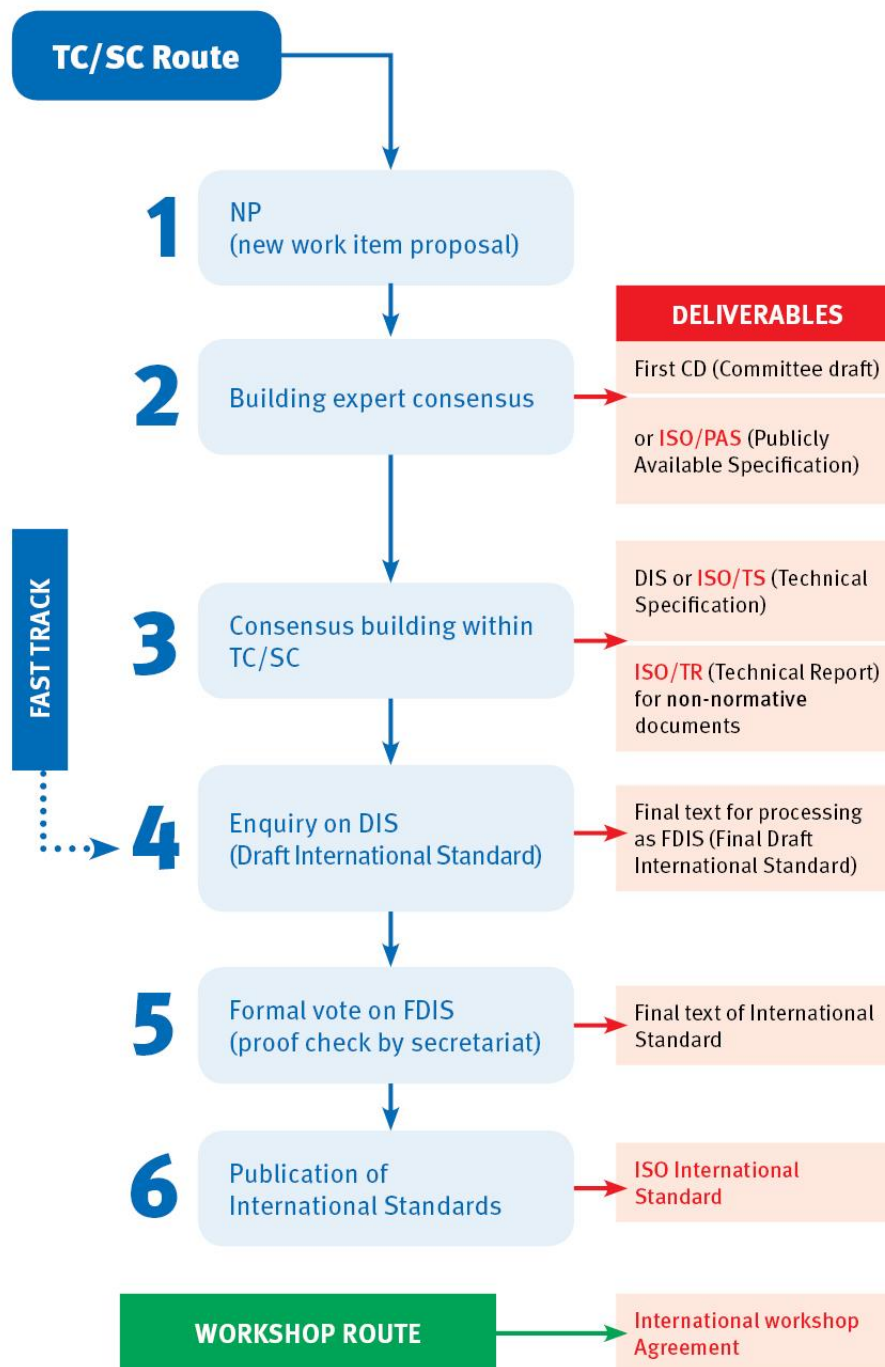


Figure 3: Standardisation process for an International standard
 [Source: www.iso.org]

6 Summary

Standardisation is one of the most powerful tools of the technological and economic infrastructure of a nation as well as of a region and greatly influences its competitive ability and the strategies of companies. Standardisation is of special importance in supporting the digital transformation of industry.

Therefore, it is important for all project partners to recognise the benefits of standardisation and to address findings that could improve the European and global framework of standards.

This deliverable within Task 11.3 provides an overview of existing standards and the ongoing standardisation work in a wide area of relevance to the EFPP project. It also defines and establishes the interface and cooperation processes with relevant standardisation bodies at an early stage. The standardisation plan described in this document provides a number of helpful foundations and clear directions for all partners in the EFPP project. It is also intended to initiate and structure cooperation with standardisation bodies.

There may be many questions that have not yet been answered and addressed. Like the EFPP project itself, standardisation is a dynamic and evolving environment that has to be observed closely and actively throughout all phases in order to achieve an optimal contribution to standardisation and alignment between the project and standards. The subsequent work in T11.3 and the deliverable series D11.7/8/9 will build on this deliverable to monitor and update the planned activities, leading to a visible impact of the EFPP project in the wider area of standardisation.

Annex A: History

Document History	
Versions	<p>V1.0:</p> <ul style="list-style-type: none"> • Consortium approved and quality checked deliverable <p>V0.3:</p> <ul style="list-style-type: none"> • ASI final draft deliverable sent to partners for internal review <p>V0.2:</p> <ul style="list-style-type: none"> • Response from partners incorporated <p>V0.1:</p> <ul style="list-style-type: none"> • ASI draft deliverable circulated for partners input
Contributions	<p>ASI:</p> <ul style="list-style-type: none"> • Karl Grün • Erwin Haubert • Martin Lorenz <p>ICE:</p> <ul style="list-style-type: none"> • Usman Wajid • Cesar Marin <p>ASC:</p> <ul style="list-style-type: none"> • Norman Wessel <p>C2K</p> <ul style="list-style-type: none"> • Simon Osborne <p>FIT</p> <ul style="list-style-type: none"> • Alexander Schneider <p>NXW</p> <ul style="list-style-type: none"> • Matteo Pardi <p>SRFG</p> <ul style="list-style-type: none"> • Violeta Damjanovic-Behrendt <p>SRDC:</p> <ul style="list-style-type: none"> • Yildiray Kabak <p>FOR:</p> <ul style="list-style-type: none"> • Georg Neugschwandtner <p>CNet:</p> <ul style="list-style-type: none"> • Mathias Axling <p>HAW:</p> <ul style="list-style-type: none"> • Ingo Martens <p>A-D:</p> <ul style="list-style-type: none"> • Berend Koch <p>IAI:</p> <ul style="list-style-type: none"> • Lars Henschel <p>CERTH:</p> <ul style="list-style-type: none"> • Alexandros Nizamis

Annex B: First Results of the Partner Survey

A data gathering exercise was organised by Task11.3 lead (ASI) to raise partner awareness about EFPF relevant standards and also to collect partner input on EFPF related standards. The outcomes of that data gathering exercise is used to prepare the standardisation plan in Section 4.4. The data collected from EFPF partners is organised in the following table:

Technical committee	Standards Reference
CEN/ASD – Aerospace	<ul style="list-style-type: none"> No specific standard referenced
ISO/TC 184/SC 4 – Industrial data	<ul style="list-style-type: none"> ISO 10303-236:2006, Industrial automation systems and integration - Product data representation and exchange - Part 236: Application protocol: Furniture catalogue and interior design - and Application modules ISO 20534:2018, Industrial automation systems and integration -- Formal semantic models for the configuration of global production networks ISO/AWI 23247, Digital Twin manufacturing framework
ISO/TC 184/SC 5 – Interoperability, integration, and architectures for enterprise systems and automation applications	<ul style="list-style-type: none"> ISO/CD 22549-1, Assessment on convergence of informatisation and industrialisation for industrial enterprises -- Part 1: Principles and framework
IEC/TC 65/SC 65E - Devices and integration in enterprise systems	<ul style="list-style-type: none"> IEC 62264-1:2013, Enterprise-control system integration -- Part 1: Models and terminology IEC 62264-2:2015, Enterprise-control system integration -- Part 2: Objects and attributes for enterprise-control system integration IEC 62264-3:2016, Enterprise-control system integration -- Part 3: Activity models of manufacturing operations management IEC 62264-4:2016, Enterprise-control system integration -- Part 4: Objects and attributes for manufacturing operations management integration IEC 62264-5:2016, Enterprise-control system integration -- Part 5: Business to manufacturing transactions 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 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 PAS 63088:2017, Smart manufacturing - Reference architecture model industry 4.0 (RAMI4.0)

<p>ISO/IEC JTC 1 – Information Technology</p>	<ul style="list-style-type: none"> • ISO/IEC 19464:2014, Information technology -- Advanced Message Queuing Protocol (AMQP) • ISO/IEC 20922:2016, Information technology -- Message Queuing Telemetry Transport (MQTT) • ISO/IEC 21778:2017, Information technology - The JSON data interchange syntax • ISO/IEC 19845:2015, Information technology - Universal Business Language Version 2.1 (UBL v2.1) • ISO/IEC 30118-1:2018, Information technology - Open Connectivity Foundation (OCF) Specification - Part 1: Core specification
<p>ISO/IEC JTC 1/SC 7 – Software and systems engineering</p>	<ul style="list-style-type: none"> • ISO/IEC TS 33052:2016 Information technology - Process reference model (PRM) for information security management
<p>ISO/IEC JTC 1/SC 27 – IT security techniques</p>	<ul style="list-style-type: none"> • ISO/IEC 27000:2018, 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 27009:2016, Information technology -- Security techniques -- Sector-specific application of ISO/IEC 27001 -- Requirements
<p>ISO/IEC JTC 1/SC 32 – Data management and interchange</p>	<ul style="list-style-type: none"> • ISO/IEC 6523-1:1998, Information technology -- Structure for the identification of organisations and organisation parts -- Part 1: Identification of organisation identification schemes • ISO/IEC 6523-2:1998, Information technology -- Structure for the identification of organisations and organisation parts -- Part 2: Registration of organisation identification schemes
<p>ISO/IEC JTC 1/SC 38 – Cloud Computing and Distributed Platforms</p>	<ul style="list-style-type: none"> • ISO/IEC 17788:2014, Information technology -- Cloud computing -- Overview and vocabulary
<p>IEEE – Institute of Electrical and Electronics Engineers</p>	<ul style="list-style-type: none"> • IEEE P2413, Standard for an Architectural Framework for the Internet of Things (IoT)
<p>ATA – Air Transport Association of America</p>	<ul style="list-style-type: none"> • Spec 2000, E-Business Specification for Materials Management
<p>ISO/TC 3 – Limits and Fits</p>	<ul style="list-style-type: none"> • No specific standard referenced
<p>ISO/TC 262 – Risk Management</p>	<ul style="list-style-type: none"> • No specific standard referenced
<p>IPC-CFX</p>	<ul style="list-style-type: none"> • Software tools for Connected Factory Exchange SDK Version 1.0.5



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