

Joint MSP/DEI Working Group on standardisation in support of Digitising
European Industry (MSP/DEI WG)

Final Report of the Joint MSP/DEI WG

November 2018

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1. Introduction

This Final Report constitutes the deliverable 2 from the Terms of Reference of the Joint MSP/DEI Working Group on standardisation in support of Digitising European Industry (MSP/DEI WG):

- 2) A final report with proposed concrete actions at EU level and implementation means, including existing tools, and providing an estimation of the budget and resources needs, to be presented to the MSP and to the High-Level Governance Meeting of the European Platform of National Initiatives on Digitising Industry by **November 2018**.

This Final Report has been prepared by the MSP/DEI WG Rapporteur, Mr. Marco Carugi, whose mandate is to assist the relevant services of the Commission in the preparation of various working documents and reports pertaining to the activities of the MSP/DEI WG.

NOTE – An Interim Report, constituting the deliverable 1 from the Terms of Reference of the MSP/DEI WG and presenting the intermediate results of the WG, has been published in June 2018.

This Final Report is organized as follows.

At first (clause 2), it provides background information and key objectives of the MSP/DEI WG according to its Terms of Reference.

In the following three clauses (clauses 3, 4 and 5), it introduces the final results of the activities conducted by the three active teams of the MSP/DEI WG, in charge of working on, respectively, Tasks 1 & 2, Task 3 and Task 4 of the WG's Terms of Reference.

Finally (clause 6), it provides conclusions and the WG Recommendations to the MSP (Multi-Stakeholder Platform on ICT Standardisation) and to the HLGGM (High-Level Governance Meeting) of the European Platform of National Initiatives on Digitising Industry.

2. The Joint MSP/DEI Working Group on standardisation in support of Digitising European Industry (MSP/DEI WG)

2.1 Setup of the MSP/DEI WG

As outlined in the Terms of Reference of the Joint MSP/DEI Working Group on Standardisation in support of Digitising European Industry, industry is one of the pillars of the European economy - the manufacturing sector in the European Union accounts for 2 million enterprises, 33 million jobs and 60% of productivity growth. We stand on the brink of a new industrial revolution, driven by new-generation information technologies such as the Internet of Things (IoT), Cloud Computing, Big Data and Data Analytics, Artificial Intelligence, Robotics and 3D Printing.

While many parts of the economy have been quick to take up digital technologies and processes, European industry across sectors and regardless of a company's size must fully use digital opportunities if it is to be globally competitive. Traditional sectors (like construction, agri-food, textiles or steel) and SMEs are particularly lagging behind in their digital transformation. Recent studies estimate that digitisation of products and services will add more than €110 billion of revenue for industry per year in Europe in the next five years.

Several EU Member States have already launched strategies to support the digitisation of industry. But a comprehensive approach at European level is needed to avoid fragmented markets and to reap the benefits of digital evolutions such as the internet of things.

After the announcement in April 2016 of a set of measures in support of the digitisation of the European industry (DEI) [1], the European Commission held a workshop on the 17/10/2017 with a view to identify common high-level standardisation issues to be tackled by European or national initiatives and the kind of support, mediation or coordination that would be needed at EU level. The workshop [2] highlighted the need to gather the key ICT standardisation actors in order to tackle the fragmentation of the various initiatives and address in more detail how the identified issues and recommendations can be taken forward. A following working-level workshop on Public Private Partnerships (PPPs) and Platforms, held on the 21/11/2017 in the framework of the High-level governance meeting of the European platform of national initiatives on digitising industry [3], endorsed the Commission to act as a facilitator for synchronisation and acceleration of standardisation efforts based on an existing infrastructure. Similar endorsement was received by the MSP on the 7/12/2017.

To follow on this endorsement and avoid a proliferation of working groups with overlapping mandates, a Joint MSP/DEI Working Group was setup, bringing together nominated representatives of the MSP members, complemented by nominated representatives of the DEI high-level governance group, including national ministries and initiatives on digitising industry, PPPs, and relevant European associations. The Working Group acts as joint *ad hoc* reflection group, and reports to both the DEI high-level governance group and the MSP.

At the MSP/DEI WG kick-off meeting on the 14/3/2018, the Terms of Reference (ToR) of the Working Group (its finalization process having included MSP & HLGGM consultation and resolution of comments) were adopted. The Working Group shall provide a comprehensive plan to foster standardisation in support of digitising European industry by means of

synchronizing European standardisation organisations (ESOs), global SDOs, H2020 platform-building and piloting activities and other relevant initiatives, such as the DE/IT/FR trilateral cooperation in this field.

2.2 Terms of Reference of the MSP/DEI WG

The ToR include four tasks, namely:

- 1) Identify, as a starting point, the standardisation needs in the manufacturing sector, which might serve as a blueprint for other domains in the future.
- 2) Map the ongoing activities carried out by ESOs, SDOs, fora & consortia, LSPs, PPPs, DE/IT/FR trilateral cooperation, other research projects, etc. that are relevant to the digitisation of European industry.
- 3) Develop a model for the synchronisation of the various standardisation activities, at the Member State level and at the European level – and in a global context.
- 4) Propose a first roadmap taking into account existing work, such as national standardisation roadmaps and other related work, and specifying concrete actions that may be included in the Rolling Plan for ICT standardisation.

NOTE – It has to be noted that the various documents produced by the WG are not expected to dive into technical details but rather to provide a high-level perspective on the topics that they are addressing.

It is recommended that the outcome of the MSP/DEI WG helps to achieve, *inter alia*, the following results:

- Reinforcing R&I projects' contributions to standardisation - especially platform development and piloting projects, steered by industrial groups.
- Linking standardisation activities to testbeds and Digital Innovation Hubs (DIHs), which play a role in supporting SMEs in gaining experiences with emerging standards.
- Reflecting on shared standards and common rules governing the platforms development at European level, e.g. the Reference Architectural Model Industrie 4.0 (RAMI 4.0), the Industrial Data Space (IDS) or emerging standards for semantic interoperability.
- Defining a short list of DEI standardisation issues which need to be urgently addressed at the EU level.

In terms of deliverables, the MSP/DEI WG is expected to:

- 1) Provide an interim report (the present document) with a first set of recommendations to be presented to the MSP and to the High-Level Governance Meeting of the European Platform of National Initiatives on Digitising Industry by **mid-June 2018**.
- 2) Issue a final report with proposed concrete actions at EU level and implementation means, including existing tools, and providing an estimation of the budget and resources needs, to be presented to the MSP and to the High-Level Governance Meeting of the European Platform of National Initiatives on Digitising Industry by **November 2018**.

2.3 Membership and working method of the MSP/DEI WG

The MSP/DEI WG is co-chaired by Commission officials of DG GROW and DG CNECT.

The composition of the MSP/DEI WG has been set out to include nominated representatives of the MSP members complemented by nominated representatives of the DEI high-level governance group, including national ministries and initiatives on digitising industry (e.g. national standardisation initiatives, the DE/IT/FR trilateral cooperation), PPPs, and relevant European associations (e.g. AIOTI and Connected Factories) in one single group.

The Working Group mainly works by electronic means and web/audio conferences are held according to the calendar established by the respective Task leaders.

A collaborative platform is used for document sharing and exchanges among members:

- the WG wiki;
- the WG e-mail reflector.

Two open workshops have been organized by the MSP/DEI WG, respectively, on:

- the 13/06/2018, in order to present the results of Tasks 1 & 2, and the preliminary results of Task 3, and with the goal to validate the intermediary outcome of the three tasks;
- the 15/11/2018, in order to present the final results of all four Tasks, and with the goal to validate the final outcome of the WG activities.

A final meeting of the MSP/DEI WG has taken place (electronically) on the 22/11/2018, in order to have a final review of the outcome of the work carried out according to the ToR of the WG, and to get the members' views before the finalization and publication of the Final Report.

3. Final results of the activities related to Tasks 1 & 2 of the MSP/DEI WG's Terms of Reference

3.1 The working context of the activities related to Tasks 1 & 2

The Tasks 1 & 2 of the MSP/DEI WG's Terms of Reference are:

- 1) Identify, as a starting point, the standardisation needs in the manufacturing sector, which might serve as a blueprint for other domains in the future.
- 2) Map the ongoing activities carried out by ESOs, SDOs, fora & consortia, LSPs, PPPs, DE/IT/FR trilateral cooperation, other research projects, etc. that are relevant to the digitisation of European industry.

Dr. Jochen Friedrich (OFE representative) was appointed as leader for Tasks 1 & 2. Under his leadership, the responsible team has conducted sixteen electronic meetings in order to progress the assigned work.

Exchanges related to the work in progress have also taken place on the WG e-mail reflector, including regular updates of the Tasks 1 & 2 related deliverable by Dr. Friedrich. Minutes of the different electronic meetings have been also completed by the Task leader and reviewed accordingly by the Task participants in the subsequent e-meetings.

The execution of these tasks has required the collection and consolidation of existing documentation and, upon an initial template provided by Dr. Friedrich to structure the inputs by the WG members, the content has been regularly updated based on contributions from members.

3.2 Results of the activities related to Tasks 1 & 2

The main result of the WG activities related to the Tasks 1 & 2 has been the development of the **“Needs for Standardisation in the Context of Digital Manufacturing and Mapping of Ongoing Standardisation Activities”** document, which is published separately (an intermediate version documenting the progress of the work until the end of the first phase (June 2018) was also published separately).

In summary, the document:

- examines the needs of the manufacturing industry and circular economy for standards in order to enable the digitisation of industry;
- provides a mapping of available and/or ongoing standardisation activities that respond to the needs of the manufacturing industry and provides the respective standards;
- gives a first outline of possible further needs for new standardisation activities in order to close standardisation gaps and/or in order to accelerate the process of digitisation of industry.

The Tasks 1 & 2 team has followed a phased approach. Initially, the team has collected input on needs and standards from all available sources, keeping at the same time the right balance of overview content versus detailed content. Then, building on the intermediate version published at the end of the first phase of work, as well as considering the inputs gathered at the first open workshop and progressing the points identified for further discussion and/or study, the content has been consolidated and assessed extracting what is relevant from a

policy perspective. Finally, while maintaining and updating the list with needs, the Recommendations for the Final Report have been formulated in terms of proposed concrete actions to be included in the 2019 EU Rolling Plan on ICT standardisation as well as other more detailed possible actions for further work.

3.2.1 Details on results of the activities related to Task 1

The Task 1 work has outlined the different **standardisation needs for the digitisation of industry**, articulated according to the needs of the manufacturing sector regarding digitisation that can be met with standards and standardisation, and the needs for possible new standardisation activities to close standardisation gaps.

Concerning standards in the context of regulatory requirements, the New Legislative Framework (NLF) and the product related Union harmonisation legislation provide all the elements required for a comprehensive regulatory framework to operate effectively for the safety and compliance of industrial products with the requirements adopted to protect the various public interests and for the proper functioning of the single market. The requirements as laid down in this Union harmonisation legislation apply in the context of industry and hence equally in the context of digitising industry.

All companies involved in manufacturing must have their manufacturing machine processes in compliance with the Machinery Directive 2006/42/EC. Harmonised Standards provide the details that assist and enable companies to conform to and be certified to the Machinery Directive.

Within the NLF there are other legal requirements stemming from legal acts outside of the NLF, and, in the context of DEI, these are, for instance, the more recent legal acts in the area of privacy and security.

The topic of new standardisation activities in response to regulatory requirements will continue to be an ongoing activity in the context of digitising European industry.

Standards ensuring and facilitating interoperability are key for digitising industry. They enable the integration of technologies, adding digital functionality to physical layers, and collecting, transmitting and analysing data for the optimisation, automation and integration of processes. They support integration platforms for interconnecting different layers and levels. And the related deliverables can also provide use cases, reference architectures and other guidance and overview documentation promoting the uptake of new technologies and the transformation towards a digitised industry.

Digitising industry implies the integration of processes and value chains both within one organisation and across organisational boundaries (the second case typically referring to supply chains as well as delivery and post-production processes). **These integration aspects also imply various needs for using standards and technical specifications.**

The identification of gaps on standardisation takes place in many organisations and at various levels. It is important - at the European level - to take note of all of these activities and **not repeat work that is already done elsewhere, but consolidate on actions that have impact on the implementation of policy objectives in the area of industry digitisation** and derive from there a set of recommended actions to be included into the EU Rolling Plan on ICT Standardisation.

Inputs for possible recommendations on future work have been collected, with a focus on standardization gaps, and **different perspectives related to gaps have been considered**,

including the ones building on the IoT-specific standardization gaps analysis developed within AIOTI (based on outcome of ETSI STF 505) as well as on major gaps perceived by the H2020 IoT Large Scale Pilots (H2020 CREATE-IoT CSA). The document has also collected recommendations from the German Roadmap Industry 4.0 as input for further possible actions. Details on the work done are provided in clause 3.3 of this report in terms of recommended actions.

3.2.2 Details on results of the activities related to Task 2

On an international level, the range of actors currently involved in standardization relevant to the manufacturing sector presents a very heterogeneous picture. Alongside the well-known, internationally recognized standards organizations, there is also a multitude of forums and consortia that draw up technical specifications or recommendations (de facto standards) and are designated as standards developing organizations. This makes a holistic survey of standardization more complex, however the multitude of consortia and forums needs to be included and their work needs to be taken into account in a systematic way. In summary, **it is necessary that all of the identified consortia, platforms and initiatives be systematically collated and evaluated in advance.**

The Task 2 work has provided an **overview of the standardisation landscape and standardization deliverables in the context of the digitisation of industry.**

The **standardization ecosystem** is illustrated, including Standards Bodies, Public Private Partnerships (PPPs), Joint Undertakings (JUs), R&D projects and other projects that contribute to pre-standardization and standardisation for the digitisation of industry. The various instruments available at the European level to progress collaborative projects are highlighted. It has to be noted that the Working Group set up by the European Commission on “Future Partnerships in the area of DEI” has identified ten PPPs and two JUs relevant for DEI, as well as identified the AIOTI (Alliance for Internet Of Things Innovation) as an instrumental entity in bringing together the required resources and coordination to develop new technologies.

Concerning the standardization ecosystem, a distinction is made between:

- **Standards Bodies formally recognised** under WTO, EU Regulation 1025/2012, national government contracts or rules. They include: IEC, ISO, ITU, the European standardisation organisations (ESOs) CENELEC, CEN and ETSI, the standardisation bodies on the national level. Also, 3GPP and oneM2M can be associated with this group as both are linked to ETSI and UN/CEFACT.
- **Standards Bodies not formally recognised** (providing technical specifications, usually in a dedicated area of expertise, for global use). Those explicitly identified in the context of DEI are **(but are not limited to)**: W3C, OASIS, OMG, IETF, IEEE, OPC Foundation, GS1, ECMA.

A landscaping of the ongoing standardisation activities on international, European and national level is addressed: on one hand, providing an overview of the relevant technical committees and working groups in standards bodies (see above), as well as in PPPs, JUs and other initiatives (at this stage, AIOTI, ECSEL and EuroHPC); on the other hand, illustrating

to which standardisation needs of the manufacturing sector these activities provide contributions.

A landscaping of different categories of standardisation deliverables, available or under development, has been developed.

Some differentiations regarding the standardization deliverables are also highlighted.

A basic differentiation is made between standards meeting regulatory requirements (other than interoperability) and standards and technical specifications enabling interoperability (and thus the integration of technologies at different levels), these last ones being the key for digitising industry.

A further differentiation deals with horizontal standards and technical specifications, important for and implemented in many different contexts across sectors and not specific to digitising industry, versus vertical or sector specific standards and technical specifications, relevant just or in particular in the context of digitising industry (they range from specific standards addressing specific technology features to more high-level deliverables like reference architectures and use cases).

A third differentiation is made between normative standards and technical specifications, serving as base to claim compliance, and other informative publications of a standardization body, which may serve many different purposes.

A significant amount of detailed information about some of the identified standardisation activities has been collected and this detailed information exercise will be completed over the next period.

Generally, it has to be noted that **many standards and technical specifications are already available**, creating the basis for digitising processes and devices and for interconnecting processes and process layers. Due to the key role played by the IoT technologies in the digitization of industry, **concerning the positioning of Internet of Things versus DEI**, it is of particular relevance to recognize that identical or similar requirements exist at the basic levels, and therefore an identical or similar set of standards can be used in both domains in terms of basic technologies. On the other hand, while the two domains of application differ in terms of requirements at the platform/service levels, it is expected the related architectures be compatible at the greatest extent possible.

From a general perspective, it is also important to mention that various existing standardization initiatives (international, European and national levels) are developing and maintaining standards roadmaps in different technological domains (e.g. IoT, Big Data, 5G, Industry 4.0).

The Tasks 1 & 2 team has identified **available standards and technical specifications in some critical technical areas.**

A critical technical area concerns the platform/service layer, which constitutes the middle layer level key for integration, creating the linkage between different organisational levels, in particular connecting the shop floor to the office floor, and interconnecting processes. The report has addressed the **two main platforms/service layer approaches available in the context of digitising industry: OPC Unified Architecture (OPC/UA) and oneM2M.**

Reference Architectures, Architecture Models and Frameworks constitute **another critical technical area**, extensively addressed and with a number of available standards. **ISO/TC 184 created a classification model for industrial standards**, establishing a framework based on criteria of analysis called facets, and hundreds of standards have been developed according to this model.

Reference Architecture Model Industry 4.0 (RAMI 4.0), originating from the German Platform Industry 4.0, defines a three-dimensional model of the different layers and dimensions to be considered in the context of digitising industry (a methodology that makes use of RAMI 4.0 can describe all assets of an Industrie 4.0).

The trilateral activities between France (Alliance Industrie du Future), Germany (Plattform Industrie 4.0) and Italy (Piano Industria 4.0) have progressed the harmonization of their different concepts (edition 2 of "Structure of the Administration Shell" published in April 2018).

The Industrial Internet Reference Architecture (IIRA) developed by the Industrial Internet Consortium is a standards-based architectural template and methodology, aiming to assist Industrial Internet of Things (IIoT) system architects in designing solution architectures consistently and deploying interoperable IIoT systems.

Other relevant initiatives in the architecture area concern the Internet of Things Reference Architecture (**IoT RA**) in progress within ISO/IEC JTC1/SC41, the **IoT Architecture Framework** in progress within IEEE P2413, the **IoT High Level Architecture (HLA)** developed by AIOTI (this last study has also investigated the HLA mapping to RAMI4.0 and IIC). All of these initiatives follow - more or less extensively - the recommendations for architecture descriptions defined in ISO/IEC/IEEE 42010:2011.

Given the current high interest and investment in this technical area in terms of technology research, experimentations and business use cases, and, also, given the huge potential of application to digitizing industry, the report gives particular attention to the initiatives concerning **Blockchain and other Distributed Ledger Technologies (DLT)**. It identifies some relevant Blockchain open source technology developments (the "Top 5 Blockchain Platforms for Enterprises") and provides details concerning several Blockchain-related standardization projects, including projects in ISO and ISO/IEC JTC1, ITU-T, CEN, CENELEC, ETSI, IEEE, as well as the Accord project.

The Tasks 1 & 2 report provides a high-level overview of the key characteristics of these technologies, but also highlights some current significant issues - scalability and privacy being key aspects which require improvements - and recognizes that these technologies are still in early development phases, not completely prepared to support many of the world's real processes in today's economy. New technology approaches, uses cases and business models are actually coming up regularly.

Other identified critical technical areas concern **basic horizontal building blocks, security and privacy** and **matters specific to digitizing industry**, the latter ones including (but not limited to) robotics, 3D printing, cognitive methods and Artificial Intelligence, web technologies, semantics, ontologies.

Further work is required to consolidate the identification of the digitizing industry specific standards.

Particular attention has also been given to the identification of relevant **open source**

developments and – in case they are in place – of **related or flanking standardisation activities**. Open source is in fact gaining in significance in association with standardization. In a way similar to standards and specifications, open source takes the form of open technologies that are developed in collaborative processes and that are provided for use by all market players.

In many fields, open source developments are accompanied by standardisation activities flanking the open source developments or taking up technologies from open source into standardisation. In the other direction, open source is also a way for promulgating standards and promoting the implementation of standards.

EclipseIoT, OpenAAS and OPC-UA Open Source have been identified as open source platforms and projects relevant to digitising industry (and IoT).

3.3 Recommendations from the activities related to Tasks 1 & 2

The following nine high-level or summarized actions have been provided to be included into the EU Rolling Plan on ICT Standardisation for 2019. These actions will therefore be provided as proposals for activities to the ICT standardisation community and actual work will be reviewed and recorded in the context of the work of the MSP.

Action 1: Common communications standards and a 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 must be included, like standards which 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. Analysis is required as to how to provide industries with a solution enabling wireless communications without interfering with other wireless networks. In particular, a check should be run on M2M standards against requirements like real-time capability and close to hardware runtime codes.

Action 2: As part of the new skills agenda for Europe, ESOs could check whether the e-skills standards sufficiently account for the manufacturing skills of KETs, including future manufacturers, M2M, rapid prototyping and others.

Action 3: Conduct a study to identify and analyse opportunities for revisions of existing standards (communications, M2M) or new standards with a particular view on new production technologies, manufacturing processes including lifecycle operations (circular economy), functional safety issues and skills-deficit reduction.

Action 4: Improve interoperability and reduce overlap, redundancy and fragmentation. Often there are several standardisation activities ongoing in the same area in parallel. Standardisation activities should be encouraged for making standards to work together and integrating existing protocols. Moreover, standards bodies should aim for a coordinated approach regarding different reference architectures and measures should be taken to reduce overlap, redundancy and fragmentation.

Action 5: Interoperable and integrated security - SDOs should work 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). Standards should take into account risk management approaches as well as European regulation and regulatory requirements.

Action 6: Create a hierarchical catalogue of technical and social measures for assuring privacy protection and task all SDOs 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. That means, in addition to technical measures to ensure the security of the data, additional technical and social measures are needed to protect the privacy of personal data. Such social or non-technical measures will include, e.g. Codes of Conduct, Charters and Certifications, best practice guidelines, collection of evidence of privacy protection assurance, etc.

Action 7: Standards should be developed to define the main characteristics for all levels of the interaction from mechanical to electrical to protocol to semantic levels between robot and tool to ensure the exchangeability and to enable the design of generic tooling (plug-and-play). There are 2 main types of End Effector: "Off-the-Shelf" and "Bespoke". It is desirable that off-the-shelf end effectors operate on a single software protocol. There is a need for Industry 4.0 to standardise this. It would then become Plug-&-Play. For "Bespoke" end effectors (most commonly purchased) the system integrator specifies the software protocol for the Robot and End Effector.

Action 8: Start the discussion about the possible development of harmonised standards in the area of additive manufacturing. Currently, there are no harmonised standards under the Machinery Directive for Additive Manufacturing (AM) equipment. The availability of these standards could facilitate the manufacturer conformity assessment process. The European Commission should discuss together with SDOs and AM equipment manufacturers the possible need for harmonised standards in this area.

Action 9: Develop standards for ensuring long-term traceability of material to enable re-use and recycling.

Additionally, a set of possible and proposed actions in the context of digitising industry derived from European and national initiatives has been collected **with mapping against the technology areas** identified in the Tasks 1 & 2 deliverable [see the Tasks 1 & 2 deliverable for details about the actions]. These actions are the basis for the above actions provided for inclusion into the EU Rolling Plan for ICT standardisation 2019, and also **constitute input for further and ongoing work in 2019**. They may be used as a reference for stakeholders and standards bodies for considering new work on standardisation.

4. Final results of the activities related to Task 3 of the MSP/DEI WG's Terms of Reference

4.1 The working context of the activities related to Task 3

The Task 3 of the MSP/DEI WG's Terms of Reference is:

- 3) Develop a model for the synchronisation of the various standardisation activities, at the Member State level and at the European level - and in a global context.

In order to identify common high-level standardisation issues to be tackled by European or national initiatives and define the kind of support, mediation or coordination that would be needed at EU level, the MSP/DEI WG has been mandated to provide a comprehensive plan to foster standardisation in support of digitising European industry by means of synchronizing European standardisation organisations (ESOs), global SDOs, H2020 platform-building and piloting activities and other relevant initiatives, such as the DE/IT/FR trilateral cooperation in this field.

The benefits of stronger interaction and resource synchronization among the various players have been already recognized (the DE/IT/FR trilateral cooperation trilateral being an example) and the Task 3 of MSP/DEI WG's Terms of Reference is then essential to foster standardization in support of digitising European industry.

Dr. Stefan Weisgerber (CEN representative) was appointed as leader for Task 3.

Under his leadership, the responsible team has conducted nineteen electronic meetings in order to progress the assigned work.

Exchanges related to the work in progress have also taken place on the WG e-mail reflector and minutes of the different electronic meetings have been also completed by the Task leader and reviewed accordingly by the Task participants in the subsequent e-meetings.

4.2 Results of the activities related to Task 3

The Task 3 team has used a staged approach.

In order to have a clear common ground of understanding, the first phase of the Task 3 work (until June 2018) has consisted in the **development of a mind map** (this mind map was published separately).

The mind map exercise has aimed to:

- identify the targets to be addressed by implementing the model;
- generate a clear view of the stakeholders of the synchronisation model;
- identify the requirements to be met by such a model;
- develop the aspects to be considered in the definition of such a model.

Using the mind map work as basis, as well as considering the inputs gathered at the first open workshop and progressing the points for further discussion and/or study, the Task 3 team has then started in the second phase to work out the target model for synchronization.

The main final result of the WG activities related to Task 3 has been the completion of the **“Model for the synchronisation of the various standardisation activities”** document, which is published separately.

The document describes the model developed by the MSP/DEI WG in response to Task 3. Before doing so, it sets out a generic perspective, provides some examples of collaboration structures on national and European level and elaborates on the framework that has been developed to appropriately design the model. It also provides complementary material of a more detailed nature (example for concrete interaction on the Networking Platform).

Throughout Europe, digitisation of manufacturing has been determined as a major challenge to be mastered by national economies and, consequently, most European countries have established some sort of a strategic platform to coordinate activities related to this challenge.

A comprehensive overview of national initiatives, including contents and interlinks, has been developed by the European Commission, with the Digitising European Industry initiative (DEI) as a format where those initiatives interconnect to exchange results and develop common strategies.

Standardisation is the most critical element to successfully support this development for allowing coherent solutions in the diverse digital manufacturing value chains, and **many national initiatives, as well as exchanges between different countries, require substantial effort to analyse standardisation needs and to develop standardisation strategies.** Moreover, a wide variety of facilities has been set up to do piloting and testing (e.g. European Large Scale Pilots, other H2020 projects, national testing and piloting facilities), frequently with close relationship to research institutions. And standardisation relevant to the digitisation of manufacturing is ongoing in diverse places (international and European level, other).

The link between strategic platforms and standardisation is generally hard to establish due to a mutual lack of in-depth knowledge and working relationships. There are examples of initiatives which undertake to close this gap, but there is **currently no systematic approach on a European level to create synergies** by fostering exchange and synchronisation between those efforts. The same holds for the relation between standardisation and piloting/testing. **The interaction between strategy, standardisation and research, piloting and testing which is expected by the establishment of a synchronization mechanism** is illustrated in detail.

The following **targets** (in particular, the added value) to be achieved via the establishment of a synchronization mechanism have been identified:

- The foremost target is to foster cooperation and stimulate synchronization between standardisation activities on national, European and also international level. The key element to achieve this target could be a platform for sharing information or for consultation on specific topics as needed. It is expected that the complexity of cooperation between stakeholders can thus be significantly reduced.
- Such cooperation should also promote reuse of existing solutions and interoperability standards based thereon. Duplication of work could then be avoided and fragmentation reduced.
- Today, it is difficult even for experts in the field to oversee the vast variety of activities in smart manufacturing. Therefore, the model to be established should lead to an increased transparency of activities, including higher awareness of relevant standards related work and related timelines. This would reduce the perceived complexity.
- The cooperation activity should address the standardisation challenges and foster the resolution of standardisation gaps.
- However, the activity should concentrate on the aforementioned tasks. It should not aim to develop own or additional standards.

The synchronisation platform can only be successful if all relevant stakeholders are present, either directly on the platform or through cooperation. The **stakeholder groups** to be involved for effective synchronisation include:

- National initiatives on smart manufacturing
- European PPPs, Large Scale Pilots
- Test beds
- Research in academia, industry, EU co-funded settings
- Standardisation bodies
- Consortia & alliances (of industrial partners)
- Open source communities
- Industry, including SME, start-ups and consulting companies
- Societal stakeholders
- Policy makers & regulators

A number of **requirements and guidelines** which need to be adhered to have been identified:

- The cost to maintain the synchronization platform must be minimal.
- The cost for participants in the platform must be minimal.
- Nevertheless, there must be a suitable basis for sustained work.
- The platform should not constitute a wholly new system, but focus should be given to integrating existing activities, initiatives and concepts. Therefore, it should be built on existing structures as far as possible.
- To keep lean enough the operations of the platform in order to fulfil the aforementioned requirements, it must be easy for participants to connect and contribute. This includes a high level of transparency of work contents and timetables.
- Extensive outreach to the wider community, i.e. stakeholders not directly active on the platform, must be ensured, including mechanisms to obtain their input and feedback.

The diverse initiatives across Europe - on national and European level - in support of the digitisation of national industries (they vary in terms of targets, composition, mode of operation, intended outcome, etc.) are illustrated via some examples, with a specific focus on standardisation: on national level, **4S - Strategies and Standards for Smart Swedish Industries** (Sweden), **Smart Industry Standardisation Platform** (The Netherlands), **Standardisation Council Industrie 4.0 (SCI 4.0)** (Germany) and **Standardisation Industrie du Futur** (France); on European level, **Alliance for IoT Innovation (AIOTI)**, in particular the engagement model of the AIOTI WG03 on IoT standardization.

The recommended basic mode of operation for the synchronisation of the various standardisation activities in support of Digitising European Industry is **by means of a Networking Platform supporting the cooperation of the existing platforms** versus the other option of some sort of "umbrella structure" (with its own working groups etc.).

The platform aims to stimulate engagement, networking, moderation, discussion, development of position papers via consensus and cooperation, to propose actions to drive convergence and accelerated adoption of standards, as well as reflect on standardisation models and act as a monitor for the work of relevant SDOs.

A non-exhaustive set of **possible outputs of the platform** includes:

- proposals on standardisation gaps and other standards related issues;
- organisational or structural changes;
- aggregation of inputs and documents;
- stimulation of the interaction among research and innovation, testbeds, digital innovation hubs and standardisation;

- research and innovation needs.

A number of working elements of the platform, such as a repository for documents, collaboration facilities, support for cooperation between SDOs and other, are also identified.

Various aspects of the Networking Platform synchronization model are critical. On the other hand, it is recognized that the model has not to define in every detail how the platform should work and what the output will be, certain topics, including fostering the convergence of specific standards or accelerating the adoption of emerging ones, being left to the decision of the Networking Platform.

Stimulating cooperation, offering added value as a return on active contribution, is key due to the essential value of voluntarily contributing participants. The followings are decisive elements for such added value:

- impact (impactful results, either within the platform or externally),
- content (relevant results, e.g. promotion of solution of gaps once identified, resolution of possible conflicts if necessary, analysis of areas requiring interoperability),
- openness,
- approachability (low barriers to bringing up issues for discussion and resolution),
- agility (continuous adjustment of the platform objectives to those of the participating stakeholders),
- inclusiveness (considering the potentially differing objectives of the diverse - existing and candidate - stakeholders with regards to their participation in the platform, stakeholder-specific values offerings of the platform should be clearly identified and promoted – the Task 4 document makes a first analysis of individual interests, value adds, goals and expected benefits),
- incentives (mechanisms to appreciate useful contributions),
- meeting locations (physical meetings collocation with meetings of participating organisations where feasible).

Operational aspects of the platform are also key, including rights and obligations of the participants, way of working (online collaboration tools), secretariat (smooth operational support like organising discussions, documenting results and stimulating cooperation), consensus-based decision process, high transparency (on approved results and activities), proven process-based rules and procedures (with code of conduct and maximum reusability of existing work, and tailored to stimulate active, open and fair cooperation among the stakeholders).

Openness and transparency of the information flow is of high importance: stable material should be normally made available to all interested parties inside and outside the platform, and permanent circulation restrictions should only apply in rare and duly justified cases.

The **composition of the platform** should enable and stimulate appropriate representation of all stakeholders, avoiding dominating roles of individual parties and opening to any organisation that agrees with the participation rules and objectives.

Whereas the design of the platform (and the large use of remote collaboration) targets minimal cost both for the participants and the platform maintenance, **certain funding will be required to fully leverage the platform potential.** Activities requiring funding include those related to the working elements of the platform and the secretariat role.

The tasks to be addressed in the setup of an **effective and efficient platform governance** structure have been identified, although recommendations related to the work contents should be adopted by the members in order to foster acceptance. NOTE – A specific task (“Adopt and maintain a taxonomy of technical concepts and activities relevant to the Networking Platform to support efficient match-up and identification of commonalities”) has been agreed based on feedback from the second open workshop.

The envisaged key elements of the platform governance structure are: the **Steering Board** as the core element, with a composition flexible enough to accommodate changing conditions, a size large enough to allow for appropriate representation of stakeholders, but still small enough to allow for efficient operations; the current MSP/DEI WG transformed into an **Advisory Board**, potentially complemented by additional external stakeholders; the **General Assembly** as the final decision making authority, for decisions of strategic relevance.

No need has been identified requiring to make the Networking Platform a legal entity of its own. A serious drawback of establishing a legal entity would be the time required for setup and the additional administrative burden. Alternative approaches may overcome the platform limitation, as informal entity, of being unable to conclude MoUs with other organisations.

4.3 Recommendations from the activities related to Task 3

The essence of the Task 3 results is the Recommendation to implement a Networking Platform which will aim at synchronising the various Standardisation activities in support of Digitising European Industry and which will support cooperation of the existing platforms.

Eight Recommendations have been identified concerning the operation and the organization of the platform:

1. The synchronisation of the various standardisation activities in support of Digitising European Industry should be implemented by means of a Networking Platform to support cooperation of the existing platforms.
2. In support of its mission, the Networking Platform should offer working elements that facilitate and support the advancement and promotion of standards solutions for digitising manufacturing, driven by strategic requirements and in close alignment with results from research, pilots and testbeds.
3. Terms of Reference, Rules of Procedure and in particular the way how the Networking Platform works should be tailored to stimulate active, open and fair cooperation of the involved stakeholder groups.
4. The Networking Platform should work in a highly transparent way.
5. The Networking Platform should strive for appropriate representation of all stakeholder groups involved in or affected by standardisation in support of digitising manufacturing.
6. Adequate funding of the Networking Platform should be foreseen in order to allow for sustained and successful operation.
7. The Networking Platform should be set up as an informal entity.
8. The governance structures of the Networking Platform should be kept at a minimum, mainly focusing at fostering an agile and smooth interaction of all its members.

5. Final results of the activities related to Task 4 of the MSP/DEI WG's Terms of Reference

5.1 The working context of the activities related to Task 4

The Task 4 of the MSP/DEI WG's Terms of Reference is:

- 4) propose a first roadmap taking into account existing work such as national standardisation roadmaps and other related work, and specifying concrete actions that may be included in the Rolling Plan for ICT standardisation.

Dr. Jochen Friedrich (OFE representative) and Dr. Stefan Weisgerber (CEN representative) were appointed as co-leaders for Task 4.

Under their leadership, two electronic meetings have been conducted in order to progress the assigned work. WG e-mail reflector exchanges have also taken place.

5.2 Results of the activities related to Task 4

Given the limited time availability of the WG with respect to the complexity of a comprehensive roadmap development, e.g. in terms of appropriate consideration of existing work such as national standardisation roadmaps and other related work, the Task 4 team decided to build on, and complement as useful, the results of the Tasks 1 & 2 work and the Task 3 work.

The effort has been concentrated on the definition of a set of proposed follow-up actions to enable further work and the implementation of the Tasks 1 & 2 and Task 3 outcomes.

Although no specific estimation of budget and resources needs has been made, the proposed follow-up actions - constituting the "first roadmap" output of Task 4 - will contribute to the development of a comprehensive roadmap over the next period.

The main result of the Task 4 team effort has been the generation of the document "**Roadmap for Standardisation in Support of Digitising European Industries**", which is published separately.

In summary, the document:

- in line with - and complementing as useful - the results of Tasks 1 & 2 activities, provides high-level Recommendations in terms of further work concerning standardisation needs and ongoing activities, as well as a detailed set of possible and proposed actions in the context of digitising industry derived from European and national initiatives;
- in line with the results of Task 3 activities, re-iterates the Recommendations concerning operational and organizational aspects of the networking platform implementation;
- based on further discussion concerning setup and operations of the networking platform, provides considerations about mid and long-term funding of the platform's operations as well as about one suitable approach to initiate the platform implementation in early 2019.

The following clause provides details about the Task 4 Recommendations.

5.3 Recommendations from the activities related to Task 4

General Recommendation

It is recommended **the extension of the mandate of the MSP/DEI WG** in order to support the implementation of the outcome of the Tasks 1-3.

Work Packages

Five Work Packages (WP) are recommended based on the outcome of the Task 1 & 2: their purpose is to ensure the maintenance and improvement of the produced documentation, and to carry out further work beyond the current time frame of the WG.

NOTE 1 - The establishment of the Networking Platform according to this model is recommended as well.

NOTE 2 - The Work Packages below are still to be detailed further.

The five Work Packages are:

- WP1: Continued exchange on, and analysis of, needs for new standardisation activities.

Scope: continue the analysis of standardisation needs and the update of the set of proposed actions; record the progress against actions; continue to provide input to the EU RP on ICT standardisation.

NOTE – Tasks 1 & 2 of the MSP/DEI WG have provided a detailed analysis and, as described in clause 3.3 of this report, identified concrete proposals for actions to be included in the EU RP on ICT Standardisation 2019 as well as developed a set of more detailed proposed actions.

Identified deliverables and milestones: input to RP 2020, further improvements of the mapping of ongoing activities, especially with focus on fostering cooperation - TBD

- WP2: Input to the EU research agenda.

Scope: provide input on areas for research and innovation where pilot projects or collaborative advanced technology work within an EU R&I framework will be important.

Identified deliverables and milestones: input to a DEI research and innovation agenda - TBD

- WP3: Follow-up on existing work and national roadmaps.

Scope: gather input from different national roadmaps and other activities; contribute to information exchange; promote cooperation on pan-European level.

Identified deliverables and milestones: update of the document from Tasks 1 & 2.

- WP4: Overview on policy/government initiatives in other countries or regions.

Scope: develop an overview of policy/government initiatives in other (non-European) countries and regions, i.e. policy instruments, PPPs and private initiatives, which have been set up with the objective to promote digitising industry. NOTE - This is not about standardisation development, but about standardisation promotion or pre-standardisation work.

Identified deliverables and milestones: overview document or other representation as appropriate - TBD

- WP5 (agreed based on feedback received at the second open workshop): Standardisation needs and ongoing activities beyond the manufacturing sector.

Scope: develop an analysis of standardisation needs and ongoing activities in other sectors of digitizing industry. NOTE – The WG ToR already recognized this intention stating “Identify,

as a starting point, the standardisation needs in the manufacturing sector, which might serve as a blueprint for other domains in the future”.

Identified deliverables and milestones: similar outputs than those developed for the manufacturing sector are likely - TBD

Implementation of the Networking Platform

The eight recommendations identified by the Task 3 concerning operational and organizational aspects of the networking platform **are reiterated.**

In the mid and long term, the Networking Platform's operations could be potentially funded through a Horizon 2020 resp. Horizon Europe Coordination and Support Action (CSA). However, the prospective timeline evaluating the start of such project in late 2020 highlights a delay of two years which cannot cope with the extremely fast pace of the digitization progress all around the world. And, in this perspective, in-kind contributions of the members of the future platform would not suffice anyway.

In order to start the implementation of the Networking Platform in early 2019, a suitable approach is identified in **tasking the ESOs to jointly host the Secretariat of the Networking Platform**, at least in the initial phase, and to provide funding out of existing budgets for European Standardisation. The key goal should be a full implementation of the Networking Platform, supporting all features recommended by the WG, in particular high transparency, openness and inclusivity.

It is highlighted that the specific value of a joint approach would be in the extremely wide outreach offered from the beginning, including vertical industries undergoing digitisation as well as horizontal ones providing the respective information and communication technologies, and the consequent possibility to build bridges between "providers" and "users" of digital technologies as necessary. The attractiveness and effectiveness of the Networking Platform for the different stakeholders builds on the recommended platform mechanisms as identified by the WG.

6. Conclusions and Recommendations to the MSP and the HLGGM

This chapter provides conclusions concerning the activities of the MSP/DEI WG and the WG Recommendations to the MSP and the HLGGM of the European Platform of National Initiatives on Digitising Industry.

At first, it provides the feedback collected on the Tasks' activities and Recommendations at the two open workshops organized by the WG at the EC premises (Brussels, respectively, 13 June 2018 and 15 November 2018), as well as at the final WG meeting (electronic meeting, 22 November 2018). Then it summarizes the WG Recommendations to the MSP and the HLGGM. Finally, it provides some conclusive considerations on the overall work of the MSP/DEI WG and potential follow-up.

NOTE – The report of the second open workshop and the minutes of the final WG meeting are published in separate documents (as well as the previously published report of the first open workshop).

6.1 Feedback on WG Tasks' activities and Recommendations from the two open workshops and the final WG meeting

6.1.1 Feedback from the two open workshops

Taking into account the comments and proposals received at the two open workshops and progress made by the WG to address them as much as possible along its work, the following list contains some additional specific items for future consideration:

1. *About Large Enterprises versus SMEs*

The possible different perspectives of Large Enterprises versus SMEs with respect to standardization needs should be investigated (e.g. possible different views in terms of architectural interfaces validation).

2. *About the Integration versus Value Chain and Life Cycle dimensions*

It is necessary to go deeper in terms of analysis of the (organizational/cross-organizational) Integration versus Value Chain and Life Cycle dimensions, including their relationships, as well as to relate this analysis to existing developments (e.g. RAMI 4.0 dimensions).

3. *About Architectures*

- Different relevant Architectures have been developed from different perspectives: it should be considered how to put them together (e.g. for all dimensions to be necessarily considered), and which different contributing sets of capabilities (IoT, Big Data Management, Semantics, Context Information Management, Platform level capabilities, ...) from the end-to-end manufacturing value chain and life cycle perspectives.
- It is recommended to analyse what is relevant in terms of Reference Architecture from the standardization viewpoint in order to promote shared standardization actions across the whole standardization arena (key starting points exist for the analysis from a Reference Architecture viewpoint)

4. About Testing

Promotion of standardization activities and events related to “Testing” (for quality insurance, certification etc.) should be considered.

5. About Training

The benefit to promote “Training” should be considered (a number of new technologies will be integral part of the new digitizing industry picture).

6. About the Actions from Tasks 1 & 2 (see clause 3.3)

- Action 1 could be declined into more granular actions
- Actions 5, 6 and 9: these topics are somewhat at the intersection between the realms of standards that are described as not to be regulated (for interoperability) and those that should be so (for policy purposes). There may thus be a double argument for a public regulation of and mandate to use these standards.
- « Digital contracting » (auditing, taxation etc.) is not addressed as Action. It is shared that it could be considered in next steps (maybe as a specific work package).
- « Dissemination » should be also stressed ~~as Action~~ (at country and industry level).

7. About the Networking Platform from Task 3 (see clause 4.3)

- It is needed to promote synchronization among platforms and initiatives, with care to include EC activities (pilots and others).
- About governance and operations, the industry participation is the key point, and governance and operations have to match it.
- Pragmatism is needed with respect to funding, e.g. funding could be revisited on a yearly basis.

8. About further development of the Roadmap from Task 4 (see clause 5.3)

- The development of different perspectives in terms of “structuring topics” of the Roadmap should be considered (different perspectives might result useful or necessary depending on the users of the Roadmap).

9. Other

- It is needed to consider the possible impact of the WG findings on all topics of the RP for ICT standardization.
- « Metadata » related standardization matters need to be investigated as metadata are key for automation.

6.1.2 Feedback from the final WG meeting

At the final WG meeting, a debate was held after the review of the outcome of the work carried out by the MSP/DEI WG. The participants showed general support for the results and congratulated the task leaders for the excellent work.

6.2 Summary of the Recommendations of the MSP/DEI WG

The Recommendations generated by the four WG Tasks are confirmed as the Recommendations of the MSP/DEI WG to the MSP and the HLGGM:

- clause 3.3 provides the Recommendations from Tasks 1 & 2,
- clause 4.3 provides the Recommendations from Task 3,
- clause 5.3 provides the Recommendations from Task 4.

Clause 6.1.1 contains some additional specific items for future consideration based on the results of the two open workshops.

6.3 Conclusive considerations on the overall work of the MSP/DEI WG and follow-up

The activities conducted by the different Tasks of the MSP/DEI WG have seen a broad participation, very productive and focussed discussions, good team spirit and will to reach common results.

The output of the MSP/DEI WG - including the recommendations summarized in clause 6.2 - constitutes a solid foundational step for strengthening the European stakeholders' collaboration on advancement and promotion of standards for Digitizing European industry.

Based also on the feedback on this final report from the MSP and the HLG of the European Platform of National Initiatives on Digitising Industry, objectives and milestones will have to be defined in detail and an action plan launched.

As stated during the final WG meeting, in order to support the implementation of MSP/DEI WG results and recommendations, the Commission envisages funding a Coordination and Support Action (CSA) under the H2020 WP 2018-2020. In particular, the recently closed topic DT-ICT-13, namely its sub-point on "Support pilot activities and knowledge transfer across different sectors" may lead to a CSA that coordinates the platform and pilot projects under the Focus Area with Member States initiatives and with standardisation initiatives. However, it will be possible to assess whether this option is viable only after the evaluation of the submitted proposals and the subsequent award of the grant.

However, concerning the establishment of the Networking Platform (according to the proposed model), the process may take up to two years and thus an intermediary solution for the quick start of its operation should be found. As stated during the final WG meeting, the ESOs, AIOTI, or the MSP/DEI WG itself, may be the nest for such initiative. Also, the Commission is considering the possibility to bridge the gap until the launch of the CSA by contracting a facilitator who should validate the MSP/DEI WG results and recommendations, in particular the model for the synchronisation of the standardisation activities and its implementation roadmap, by liaising with SDOs, H2020 projects, and other relevant stakeholders.

7. Appendix I – Participants in the Tasks related teams of the MSP/DEI WG

Appendix I.1 – Participants in the Tasks 1 & 2 team

- 1 Jochen Friedrich – Tasks 1 & 2 leader (OFE)
- 2 Antonio Conte (EC)
- 3 Marco Carugi (MSP/DEI WG Rapporteur)
- 4 Haimo Huhle (Germany)
- 5 Annegret Kübler-Bork (Germany)
- 6 Pedro Martin Jurado (Spain)
- 7 Jose Antonio Jimenez Caballero (Spain)
- 8 Emilie Foti (France)
- 9 Simon Hicks (UK)
- 10 Dan Palmer (UK/BSI)
- 11 Sarunas Grigaliunas (Lithuania)
- 12 Vlora Rexhepi van der Pol (Netherlands)
- 13 Hans Olofsson (Sweden)
- 14 Andres Dingvall Rauchwerger (Sweden)
- 15 Pouline Terpager (Denmark)
- 16 Mary White (Ireland)
- 17 Paul Killeen (Ireland)
- 18 Stefan Weisgerber (CEN)
- 19 Philippe Tailhades (Gimelec)
- 20 David Law (IEEE)
- 21 Lindsay Frost (ETSI)
- 22 Hermann Brand (IEEE)
- 23 Patrick Guillemin (AIOTI)
- 24 Georgios Karagiannis (AIOTI)
- 25 Angels Orduna (A.SPIRE aisbl)
- 26 Brian McAuliffe (DigitalEurope)
- 27 Sara Ghazanfari (ETNO)
- 28 Maitane Olabarria Uzquiano (CECIMO)
- 29 Guido Sabatini (Digital/SME)

Appendix I.2 – Participants in the Task 3 team

- 1 Stefan Weisgerber – Task 3 leader (CEN)
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- 3 Rolf Riemenschneider (EC)
- 4 Franck Boissiere (EC)
- 5 Thomas Reibe (EC)
- 6 Arian Zwegers (EC)
- 7 Rositsa Georgieva (EC)
- 8 Marco Carugi (MSP/DEI WG Rapporteur)
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- 10 José Antonio Jiménez Caballero (Spain)
- 11 Pedro Martín Jurado (Spain)
- 12 Nathalie Geslin-Levasseur (France)

- 13 Roxana Turcanu (France)
- 14 Mary White (Ireland)
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- 17 Simon Hicks (UK)
- 18 Dan Palmer (UK/BSI)
- 19 Andres Dingvall Rauchwerger (Sweden)
- 20 Hans Olofsson (Sweden)
- 21 Pouline Terpger (Denmark)
- 22 Vlora Rexhepi van der Pol (Netherlands)
- 23 Philippe Tailhades (Gimelec)
- 24 Jens Gayko (SCI 4.0)
- 25 Yves Leboucher (SCI 4.0)
- 26 David Law (IEEE)
- 27 Michel Iñigo Ulloa (MONDRAGON)
- 28 Lindsay Frost (ETSI)
- 29 Hermann Brand (IEEE)
- 30 Ruggero Lenzi (CEN)
- 31 Patrick Guillemin (AIOTI)
- 32 Georgios Karagiannis (AIOTI)
- 33 Jochen Friedrich (OFE)
- 34 Maitane Olabarria Uzquiano (CECIMO)

Appendix I.3 – Participants in the Task 4 team presence of people highlighted in yellow should be confirmed (no notes taken)

- 1 Stefan Weisgerber – Task 4 co-leader (CEN)
- 2 Jochen Friedrich – Task 4 co-leader (OFE)
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- 4 Rolf Riemenschneider (EC)
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- 19 Lindsay Frost (ETSI)
- 20 Hermann Brand (IEEE)
- 21 David Law (IEEE)
- 22 Patrick Guillemin (AIOTI)
- 23 Georgios Karagiannis (AIOTI)
- 24 Brian McAuliffe (DigitalEurope)
- 25 Maitane Olabarria Uzquiano (CECIMO)

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