European Commission

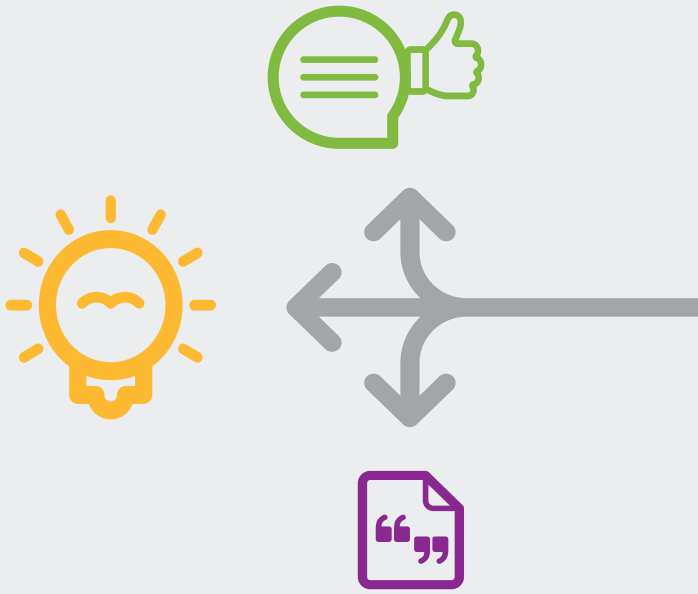
ROLLING PLAN FOR ICT STANDARDISATION

2017

Grow

EUROPEAN COMMISSION
Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs

Innovation and Advanced Manufacturing
KETs, Digital Manufacturing and Interoperability



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EXECUTIVE SUMMARY

The Rolling Plan for ICT Standardisation provides a unique bridge between EU policies and standardisation activities in the field of information and communication technologies (ICT) and thus, it allows for increased convergence of the efforts of standardisation makers towards European policy goals. This document is the result of a yearly dialogue involving a wide range of representatives of the major standardisation stakeholders as represented in the multi-stakeholder platform on ICT standardisation. The Rolling Plan focuses on those actions that can support EU policies and does not provide a comprehensive overview as regards the work programmes of the various standardisation bodies.

The identification of the standardisation actions in support of European policies made in this document is complementary to other instruments, in particular to the annual Union work programme (AUWP). The Rolling Plan details the requirements for ICT standardisation in the form of actions and provides a follow-up mechanism for these actions.

The Rolling Plan 2016 identified 162 actions in total, of which 127 have started and 19 are completed by now. A summary of the sections of the Rolling Plan 2017 can be found below organised around four thematic areas: key enablers, societal challenges, innovation for the single market and sustainable growth.

The Commission has identified five priority domains in its Communication on ICT Standardisation Priorities for the Digital Single Market [1] —5G, cloud, cybersecurity, big data and internet of things (IoT) —where ICT standardisation is considered most urgent for the completion of the Digital Single Market (DSM), as well as a number of application domains that will benefit from standard setting in those horizontal technologies, in particular eHealth, intelligent transport systems, smart energy and advanced manufacturing. The Rolling Plan 2017 includes actions in support of the priorities indicated in the Communication.

The Rolling Plan is a living instrument. Compared to the 2016 edition, in the Rolling Plan 2017 some domains have disappeared because of completion of activities (RFID) and new domains have been added (5G, FinTech, Building information modelling (BIM) and Common information sharing environment (CISE) for the EU maritime domain).

1 COM (2016) 176 final.

KEY ENABLERS

5G

5G standards are key to competitiveness and the interoperability of global networks and require collaboration between stakeholders from different standardisation cultures. The Communication on ICT Standardisation Priorities identifies 5G as a priority domain and proposes some actions to foster the emergence and uptake of global 5G standards.

Moreover, The European Commission has adopted a 5G Action Plan and called on Member States and industry to commit to the following objectives:

- a standardisation approach that preserves future evolution capabilities and aims at the availability of 5G global standards by end of 2019;
- a holistic standardisation approach encompassing both radio access and core networks as coordinated activities within global standardisation bodies, encompassing disruptive use-cases and promoting open innovation;
- the establishment of cross-industry partnerships to support timely standard setting, leveraging international cooperation partnerships, and supporting the digitisation of industry.

CLOUD COMPUTING

In 2016, the second phase of the cloud standards coordination was completed. It was carried out by ETSI and helped prepare the Communication on ICT Standardisation Priorities. The Communication identifies cloud as a priority domain and proposes some actions to foster the development and use of cloud standards.

ISO/IEC JTC 1, the Committee coordinating ICT matters, demonstrated significant activity in cloud standardisation with a focus on service level agreements and interoperability aspects. The Commission services, in collaboration with standardisation development organisations and open source (OSS) related organisations, launched an action to analyse the impact of open source in the cloud standardisation process.

In 2017, an extensive consultation with the stakeholders will be carried out to establish a roadmap for the coming years in the area of cloud standards. This process will be supported by a dedicated working group on cloud standardisation of the cloud special industry group with the first deliverables expected in the second half of 2017.

PUBLIC SECTOR INFORMATION, OPEN DATA AND BIG DATA

In January 2017, the Commission adopted a Communication on "Building a European Data Economy" exploring issues such as free flow of data, access and transfer in relation to machine generated data, liability and safety in the context of emerging technologies, portability of non-personal data, interoperability and standards. The Commission has also launched a public consultation.

Under the Horizon 2020 ICT Work Programme 2016-2017 on topic ICT-14 / Big Data public-private-partnership, several actions have started on data integration and experimentation (including cross-sectoral and cross-lingual issues), with more actions expected during 2017. Also, a dedicated subgroup (SG6) of task force 6 has been set up to deal with big data standardisation.

The DCAT application profile has been developed as a common project to describe public sector data catalogues and data sets and to promote the specification to be used by data portals across Europe. DCAT-AP extensions covering geospatial datasets (GEO/DCAT-AP) and statistical datasets (STAT/DCAT-AP) have been finalised.

The Communication on ICT Standardisation Priorities identifies big data as a priority domain and proposes some actions to contribute to global standardisation in the field of data.

INTERNET OF THINGS

The internet of things (IoT) is a key priority area of the Digital Single Market. Industry is best placed to develop the technological standards and solutions to reap the benefits of new global IoT ecosystems while also addressing the challenges such as security, scalability and interoperability. In this context, the European large-scale pilots will support the deployment of IoT solutions by validating their acceptability and enhancing the buy-in from users and the public.

The Communication on ICT Standardisation Priorities identifies IoT as a priority domain and proposes some actions to promote the development and uptake of IoT standards. The alliance for internet of things innovation (AIOTI) will play an important role in this field and help foster a digital single market for IoT.

CYBERSECURITY / NETWORK AND INFORMATION SECURITY

The European cybersecurity strategy and the Directive on network and information security adopted in July 2015 provide for action to promote the development and take-up of ICT security standards.

The Communication on ICT Standardisation Priorities identifies cybersecurity as a priority domain and proposes actions to accelerate the development of appropriate standards in this field.

EPRIVACY

In support of the ePrivacy Directive[2] and the General Data Protection Regulation[3], and in line with the standardisation request M/530, standardisation actions are needed to ensure privacy in personal data processing and the free movement of such data. In 2016, the CEN-CENELEC joint working group (JWG) 8 "Privacy management in products and services" was set up to execute M/530 and will continue until 2018. The group is in line with the agreed work programme which focuses on standardisation deliverables that address privacy management in the design and development and the production and service provision processes of security technologies, with associated guidelines.

2016 was a crucial year for improving privacy rights with the thorough review of the ePrivacy Directive 2002/58/EC[4].

The review led to the adoption by the Commission of a proposal for a Regulation on privacy and electronic communications that will replace the old directive and address its flaws[5]. Overall, the proposed Regulation will increase the protection of citizens' electronic communications as all providers of comparable, functionally equivalent services from a consumer's point of view (instant messaging and voice over IP) would be subject to the same set of rules.

E-INFRASTRUCTURES FOR RESEARCH DATA AND COMPUTING-INTENSIVE SCIENCE

Building on existing EU-funded e-Infrastructures, the European cloud initiative strategy aims at consolidating the efforts to accelerate and support the transition to more effective open science and open innovation in the Digital Single Market. In this context, the implementation of standards and recommendations will be of utmost importance in order to allow for interoperability, avoid fragmentation and improve the efficiency and effectiveness of research.

To take advantage of the capabilities of different scientific fields and of the potential of ICT, this Rolling Plan calls on standard developing organisations to identify the standardisation needs (action 1) and explore the use of concepts such as digital objects architecture and array databases (actions 2 and 3).

BROADBAND INFRASTRUCTURE MAPPING

The European Commission has launched a project to map fixed and mobile quality of broadband services in Europe. This is a crucial instrument to assess and monitor the achievement of the new connectivity goals as described in the Communication on "Connectivity for a competitive Digital Single Market – Towards a European Gigabit Society".

To support access for individuals to broadband services with higher quality of service, this Rolling Plan calls on the standard developing organisations to analyse the standardisation landscape taking into account the studies the Commission launched to help map broadband infrastructures, services offered, demand status and investments, including the definition of common (fixed and mobile) network performance measurement.

ELECTRONIC IDENTIFICATION AND TRUST SERVICES INCLUDING E-SIGNATURES

Further to the issue of the standardisation mandate M/460 at the end of 2009, CEN and ETSI are working on various standardisation deliverables needed for the completion of the rationalised framework of e-signatures standards.

2 Directive 2002/58/EC of the European Parliament and of the Council of 12 July 2002 concerning the processing of personal data and the protection of privacy in the electronic communications sector (Directive on privacy and electronic communications); Official Journal, L 201 , 31/07/2002 P. 0037 – 0047).

3 2016/679/EU

4 Directive 2002/58/EC of the European Parliament and of the Council of 12 July 2002 concerning the processing of personal data and the protection of privacy in the electronic communications sector (Directive on privacy and electronic communications); Official Journal, L 201 , 31/07/2002 P. 0037 – 0047).

5 Proposal for a Regulation of the European Parliament and of the Council concerning the respect for private life and the protection of personal data in electronic communications and repealing Directive 2002/58/EC (Regulation on Privacy and Electronic Communications), 10.01.2017, COM (2017)10 final https://ec.europa.eu/digital-single-market/en/news/proposal-regulation-privacy-and-electronic-communications

More recently, CEN and ETSI have extended their activities to cover the standardisation needs that pertain to the implementation of Regulation (EU) 910/2014 on electronic identification and trust services for electronic transactions in the internal market (eIDAS). Several standardisation deliverables resulted or are ongoing, some of which may be referenced in implementing acts of Regulation (EU) 910/2014.

SOCIETAL CHALLENGES

EHEALTH AND ACTIVE AND HEALTHY AGEING

In 2016, CEN's Technical Committee 251 on Health Informatics started to work on standardising an international patient summary, drawing from elements of the guidelines developed under the eHealth network. Completion of the standards is expected in 2018. This activity is funded by the Commission and ensures European participation in an international initiative which is expected to enable people to access and share their health data information for emergency or unplanned care anywhere and as needed.

In 2017, the development of a European guidance document is foreseen based on the Publicly Available Specification (PAS) 277 developed by the UK national standardisation body (BSI) for the use of the eHealth and wellness app developers to set out quality criteria and principles to be followed throughout the app development life cycle. This standardisation activity will address some of the concerns related to the apps' quality and reliability.

WEB ACCESSIBILITY AND ACCESSIBILITY

The Directive on making the websites and mobile apps of public sector bodies more accessible was adopted on 26 October 2016. This means that people with disabilities — especially persons with vision or hearing impairments — will have better access to the websites and mobile applications of public services. The Commission is considering issuing a standardisation request in 2017.

On 2 December 2015, the European Commission adopted a proposal for a Directive concerning the harmonisation of accessibility requirements for certain products and services, the so-called European Accessibility Act. There is a strong ICT focus among the list of products and services which should be reflected in the standardisation work for 2017.

E-SKILLS AND E-LEARNING

In support of the objectives set out in the Communications "A New Skills Agenda for Europe"[6], "A Digital Single Market Strategy for Europe[7] and "e-Skills for the 21st Century: Fostering Competitiveness, Growth and Jobs[8]", the Commission is planning to issue, in 2017, a standardisation request as announced in the AUWP, to develop standards for a comprehensive European framework for the ICT profession which would complement and build on the existing European e-Competence framework.

EMERGENCY COMMUNICATIONS AND ECALL

In 2017 the completion of the standards related to location of the emergency calls in accordance with mandate/493, and the development of standards needed to cope with technology advances, such as smartphone apps and next generation networks, is expected.

Standards for next generation networks are also expected in 2017, notably for eCall as well as standards for other users than M1 and N1 vehicles (lightweight vehicles for the carriage of goods or passengers), for after-market equipment and for integration with the cooperative intelligent transport systems.

EGOVERNMENT

In 2016, the Commission adopted the Interoperability Solutions for public Administrations (ISA^2) work programme to support the development of the digital solutions that enable public administrations, businesses and citizens in Europe to benefit from interoperable cross-border and cross-sector public services. In 2017, standardisation work is expected to support this work programme together with international standardisation bodies, with a focus on ADMS – a specification used to describe reusable solutions – and core vocabularies to increase semantic interoperability. The DCAT application profile is being implemented in the pan-European data portal and was adopted by several Member States for their own data portals.

6 COM(2016) 381 final
7 COM(2015) 192 final
8 COM(2007) 496

INNOVATION FOR THE DIGITAL SINGLE MARKET

E-PROCUREMENT AND E-INVOICING

Procurement processes, including invoicing, need to be further digitalised to ensure application of the procurement Directives. This Rolling Plan calls for aligning the efforts of CEN's Technical Committees 440 and 434 with the ISA core vocabularies to develop a common semantic model for the e-procurement domain. This joint working group is under establishment between the two TCs. This work should build synergies with the ontology being developed by the Publications Office of the EU.

CARD, INTERNET AND MOBILE PAYMENTS

In 2017, the Commission will continue to encourage the cooperation initiatives both at standardisation (ESOs, W3C and others) and strategic level (Euro Retail Payments Board). More analysis of the standardisation gaps (action 3) and a precise definition of mobile payments (action 1) are still required in the following years.

XBRL (EXTENSIBLE BUSINESS REPORTING LANGUAGE)

This Rolling Plan calls for standardisation actions in support of the implementation of business reporting by Member States, in the context of the revised Transparency Directive.

DIGITAL CINEMA

The Commission is currently evaluating a new action proposed by CEN related to the development of a European standard and the related guidelines for the preservation of digital films, and to promote awareness (actions 1 and 2).

FINANCIAL TECHNOLOGIES

The Commission set up in 2016 an internal task force on financial technologies. Co-chaired by DG FISMA and DG CNECT, the task force brings together services responsible for financial regulation and for the Digital Single Market, along with other colleagues dealing with competition and consumer protection policy. It will further engage outside experts and stakeholders with the aim of formulating policy-oriented recommendations and it will propose measures in the course of 2017. One of the work streams of the task force will focus on interoperability and standards.

SUSTAINABLE GROWTH

SMART GRIDS AND SMART METERING, SMART AND EFFICIENT ENERGY USE

Expert Group 1 of the smart grids task force was re-launched to assess the interoperability, standards and functionalities applied in the large-scale roll-out of smart metering in Member States and, in particular, the status of implementation of the required standardised interfaces and of the Commission-recommended functionalities relating to providing information to consumers.

SMART CITIES AND COMMUNITIES, AGGREGATING SMART SERVICES AND TECHNOLOGIES IN URBAN AREAS

The initial phase of the Smart and Sustainable Cities and Communities Coordination Group (SSCC-CG) has been completed towards the end of 2016, and an overview white paper from January 2015 was published. The work will be continued by the CEN-CENELEC-ETSI sector forum on smart and sustainable cities and communities. DG CNECT is funding H2020 support actions. In 2017, the core standardisation work is expected to develop hand-in-hand with the work of cities, based on the principles developed in the European innovation partnership (EIC) on smart cities and communities' memorandum of understanding (see action 6).

ICT ENVIRONMENTAL IMPACT

In 2016, agreement was reached on the work programme related to standardisation request M/462. ETSI started standardisation work, with the objective to development KPI standards by 2018, possibly for referencing in ecodesign-related implementing measures.

ELECTRONIC TOLLING SYSTEM

The Commission will review the electronic tolling system Directive, possibly extending its scope in terms of standards to the back office.

TRANSPORT

The cooperative intelligent transport systems (C-ITS) platform with Member States completed its report in 2016. In particular, the working group on security defined new needs for security in cooperative systems (see ITS section, action 16). In 2017, standards for day n applications are expected.

With regard to the standardisation request on Urban ITS via standardisation mandate 546, work this year was mainly focused on defining and prioritising with stakeholders the standardisation requirements through a pre-study[9]. Based on the proposals submitted to the Commission, work will start in January 2017 on a core set of these proposals to support multimodality, traffic management and urban logistics.

In 2017, work will also start to steer and manage the integration of accurate (public) road data in digital maps with timely updates, based on the ROSATTE project and other activities such as the iMobility Forum.

ADVANCED MANUFACTURING

The Commission will promote the development of interoperability standards and European reference architectures, as well as open cross-sectoral platforms for the digitisation of European industry, including experimentation, validation, interoperability testing facilities and trusted labels and certification schemes.

In the 2017 AUWP, the Commission expressed its intention to possibly issue a standardisation request, which could be focused on communication protocols in industrial supply chains and specific KETs related technologies such as additive manufacturing.

ROBOTICS AND AUTONOMOUS SYSTEMS

In 2016 work on robotics standardisation continued on all fronts. During 2016, ISO issued two new standards on robotics, namely ISO/TS 15066:2016 "Robots and robotic devices — Collaborative robots", and ISO 18646-1:2016 "Robotics -- Performance criteria and related test methods for service robots -- Part 1: Locomotion for wheeled robots". Work on nine other ISO standards on robotics is ongoing.

In February 2016 SPARC, the public private partnership on robotics, issued a new update of the multi-annual roadmap. R&D projects on robotics funded under Horizon 2020 have set the scientific basis for new technologies and interoperability. Among them it is worthwhile highlighting the launch of two new projects dealing with robotic operating systems. This Rolling Plan calls for increased coordination in the standardisation work led by industry, notably through the SPARC public-private partnership.

CONSTRUCTION

This new section in the Rolling Plan focuses on Building Information Modelling (BIM). The Commission is calling for more standardisation work, mainly based on ISO (action 1), to support the competitiveness of the architectural, engineering and construction industry, one of the largest in Europe. This Rolling Plan calls for a gap analysis (action 2) and better awareness and support for implementation by the industry (actions 3 to 6).

CISE — COMMON INFORMATION SHARING ENVIRONMENT IN THE MARITIME SECTOR

This new section in the Rolling Plan focuses on increasing data exchanges in the maritime sector. In 2017, the EUCISE 2020 project (FP7 project on CISE pre-operational validation) will develop the CISE components using the CISE data and service model and validate them in a pre-production environment, involving 37 authorities from 13 European countries. The current CISE data and service model may be considered for standardisation in 2017.

The Commission would like to thank all Members of the Multi-Stakeholder Platform on ICT Standardisation for their active collaboration and for making this document possible: the EU Member States, EFTA States, standard setting organisations (ETSI, CEN, CENELEC, ISO, IEEE, IEC, ITU, OMG, IETF/IAB, OASIS, Ecma, W3C/ERCIM, UN/CEFACT), industry associations (Business Europe, Cable Europe, Digital Europe, ECIS, ETNO, EBU, EuroISPA, SBS, OFE, Orgalime) and stakeholder associations (AGE, ANEC, ECOS, EDF, ETUC).

ⓘ **https://ec.europa.eu/growth/sectors/digital-economy/ict-standardisation_en**
✉ **GROW-ICT-STANDARDISATION@ec.europa.eu**

9 http://www.urbanits.eu/

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THE STRATEGIC ROLE OF ICT STANDARDISATION IN THE CONTEXT OF EU POLICY MAKING

Standards[10] play a critical role in supporting European policies and legislation. Innovation and technology adoption provide critical support for Europe to face the challenges of a global market place, of society and economies. Policy making in Europe rely on standards and technical specifications to reap the benefits of broader, more interoperable markets and systems, and greater network effects.

The Rolling Plan addresses technology areas in need for ICT standards and explores the role which standards and technical specifications can play in achieving the policy objectives. The Rolling Plan for ICT Standardisation is published by the Commission to consolidate the different ICT standardisation needs in support of EU policies into a single document, identifying possible actions. It reaches out to both European Standardisation Organisations (ESOs) -ETSI, CEN and CENELEC- and international and global standards bodies who can respond to the proposed actions and support the respective policy objectives with standardisation deliverables.

The Annual Union Work Programme (AUWP) for European Standardisation is another EU planning tool, more high-level and not exclusively focused on ICT. It is adopted by a Commission Decision in accordance with Article 8 of the EU regulation 1025/2012 and "shall identify strategic priorities for European standardisation, taking into account Union long-term strategies for growth. It shall indicate the European standards and European standardisation deliverables that the Commission intends to request from the European standardisation organisations in accordance with Article 10".

In order to further promote ICT standardisation and develop action plans in support of a set of key EU priority areas for the digital single market the Commission has adopted the Communication on ICT standardisation priorities on 19.4.2016 (COM(2016) 176) "to set out a comprehensive strategic and political approach to standardisation for priority ICT technologies that are critical to the completion of the Digital Single Market". Many actions of the Rolling plan support the implementation of the priorities of this Communication.

The European Multi-Stakeholder Platform on ICT Standardisation (MSP) is a group of experts set-up by Commission Decision 2011/C349/04 with the aim to advise the Commission on all matters related to ICT standardisation. The MSP is composed of all Member States and EFTA countries and all other relevant stakeholders, including standard setting organisations, industry, SMEs and societal stakeholders in the area of ICT standardisation. Its tasks include, inter alia, providing advice on the content of the Rolling Plan and on the ICT technical specifications susceptible to be identified by the Commission for referencing in public procurement (Regulation EU 1025/2012, Art. 13 and 14).

In addition there are a number of further technical advisory groups to the Commission that have standardisation within their scope and in a number of cases are called by sectorial regulation (e.g. energy, environment and transport).

DEVELOPMENT AND MAINTENANCE OF THE ROLLING PLAN

The Rolling Plan is a living document and does not claim completeness. It aims at covering as much as possible the broad range of standardisation activities, technical specifications and standards relevant for the respective policy objectives and topic areas, but there is no systematic search.

The Rolling Plan is a Commission document, collaboratively and regularly reviewed, on the basis of input from the EU Services and the advice of the MSP, on an annual or by-need basis. In between two versions of the Rolling Plan, factual updates in chapter 3 are provided on a need basis in the form of Addenda to the Rolling Plan.

10 The term "standards" is used in this document in a generic way for all such deliverables from both recognised standards organisations and from standardisation fora and consortia – or the terms "standards and technical specifications" are used. Yet, whenever required in this document the terms are specified in a more detailed way drawing on the definitions given in the Regulation on European standardisation (1025/2012/EU).

The Rolling Plan is based and integrates broad stakeholder input on ICT standardisation topics and strategies. All stakeholders represented in the MSP provide regular input and feedback and thus contribute to the development of a concise picture on ongoing standardisation activities as well as on standardisation needs and market and policy needs in general.

The Rolling Plan does not claim to be comprehensive or complete. It provides a perspective at a given point in time and subject to the contributions received and integrated.

The term "standards" is used in this document in a generic way for all deliverables from both recognised standards organisations and from standardisation fora and consortia – or the terms "standards and technical specifications" are used. Yet, whenever required in this document the terms are specified in a more detailed way, drawing on the definitions given in the Regulation on European standardisation (1025/2012/EU).

PROMOTING THE IMPLEMENTATION OF STANDARDS

THE USE OF STANDARDISATION IN SUPPORT OF POLICY MAKING

An important objective of this Rolling Plan is to create awareness of the importance of ICT standards in the context of policy making and to promote the use and uptake of standards in general in order to increase ICT interoperability in those policy areas that were identified as needing ICT standardisation activities. To this end, the Rolling Plan may look at the full spectrum of available instruments for promoting awareness about standardisation and standards; for identifying and mapping standards, finding standardisation gaps and kicking off new activities in ICT standardisation; and for making use of standardisation, standards and technical specifications in policies. International cooperation regarding ICT standardisation may also be addressed.

The proposed actions around standardisation in this Rolling Plan may, therefore, directly address standards developing organisations (SDOs), but they may also be directed to public authorities and to the various stakeholders, suggesting some activities which are considered important in the context of specific policy making and of promoting the uptake and implementation of standards.

In some instances standardisation or the availability of standards can be helpful or even a precondition to implement a policy or a piece of legislation. Standards and technical specifications in ICT ensure interoperability and promote open ICT ecosystems. Standardisation may, therefore, play an important role in promoting the uptake of new technologies or the transformation of technologies and systems into new, innovative complex systems including ICT technologies and combining them with other technologies and technology layers. In this respect, the availability of a standard or technical specification may also facilitate legislation enforcement and allow the target users to actually implement the policy.

Once standardisation activities or specific standards or technical specifications have been identified as needed in support of a policy or legislation, it is, however, important that the respective activities or standards are well known and get broadly accepted, used and implemented. Different instruments can be pursued in promotion of the uptake of standards. Some of these instruments are generic, i.e. independent of the standard concerned. Examples are guidance of public procurement on how to ask for standards in general; or conferences to raise awareness on the importance of ICT standards. It may also be important that the respective policy contexts in which specific standards are to be used are highlighted, best with broad stakeholder involvement, and awareness is raised on the importance, benefit and need of using the standards within the policy contexts.

In general, adoption instruments can be classified according to the nature of the instruments (communication/education or mandating/comply or explain/procurement) or to the development phase of the standard (preliminary, creation, drafting, adoption).

Of course, not all instruments are available for all stakeholders and are not relevant in all phases of policy making. Obliging standards by law is, for example, only possible for public authorities and only when it concerns an international, European or national standard. Providing free and easy insight in the specifications documents is up to the SDO concerned and is relevant in all development phases of a standard.

PUBLIC PROCUREMENT

Governments can promote the uptake and implementation of standards and specifications via public procurement.

The Regulation on European Standardisation 1025/2012, which came into force in January 2013, offers the possibility to identify relevant ICT specifications under conditions defined in Articles 13 and 14. Identified ICT technical specifications get the status of common technical specifications and may be referenced by public procurers. The European Commission draws on this possibility with the "Guide for the procurement of standards-based ICT — Elements of Good Practice" (COM(2013) 455 and SWD(2013) 224). The Rolling Plan supports this guide by identifying available standardisation activities, standards and technical specifications in areas with policy relevance.

This may allow formal identification of various consortia standards that are in practical use at present by various Member States. Several Member States use national catalogues, i.e. lists with standards that can be used by public authorities in their public procurement. Some Member States use instruments to help procurement specialists requiring standards. E.g. the Netherlands have made procurements text (general and per standard) to help procurement specialists to ask for standards in a way that is in line with Dutch policy. Other Member States have similar activities in place.

With the "Guide for the procurement of standards-based ICT — Elements of Good Practice" the European Commission also promotes the sharing of best practices among public authorities in order to diminish lock-in.

RESEARCH AND INNOVATION

Research is a rich source for new standards or standards components and for applying available standards in advanced technology contexts. The new knowledge resulting from publicly funded research and innovation programmes can be included in new or improved standards, contributing both to the implementation of the research outcomes and the usage of standards. Historically, many European ICT research projects under EU R&D Framework Programmes have used standards or contributed to their development. EU funded pilot projects are also an important tool to test standards and provide feedback to standardisation development organisations for improvement.

Initiatives linking ICT standardisation and ICT R&I appear to be most effective when carried out at the research planning stage. Standardisation awareness is therefore essential in the research life cycle. Standardisation bodies have partially set up links into research activities for facilitating the uptake of standardisation deliverables in research projects and the transfer of research results into standardisation. Research support actions can also contribute to support standardisation activities, liaison between R&I projects and standardisation organisations, awareness and international cooperation.

Similar programmes have been set up to address the needs of innovative small and medium enterprises (SMEs). The objectives are to promote the use and implementation of standards by SMEs but also to encourage and facilitate their participation in standardisation. Failing to support innovative SMEs could seriously restrict the market impact of these SMEs, and their long-term growth prospects.

Standards, in particular when set at European or international level, can contribute to the integration of the single market, also for services, by helping companies improve quality of their offer and providing customers with a wider choice and better prices.

TESTING AND QUALITY IMPROVEMENT IN STANDARDS

If standards are to be successful in terms of widespread deployment, it is necessary to ensure that there are products and services implementing them and that they are truly interoperable.

Therefore, one of the main aims of European and global standardisation is to enable interoperability in a multi-vendor, multi-network, multi-service environment. Interoperability gives users a much greater choice of products and services, and enables manufacturers and service providers to benefit from economies of scale in a wider market. There is a broad stakeholder demand in the marketplace to ensure interoperability.

The validation of standards and products through open interoperability events is an example of how to achieve this in a pragmatic and efficient manner. Organizing such events in the earlier phases of the development of standards can give quality assurance and facilitates the development of commonly agreed standardised solutions.

Interoperability testing leads not only to better products but to better standards, suited to the user needs. It gives stakeholders confidence to implement standards and to release products in a timely manner.

Standards bodies, governments and other organisations regularly organise interoperability events, e.g. in the form of plug tests, plug fests, etc. One example is, for instance, the ETSI "PlugtestsTM events". Typically these interoperability events gather different vendors (often competitors) in order to check whether their products properly implement standards and are interoperable between them. This approach has proven to be a practical way to boost interoperability further to the development of standards, and has been applied with some success to standards and specifications issued by other organisations, including formal standards bodies and industry consortia.

Some fora and consortia also have internal interoperability and conformance testing requirements applied to specifications as a quality control matter prior to their finalisation as standards.

NEW ACTIONS

In summary, new standardisation related initiatives to further support the effective take up and implementation of standards in the priority domains identified by the Rolling Plan could cover:

awareness, promotion, conferences, information and education to all stakeholders including societal stakeholders, paying particular attention to the cooperation with R&I and SMEs involvement

implementation of field operational tests, pilot projects and interoperability testing exchange of good practice between Member States and between standardisation organizations, including international cooperation guidelines for procurers on how to mention standards monitoring the use of standards in IT systems and in IT procurement. Monitoring is an effective way to get insight in the adoption of a standard and makes it possible for standards users to learn from each other (higher ranking countries/organisations could teach others how to get a standard adopted)

Encouraging major IT suppliers to implement selected standards in their products.

EU POLICY AREAS SUPPORTED BY ICT STANDARDISATION

ICT standardisation can support European policies. Together with the MSP, the European Commission has identified the following clusters of topics. Each activity within the topic is set out in the same way: with an outline of the policy objectives, the legal base, (new or ongoing) standardisation actions, and an overview of the situation.

This rolling plan does not claim completeness or seek to be exhaustive; it focuses on those activities with a proven link to EU policy. The reader must rely on standardisation-related websites for information on other activities.

KEY ENABLERS AND SECURITY

- 5G (*new*)
- Cloud computing
- Public sector information, open data and big data
- Internet of things
- Network and information security
- ePrivacy
- eInfrastructures for research data and computing-intensive science
- Broadband infrastructure mapping
- Electronic identification and trust services including e-signatures

SOCIETAL CHALLENGES

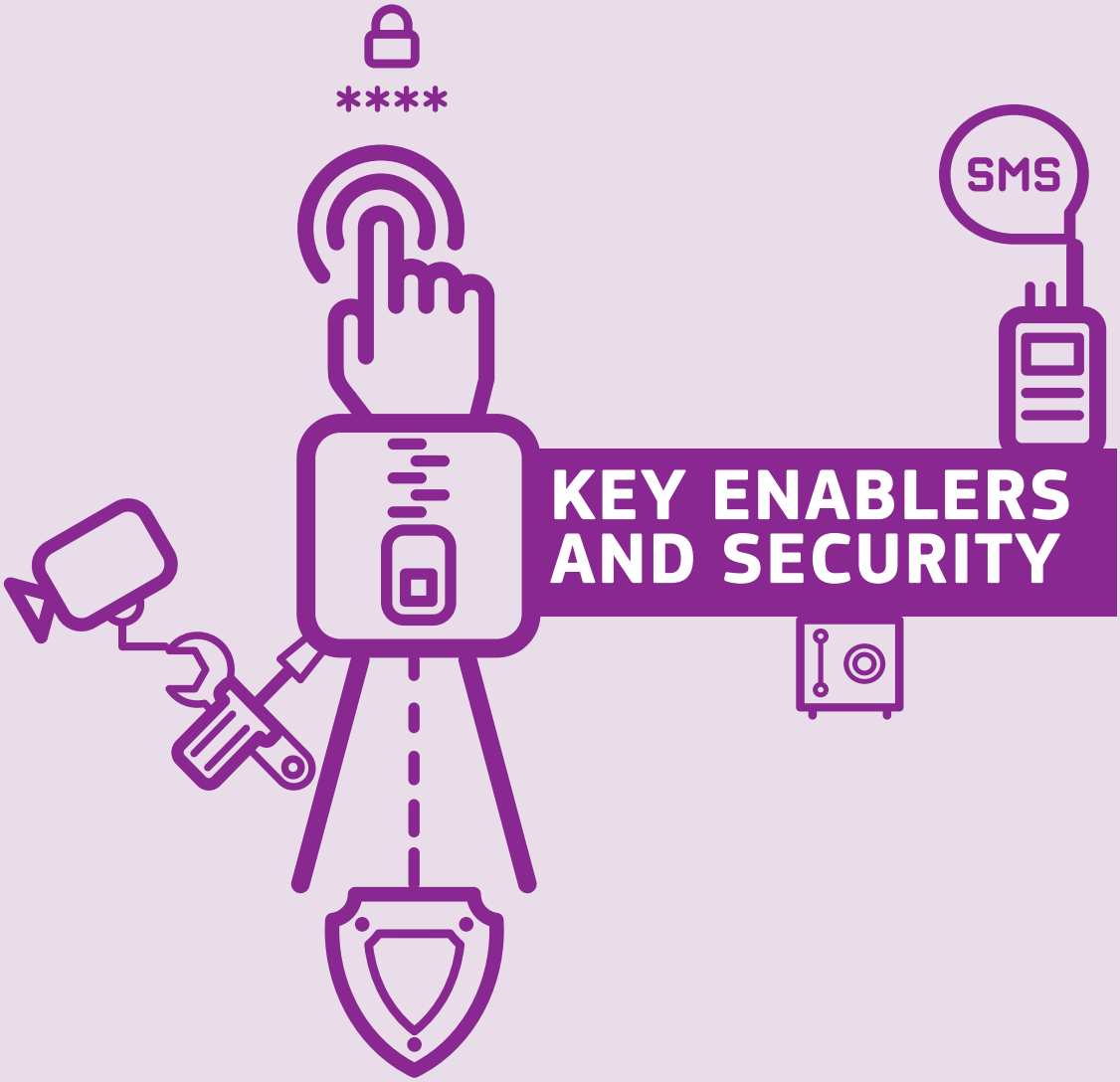
- eHealth
- Active and healthy ageing
- Accessibility of ICT products and services
- e-Skills and e-Learning
- Emergency communications
- eCall
- eGovernment

INNOVATION FOR THE DIGITAL SINGLE MARKET

- e-Procurement, pre and post award
- e-Invoicing
- Card, mobile and internet payments
- XBRL
- Preservation of digital cinema

SUSTAINABLE GROWTH

- Smart grids and smart metering, smart and efficient energy use
- Smart cities and communities, aggregating smart services and technologies in urban areas
- ICT environmental impact
- European electronic toll service (EETS)
- Intelligent transport systems (ITS)
- Advanced manufacturing
- Robotics and autonomous systems
- Construction — building information modelling (*new*)
- Common information sharing environment (CISE) for the EU maritime domain (*new*)



KEY ENABLERS AND SECURITY

5G

POLICY OBJECTIVES

The 2015 digital single market (DSM) strategy and the communication "Towards connectivity for a European gigabit society" identify very high-capacity networks like 5G as a key asset for global competitiveness. 5G is not fully standardised yet but its key specifications and technological foundations are already being developed and tested. The Commission launched a 5G public-private-partnership (the 5G-PPP) to that end in 2013[11]. In addition to fibre-like performance for mobile networks, the benefits of adopting 5G go beyond the telecom sector to enable a fully mobile and connected society and to empower socioeconomic transformations in a variety of ways (many of which are not possible at present). These transformations include higher productivity, sustainability, well-being[12] and innovation opportunities for smaller actors and start-ups. 5G makes possible a new wave of convergence possible through digital business models reaching non-ICT-native industrial sectors. In that context, the EU sees 5G as a core infrastructure to support the DSM strategy's wider objectives for the digitisation of the industry.

LEGISLATION AND POLICY DOCUMENTS

AT EUROPEAN LEVEL

The strategy for Digitising European Industry[13] and the Communication on ICT standardisation priorities for the digital single market[14] announced the European Commission's intention to develop a 5G action plan for EU-wide deployment, which was adopted in September 2016[15]. The communication draws on multiple consultations, events16 with stakeholders, a targeted survey[17], several studies[18], a 5G industry manifesto[19] and early results[20] of the 5G-PPP. It presents a set of targeted actions for a timely and coordinated deployment of 5G networks in Europe through a partnership between the Commission, Member States, and industry. It leverages the new opportunities offered by the revised telecommunication regulatory framework by putting it in the context of a concrete European project of high added value for businesses and citizen.

11 https://5g-ppp.eu
12 Next Generation Mobile Networks Alliance 5G White Paper, https://www.ngmn.org/de/5g-white-paper.html
13 https://ec.europa.eu/digital-single-market/en/digitising-european-industry
14 COM(2016) 176 final, page 8
15 COM(2016) 588 final 5G for Europe: An Action Plan and accompanying Staff Working Document SWD(2016) 306 on 5G Global Developments.
16 See: e.g. https://5g-ppp.eu/event-calendar/#
17 https://ec.europa.eu/digital-single-market/en/news/have-your-say-coordinated-introduction-5g-networks-europe
18 see footnotes 4 & 5 above
19 Industry Manifesto 7 July 2016: http://ec.europa.eu/newsroom/dae/document.cfm?action=display&doc_id=16579;
20 White paper 5G Empowering Vertical Industries: https://5g-ppp.eu/roadmaps/

PROPOSED NEW ACTIONS ON STANDARDISATION

The Communication on ICT standardisation priorities for the digital single market proposes priority actions on 5G, some of which are reflected below.

OTHER ACTIVITIES AROUND STANDARDISATION

ACTION 1 Global industry standards. Foster the emergence of global industry standards under EU leadership for key 5G technologies (radio access network, core network) and network architectures notably through the exploitation of 5G public-private partnership results in key EU and international standardisation bodies (3GPP, ITU, OPNFV)

ACTION 2 High-level events. Ensure that 5G standards are compatible with innovative use-cases of vertical industries, notably through broader participation of industries with sector-specific needs, in 5G standardisation organisations.

STANDARDISATION NEEDS, ONGOING ACTIVITIES AND PROGRESS REPORT

COMMISSION PERSPECTIVE AND PROGRESS REPORT

The Communication on ICT standardisation priorities[21] identifies 5G standards as key to competitiveness and the interoperability of global networks, with stakeholders from different standardisation cultures called upon to collaborate. It also details the actions required.

The standardisation agenda of 5G has largely been set out. The aim is early availability of standards for 'super' broadband solutions. Special focus is given to ultra-reliability and low latency, which are also targets for the first 5G wave. The second phase should deliver the standards for other use-cases, such as those related to industrial applications. Here, availability of standards promoting open innovation and opportunities for start-up is also key.

The European Commission has called on Member States and industry to commit to the following objectives:

- a standardisation approach that preserves future evolution capabilities and aims at availability of 5G global standards by end of 2019;
- a holistic standardisation approach encompassing both radio access and core networks as coordinated activities within global standardisation bodies, encompassing disruptive

21 COM(2016) 176 final

use-cases and promoting open innovation;
- establishment of cross-industry partnerships by 2017, at the latest, to support timely standard-setting, partly by leveraging international cooperation partnerships, in particular towards the digitisation of industry.

ONGOING STANDARDS ACTIVITIES

STANDARDS DEVELOPMENTS

ETSI (3GPP)

3G PP, the key standardisation global body for mobile communication network standardisation, officially started the standardisation process in September 2015, with an inception workshop in Phoenix that brought together more than 500 participants. Since then, it has laid down the timetable. 3G PP plans to deliver a first release, release 15 (mainly focused on broadband and including ultra-reliability and low latency) in mid 2018, while a second release covering the complementary use-cases, related to industry applications, should be available by the end of 2019 under 3G PP release 16.

IEEE

IEEE is leading an effort to build and mature 5G-related standards, and already has various standardisation activities on 5G and 5G-related technologies.
http://standards.ieee.org/develop/msp/5G.pdf
http://standards.ieee.org/develop/msp/iot.pdf.

ITU

In ITU, 5G technologies are discussed under the IMT-2020 banner.

ITU-T Focus Group on IMT-2020, established by ITU-T SG13, delivered a gap analysis document "overview of technical developments at the network part of the 5G networks" with 85 technical areas for application of the 5G standardisation efforts in the future.

Currently the Focus Group is working on a number of technical reports to cover network management framework and requirements for IMT-2020, framework of IMT-2020 network architecture, application of network softwarization to IMT-2020 and some others. http://itu.int/en/ITU-T/focusgroups/imt-2020

ITU-T SG13 started its work on 5G (network aspects) by exploring the requirements of IMT-2020 fixed-mobile convergence; mobile network slicing orchestration and management; and requirements and architectural aspects of multi-layer, multi-domain, and multi-technology orchestration in large-scale SDN.

These future studies are based on previous achievement like Recommendation ITU-T Y.3033 "Framework of data aware networking for future networks" and Supplement 35 to Y.3300-series on Data-aware networking — scenarios and use-cases.

OTHERS (INCLUDING STAKEHOLDER GROUPS, TECHNOLOGY PLATFORMS, AND RESEARCH PROJECTS

EC

There are several projects funded by the European Commission, dealing with 5G standardisation. Also, the 5G PPP deals with some issues connected to 5G standardisation.
https://5g-ppp.eu/

CLOUD COMPUTING

POLICY OBJECTIVES

Establishing a coherent framework and conditions for cloud computing was one of the key priorities of the digital agenda for Europe. The digital single market strategy confirmed the importance of cloud computing, which is driving a paradigm shift in the delivery of digital technologies, enhancing innovation, digital single market and access to content.

LEGISLATION AND POLICY DOCUMENTS

AT EUROPEAN LEVEL

- **COM(2016)176** "ICT Standardisation priorities for the digital single market"
- **COM(2016)178** "European cloud initiative — building a competitive data and knowledge economy in Europe" (Along with SWD(2016)106 and SWD(2016)107)
- **COM(2012)529** "Unleashing the potential of cloud computing in Europe"
- **COM(2015)192** "A digital single market strategy for Europe"

OTHER

'ICT Strategy of the German Federal Government: Digital Germany 2015' (TFRP011_DE_ict-strategy-digital-germany-2015.pdf), p.10.

'The new cloud computing action programme comprises four fields of activity: harnessing innovation and eIDAS market potential (research programme for secure Internet services, cloud computing for small and medium-sized enterprises and the public sector — trusted cloud); creating a pro-innovative framework (security and legal framework, standards, certification); co-shaping international developments; providing informational guidance'.

PROPOSED NEW ACTIONS ON STANDARDISATION

The Communication on ICT Standardisation Priorities for the digital single market proposes priority actions in the domain of Cloud. Actions mentioned below reflect some of them.

STANDARDS DEVELOPMENT

ACTION 1 Develop ICT standards needed to further improve the interoperability, data protection and portability of cloud services.

OTHER ACTIVITIES AROUND STANDARDISATION

ACTION 2 Promote the use of the ICT standards needed to further improve the interoperability, data protection and portability of cloud services.

ACTION 3 Increase the use of open source elements by better integrating open source communities into SDOs' standard setting processes, by the end of 2016.

ACTION 4 Facilitate the adoption of cloud computing services by supporting the finalisation of international standards on service level agreements (SLAs) and promotion and usage of the cloud code of conduct (CoC).

ACTION 5 ESOs are asked to update the mapping of cloud standards and guidelines for end-users (especially SMEs and the public sector), in collaboration with international SDOs, cloud providers and end users, by mid-2017. This action could also draw on the material developed, e.g. to update the standards mapping carried out by cloud standards coordination phases 1 & 2.

ACTION 6 Promote the use of the ISO/IEC JTC 1 reference cloud architecture and define generic cloud architecture building blocks. Map available standards to the generic cloud architecture building blocks. Define privacy, security and test standards for each building block. This will also help determine which standards can be used for open cloud platforms and architectures taking into account the key role of open source for cloud infrastructure design and implementations.

STANDARDISATION NEEDS, ONGOING ACTIVITIES AND PROGRESS REPORT

COMMISSION PERSPECTIVE AND PROGRESS REPORT

The proposed actions follow the direction as outlined in the EU Communication on ICT standardisation priorities which identified cloud as a key priority for Europe. The actions include a follow-up of cloud standards coordination started in 2012/2013 when the Commission asked ETSI to coordinate stakeholders to produce a detailed map of the necessary standards (e.g. for security, interoperability, data portability and reversibility). The ETSI Cloud Standards Coordination (CSC) Task Force http://csc.etsi.org reported on 11 December 2013. See: http://www.etsi.org/images/files/Events/2013/2013_CSC_Delivery_WS/CSC-Final_report-013-CSC_Final_report_v1_0_PDF_format-.PDF.

In February 2015, CSC Phase 2 was launched to address issues left open in Phase 1. Phase 2 focused its activities on cloud security, on users' needs, and on the relationship between open source and standards. It also produced an update to the Phase 1 report on cloud standards. The four reports consolidating the outcomes of CSC Phase 2 are available at http://csc.etsi.org/phase2.html.

ONGOING STANDARDS DEVELOPMENT

STANDARDS DEVELOPMENT

ETSI

Cloud standards coordination

http://csc.etsi.org/phase2.html

ISO/IEC

ISO/IEC JTC 1/SC 38: Cloud computing and distributed applications

A full suite of standards is available and in progress in ISO/IEC JTC 1 SC 38 on cloud computing technologies including, most notably, the ISO Cloud Reference Architecture but also work on vocabulary, SLAs, etc. This is complemented by work in ISO/IEC JTC 1 SC27 on cybersecurity and on more specific work as on Virtualisation. Below is a non-exhaustive list of relevant ISO standards.

http://www.iso.org/iso/jtc1_sc38_home

ISO/IEC 27017 — Code of practice for information security controls based on ISO/IEC 27002 for cloud services

ISO/IEC 27018 — Code of practice for personally identifiable information (PII) protection in public cloud acting as PII processors

ISO/IEC 27036-4 — Information security for supplier relationships — Part 4: Guidelines for security of cloud services

ISO/IEC 19086-1 — Cloud computing — service level agreement (SLA) framework and terminology — Part 1: Overview and concepts [publication imminent]

ISO/IEC 19941 Cloud Computing — Interoperability and portability

ISO/IEC 19944 Cloud Computing — Cloud services and devices: data flow, data categories and data use

ISO/IEC JTC 1/SC 27: Security Techniques: Development of standards for the protection of information and ICT

This includes generic methods, techniques and guidelines to address both security and privacy aspects

http://www.iso.org/iso/iso_technical_committee?commid=45306

ITU

ITU-T Study Group 13 leads ITU's work on standards for future networks and 5G and is the primary SG working on cloud computing. To this end, it approved 11 recommendations covering different aspects of cloud computing from terminology and overview to reference architecture and functional requirements for technologies supporting XaaS. This work is complemented by SG11 for cloud computing conformance and interoperability testing (Approved Q.Supplement 65 on Cloud computing interoperability activities and Recommendation ITU-T Q.4040 "The framework and overview of Cloud Computing interoperability testing") and SG17 for cloud computing security. The cloud computing roadmap, maintained by SG13, lists and points to cloud computing

standardisation efforts deliverables across telco/IT industry.

https://extranet.itu.int/sites/itu-t/Roadmaps/SitePages/JCA-Cloud-Standard.aspx

SG13 is progressing the work on distributed cloud, cloud service brokerage, data storage federation, containers and micro-services and requirements for physical machinery.

http://itu.int/ITU-T/go/sg13

IEEE

The IEEE Intercloud Testbed ("Testbed" for short) is creating a global lab — to prove and improve the intercloud, based on IEEE P2302 draft standard for Intercloud interoperability and federation. To that end, IEEE is partnering with companies, universities, and research institutions around the world to create a well-connected standards-based platform for the intercloud. The IEEE cloud computing testbed also could be used to experiment with other IEEE cloud computing products and services such as eLearning education modules.

http://standards.ieee.org/develop/msp/cloudcomputing.pdf.

IETF

The IETF has multiple groups working on standards for virtualisation techniques, including techniques used in cloud computing and data centers.

The L2VPN working group produced specifications defining and specifying solutions for supporting provider-provisioned Layer-2 Virtual Private Networks (L2VPNs). They are also addressing requirements driven by cloud computing services and data centers as they apply to Layer-2 VPN services.

The L3VPN working group is responsible for defining, specifying and extending solutions for supporting provider-provisioned Layer-3 (routed) Virtual Private Networks (L3VPNs). These solutions provide IPv4, IPv6, and MPLS services including multicast.

The Layer Three Virtual Private Network Service Model (L3SM) working group is tasked with creating a YANG data model that describes a L3VPN service (an L3VPN service model) that can be used for communication between customers and network operators, and to provide input to automated control and configuration applications.

The NVO3 working group develops a set of protocols and/or protocol extensions that enable network virtualization within a data center (DC) environment that assumes an IP-based underlay. An NVO3 solution provides layer 2 and/or layer 3 services for virtual networks enabling multi-tenancy and workload mobility, addressing the issues described in the problem statement (including management and security).

The System for Cross-domain Identity Management (SCIM) working group works on standardising methods for creating, reading, searching, modifying, and deleting user identities and identity-related objects across administrative domains, with the goal of simplifying common tasks related to user identity management in services and applications.

http://trac.tools.ietf.org/group/iab/trac/wiki/Multi-Stake-Holder-Platform#Cloud.

OGF

Open Grid Forum (OGF) is a leading standards development organisation operating in the areas of grid, cloud and related forms of advanced distributed computing. The OGF community pursues these topics through an open process for development, creation and promotion of relevant specifications and use-cases. http://www.ogf.org/

OMG

Object Management Group (OMG): the OMG's focus is always on modelling, and the first specific cloud-related specification efforts have only just begun, focusing on modelling deployment of applications & services on the clouds for portability, interoperability & reuse. http://www.omg.org/

Hosted by the OMG is the Cloud Standards Customer Council, which has produced a series of customer-oriented white papers on diverse topics related to cloud computing, all of which are publicly accessible at: http://www.cloud-council.org/resource-hub.htm

OASIS

OASIS hosts multiple standardisation projects for cloud computing management, interoperability and functionality, including

Cloud Application Management for Platforms (CAMP) https://www.oasis-open.org/committees/camp,

Cloud Authorisation project, the OASIS Identity in the Cloud project https://www.oasis-open.org/committees/id-cloud,

OASIS Open Data Protocol (Odata) Protocol https://www.oasis-open.org/committees/odata,

Topology and Orchestration Specification for Cloud Applications (TOSCA) https://www.oasis-open.org/committees/tosca. https://www.oasis-open.org/committees/tc_cat.php?cat=cloud

OTHERS (INCLUDING STAKEHOLDER GROUPS, TECHNOLOGY PLATFORMS, AND RESEARCH PROJECTS)

C-SIGS

Proposal to list deliverables from the cloud select industry groups as a contribution from Europe to the global cloud standardisation community.

3 SIGs have produced significant work:

SIG CoC: Code of Conduct for Protection of Personal Data in cloud services. Published in June 2016. Strong relationship with ISO/IEC 27018 standard.

SIG Certification: Security certifications relevant to cloud computing published by ENISA, along with an evaluation framework.

SIG SLA: Produced a report on SLAs relevant to the European market for cloud services, which was submitted to ISO/IEC SC38 committee as input to the work on the 19086 standards.

GICTF

Global Inter-Cloud Technology Forum (GICTF) is promoting standardisation of network protocols and the interfaces through which cloud systems inter-work with each other, to promote international interworking of cloud systems, to enable global provision of highly reliable, secure and high-quality cloud services, and to contribute to the development Japan's ICT industry and to the strengthening of its international competitiveness. http://www.gictf.jp/index_e.html.

OCC

The Open Cloud Consortium (OCC) supports the development of standards for cloud computing and frameworks for interoperating between clouds; develops benchmarks for cloud computing; and supports reference implementations for cloud computing, preferably open source reference implementations. The OCC has a particular focus in large data clouds. It has developed the MalStone Benchmark for large data clouds and is working on a reference model for large data clouds.

http://opencloudconsortium.org/

TM FORUM

TM Forum: The primary objective of TM Forum's Cloud Services Initiative is to help the industry overcome these barriers and assist in the growth of a vibrant commercial marketplace for cloud-based services. The centrepiece of this initiative is an ecosystem of major buyers and sellers who will collaborate to define a range of common approaches, processes, metrics and other key service enablers.

http://www.tmforum.org/DigitalServices/13907/home.html

SNIA

Storage Networking Industry Association (SNIA): The Cloud Work Group exists to create a common understanding among buyers and suppliers of how enterprises of all sizes and scales of operation can include cloud computing technology in a safe and secure way in their architectures to realise its significant cost, scalability and agility benefits. It includes some of the industry's leading cloud providers and end-user organisations, collaborating on standard models and frameworks aimed at eliminating vendor lock-in for enterprises looking to benefit from cloud products and services.

http://www.snia.org/cloud

MSP MEMBERS' AND STAKEHOLDERS' REMARKS

Coordination between ongoing standardisation development work is important.

The CSC activity conducted with ETSI's coordination has delivered great value to the discussion by identifying key use-cases for cloud and by mapping available standards to the use-case scenarios. This provides a good source of information on available and ongoing standards and standardisation activities and will be helpful to prevent duplication of effort and fragmentation of relevant cloud standards. It will also help determine which standards can be used for open cloud platforms and architectures taking into account the key role of open source for cloud infrastructure design and implementations.

The CSC task force (Phase 2) has mapped available standards in more detail and analysed standardisation needs in cloud security, has carried out an extensive survey to understand users' needs, and has analysed the relationship between open source and standards.

Existing standards should be checked to take account of the protection of individuals with regard to personal data processing and the free movement of such data under the General Data Protection Regulation. Specific standards for privacy/protection of personal data should be identified and where necessary developed.

Another factor for consideration in relation to cloud computing is work done in open source projects which address particular aspects of cloud computing (e.g. OpenStack (IaaS), Cloud Foundry (PaaS) and Docker (Container technology)). Open Source communities should be encouraged to collaborate with standardisation and submit their APIs for standardisation.

Network Functions Virtualization (NFV), Software Defined Networks (SDN) and Self Organizing Networks (SON) either singly or in combination offer an alternative design approach for new network infrastructure and services. NFV, SDN and SON are in a rapid and expansive state of standardisation and are supported by several large-scale Open Source projects. ETSI is supporting interoperability events, technology evaluations and Proofs of Concept (PoCs) as important tools in the development and standardisation of these embryo technologies. Related to NFV, Mobile Edge Computing (MEC) provides IT and cloud computing capabilities within the Radio Access Network (RAN) in close proximity to mobile subscribers. To application developers and content providers, the RAN edge offers a service environment with ultra-low latency and high bandwidth and direct access to real-time radio network information that can be used by applications and services to offer context-related services.

ETSI ISG NGP is investigating communications and networking protocols to provide the scale, security, mobility and ease of deployment required for a connected society. The industry has reached a point where forward leaps in the technology of the local access networks (such as LTE-A, G.FAST, DOCSIS 3.1 and 5G) will not deliver their full potential unless, in parallel, the entire infoComms protocol stacks evolve more holistically. The driving vision is a considerably more efficient Internet that is far more attentive to user demand and responsiveness — whether "the user" is human or millions of things. Therefore, the ISG will stimulate closer cooperation over standardisation efforts for generational changes in communications and networking technology.

PUBLIC SECTOR INFORMATION, OPEN DATA AND BIG DATA

POLICY OBJECTIVES

With the continuously growing amount of data (often referred to as 'big data') and the increasing amount of open data, interoperability is increasingly a key issue in exploiting the value of this data.

Standardisation at different levels (such as metadata schemata, data representation formats and licensing conditions of open data) is essential to enable broad data integration, data exchange and interoperability with the overall goal of fostering innovation based on data. This refers to all types of (multilingual) data, including both structured and unstructured data, and data from different domains as diverse as geospatial data, statistical data, weather data, public sector information (PSI) and research data (see also the rolling plan contribution on 'e-Infrastructures for data and computing-intensive science'), to name just a few.

LEGISLATION AND POLICY DOCUMENTS

AT EUROPEAN LEVEL

- **COM(2014) 442** Towards a thriving data-driven economy
- **COM(2016) 176** ICT Standardisation Priorities for the Digital Single Market
- **COM(2017)** 9 final Building a European Data Economy:
- **A Communication on Building a European Data Economy has been adopted on 10/01/2017.** This Communication explores the following issues: free flow of data; access and transfer in relation to machine generated data; liability and safety in the context of emerging technologies; and portability of non-personal data, interoperability and standards. Together with the Communication the Commission has launched a public consultation.
- **Decision (EU) 2015/2240** on interoperability solutions and common frameworks for European public administrations, businesses and citizens (ISA^2 programme) as a means for modernising the public sector (ISA^2)
- **The revised PSI Directive (2013/37/EU)** on the re-use of public sector information (Public Sector Information Directive) was published in the Official Journal on 27 June 2013. The Directive requests to make available for reuse PSI by default, preferably in machine-readable formats. All Member States, with one exception, have currently (January 2017) transposed it into national legislation.
- **COM(2011) 882** on Open data
- **COM(2011) 833 on the reuse of Commission documents**
- **COM(2015)192** "A Digital single market strategy for Europe"

PROPOSED NEW ACTIONS ON STANDARDISATION

The Communication on ICT Standardisation Priorities for the Digital Single Market proposes priority actions in the domain of Big Data. Actions mentioned herein below reflect some of them.

OTHER ACTIVITIES AROUND STANDARDISATION

ACTION 1 Invite the CEN to support and assist the DCAT-AP standardisation process. DCAT-AP is based on the data catalogue vocabulary (DCAT). It contains specifications for metadata records to meet the specific application needs of data portals in Europe while providing semantic interoperability with other applications on the basis of reuse of established controlled vocabularies (e.g. EuroVoc[22]) and mappings to existing metadata vocabularies (e.g. SDMX, INSPIRE metadata, Dublin Core, etc.). DCAT-AP and its extensions have been developed by multi-sectorial expert groups. Experts from international standardisation organisations participated in the group together with open data portal owners to ensure the interoperability of the resulting specification and to assist in its standardisation. These mappings have provided already a DCAT-AP extension to cover geospatial datasets, called GEO/DCAT-AP. The specification was developed under the coordination of the JRC team working on the implementation of the INSPIRE Directive. Another extension to describe statistical datasets, called STAT/DCAT-AP[23], was published end 2016. This work has been coordinated by EUROSTAT and the Publications Office.

22 http://eurovoc.europa.eu/drupal/
23 https://joinup.ec.europa.eu/asset/stat_dcat_application_profile/home

ACTION 2 Promote standardisation in/via the open data infrastructure, especially the European Data Portal being deployed in 2015-2020 as part of the digital service infrastructure under the Connecting Europe Facility programme,

ACTION 3 Support of standardisation activities at different levels: H2020 R&D&I activities; support for internationalisation of standardisation, in particular for the DCAT-AP specifications developed in the ISA programme (see also action 2 under eGovernment), and for specifications developed under the Future Internet public-private-partnership, such as FIWARE NGSI and FIWARE CKAN.

ACTION 4 Bring the European data community together, including through the H2020 Big Data Value public-private partnership, to identify missing standards and design options for a big data reference architecture, taking into account existing international approaches.

ACTION 5 Encourage the CEN to coordinate with the relevant W3C groups on preventing incompatible changes and on the conditions for availability of the standard(s), to standardise the DCAT-AP.

STANDARDISATION NEEDS, ONGOING ACTIVITIES AND PROGRESS REPORT

COMMISSION PERSPECTIVE AND PROGRESS REPORT

Overall, the application of standard and shared formats and protocols for gathering and processing data from different sources in a coherent and interoperable manner across sectors and vertical markets should be encouraged, for example in R&D&I projects and in the EU open data portal (https://data.europa.eu/euodp) and the European data portal (https://data.europa.eu/europeandataportal).

Studies conducted for the European Commission showed that businesses and citizens were facing difficulties in finding and re-using public sector information. The Communication on Open data states that "the availability of the information in a machine-readable format and a thin layer of commonly agreed metadata could facilitate data cross-reference and interoperability and therefore considerably enhance its value for reuse". [24]

A common standard for the referencing of open data in the European open data portals would be useful. A candidate for a common standard in this area is the data catalog vocabulary (DCAT) in collaboration with FIWARE open stack-based specification and open standards APIs[25] (see section below)

The DCAT Application Profile has been developed as a common project from the ISA programme, the Publications Office (PO) and CNECT to describe public-sector data catalogues and datasets and to promote the specification to be used by data portals across Europe. Agreeing on a common application profile and promoting this among the Member States will substantially improve the interoperability among data catalogues and the exchange between of data between Member States. The DCAT-AP is the specification used by the European Data Portal, which is part of the Connecting Europe Facility infrastructure. The DCAT-AP and GeoDCAT-AP work also highlighted the need for further work on the core standard. These are topics for the W3C smart descriptions & smarter vocabularies (SDSVoc) under the VRE4EIC Project https://www.w3.org/2016/11/sdsvoc/ .

The mapping of existing relevant standards for a number of big data areas would be beneficial. Moreover, it might be useful to identify European clusters of industries that are with sufficiently similar activities to develop data standards. Especially for open data, the topics of data provenance and licensing (for example the potential of machine-readable licences) need to be addressed, as encouraged in the revised PSI Directive (see section on legislation).

The revised PSI Directive encourages the use of standard licences which must be available in digital format and be processed electronically (Article 8(2)). Furthermore, the Directive encourages the use of open licences available online, which should eventually become common practice across the EU (Recital 26). In addition, to help Member States transpose the revised provisions, the Commission adopted guidelines[26] which recommend the use of such standard open licences for the reuse of PSI.

24 see http://ec.europa.eu/information_society/policy/psi/docs/pdfs/report/final_version_study_psi.docx for an overview and http://ec.europa.eu/information_society/policy/psi/docs/pdfs/opendata2012/open_data_communication/en.pdf

25 see http://www.europeandataportal.eu/en/content/edp-and-fiware-launch-new-partnership

26 http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.C_.2014.240.01.0001.01.ENG

ONGOING STANDARDS DEVELOPMENT

STANDARDS DEVELOPMENT

ITU-T

Recommendation Y.3600 provides requirements, capabilities and use-cases of cloud computing based big data together with the system context. Cloud computing-based big data provides the capability to collect, store, analyse, visualize and manage varieties of large volume datasets, which cannot be rapidly transferred and analysed using traditional technologies.

http://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=9853

The ITU workshop on "Big Data" (June 2014) discussed standards needs for big data in the telecommunications sector and adopted an outcome document.

http://itu.int/en/ITU-T/Workshops-and-Seminars/bigdata

SG13 has developed a definition for big data and most importantly a roadmap for big data standardisation in ITU-T, including the standardisation landscape, identification/prioritization of technical areas and possible standardisation activities. It has now been published as Supplement 40 to Y.3600-series Recommendations "Big Data Standardisation Roadmap". The work is progressing on big data exchange framework and requirements, requirements for data provenance, functional architecture of big data as a service and some aspects of big data-driven networking.

W3C

DCAT vocabulary (done in the linked government data W3C working group)

http://www.w3.org/TR/vocab-dcat/

W3C

Planning a workshop and probably a new WG in 2017 on DCAT-AP standardisation. Data on the web best practices (https://www.w3.org/TR/dwbp) also covers this, together with data quality, data usage and the need for licence info (https://www.w3.org/TR/vocab-dqv ; https://www.w3.org/TR/vocab-duv , https://www.w3.org/TR/odrl-model/)

See also the Permissions & Obligations Expression WG which is funded by the Big Data Europe project (https://www.w3.org/2016/poe/ and https://www.big-data-europe .

OASIS

The project addresses querying and sharing of data across disparate applications and multiple stakeholders for reuse in enterprise, cloud, and mobile devices. Specification development in the OASIS OData TC builds on the core OData Protocol V4 released in 2014 and addresses additional requirements identified as extensions in four directional white papers: data aggregation, temporal data, JSON documents, and XML documents as streams.

https://www.oasis-open.org/committees/tc_home.php?wg_abbrev=odata

OASIS

ODF is an open, standardised format for reports, office documents and free-form information, fully integrated with other XML systems, and increasingly used as a standard format for publicly-released government information. Link:

https://www.oasis-open.org/committees/office
https://www.oasis-open.org/committees/odata

OASIS XML Localisation Interchange File Format (XLIFF):

https://www.oasis-open.org/committees/xliff

ISO/IEC JTC1

WG 9 — Big Data. This working group was formed at the November 2014 JTC1 Plenary. They have begun working on requirements, use-cases, vocabulary and a reference architecture for big data

IEEE

IEEE has a pre-standardisation activity on open data:

http://standards.ieee.org/develop/msp/open-big-data.pdf

OGC

The Open Geospatial Consortium (OGC) defines and maintains standards for location-based, spatio-temporal data and services. The work includes, for instance, schema allowing description of spatio-temporal sensor, image, simulation, and statistics data (such as "datacubes"), a modular suite of standards for Web services allowing ingestion, extraction, fusion, and (with the web coverage processing service (WCPS) component standard) analytics of massive spatio-temporal data like satellite and climate archives. OGC also contributes to the INSPIRE project.
http://www.opengeospatial.org

OTHERS

ISA AND ISA SQUARE PROGRAMME OF THE EUROPEAN COMMISSION

The DCAT application profile (DCAT-AP) has been defined. DCAT-AP is a specification based on DCAT (a RDF vocabulary designed to facilitate interoperability between data catalogues published on the web) to enable interoperability between data portals, for example to allow metasearches in the European Data Portal that harvests data from national open data portals.

Extensions of the DCAT-AP to spatial (GeoDCAT-AP: https://joinup.ec.europa.eu/node/139283) and statistical information (StatDCAT-AP: https://joinup.ec.europa.eu/asset/stat_dcat_application_profile/home) have also been developed.
https://joinup.ec.europa.eu/asset/dcat_application_profile/description
https://joinup.ec.europa.eu/asset/dcat_application_profile/asset_release/dcat-ap-v11

CEF

Under the framework of the Connecting Europe Facility programme support to the interoperability of metadata and data at national and EU level is being developed through dedicated calls for proposals

SHARE-PSI 2.0, PROJECT FUNDED BY CNECT AND LED BY GEIE ERCIM (EUROPEAN HOST OF W3C)

Developed a set of high-level policy-related best practices for sharing public sector information that complement
the more technical W3C data on the web best practices, see https://www.w3.org/2013/share-psi/bp/.

The project also created and collated a set of 40 implementation guides from different Member States and beyond.

EU COMMISSION

A smart open data project by DG ENV led directly to the establishment of the Spatial Data on the Web Working group, a collaboration between W3C and the OGC.

G8 OPEN DATA CHARTER

In 2013, the EU endorsed the G8 Open Data Charter and, with other G8 members, committed to implementing a number of open data activities in the G8 members' collective action plan (publication of core and high-quality datasets held at EU level, publication of data on the EU open data portal and the sharing of experiences of open data work).

FUTURE INTERNET PUBLIC PRIVATE PARTNERSHIP PROGRAMME

Specifications developed under the Future Internet public-private-partnership programme (FP7):

FIWARE NGSI is an API for context information management that provides a lightweight and simple means to gather, publish, query and subscribe to context information. FIWARE NGSI can be used for real-time open data management.

FIWARE CKAN: Open Data publication Generic Enabler. FIWARE CKAN is an open source solution for the publication, management and consumption of open data, usually, but not only, through static datasets. FIWARE CKAN allows its users to catalogue, upload and manage open datasets and data sources. It supports searching, browsing, visualising and accessing open data

BIG DATA VALUE CPPP TF6 SG6 ON BIG DATA STANDARDISATION:

In the big data value contractual public-private-partnership, a dedicated subgroup (SG6) of Task Force 6: Technical deals with big data standardisation.

ISÆN

At the CEN workshop on a "Unique identifier for personal data usage control in big data" which took place on 27/06/2016, the design of an algorithmic-based indicator called ISAEN was proposed.

MSP MEMBERS' AND STAKEHOLDERS' REMARKS

Existing standards should be checked to take account of the protection of individuals with regard to personal data processing and the free movement of such data in the light of data protection principles. Specific privacy by design standards should be identified and when necessary developed.

Since early 2014, French companies and public bodies have been working in the French association for standardisation AFNOR on a white paper on expectations regarding standards for big data; see http://www.afnor.org/liste-des-actualites/actualites/2015/juin-2015/big-data-impact-et-attentes-pour-la-normalisation-decouvrez-le-livre-blanc-afnor

The report identified several priorities:

- Data access including open data and governance of data within companies (enhanced exploitation, data quality, security): mix the requirements of big data into the existing management standards. The development of a standard regarding data management could be considered.
- Data transformation, where three elements are identified:
  - Processes and methods of reversibility in pseudonymisation algorithms, evaluation of system performance (ex: Hadoop), NoSQL query language, or visualisation and manipulation process of big data results ;
  - Adapt infrastructures to big data, like cloud computing for storage and massively parallel architectures;
  - Data quality and data identification
    - criteria and methods for characterising sources and information, in terms of perceived quality and trust in a specific context ;
    - indexing of unstructured data coming from social networks and data associated with mobility and sensors ;
- Identifying the use-cases for big data is essential. Highly visible issues for end-users should be addressed: technical interoperability, SLAs, traceability of treatment, data erasure, regulatory compliance, data representation, APIs, etc.

INTERNET OF THINGS

POLICY OBJECTIVES

The Internet of Things (IoT) is a key priority area of the digital single market. The IoT is an emerging technology that connects more objects to the internet — including household equipment, wearable electronics, vehicles and sensors. The number of such connected devices is expected to exceed 20 billion by 2020. Besides the innovation potential in many industrial sectors, the IoT also has the potential to help address many societal challenges including climate change, resource and energy efficiency and ageing.

A large number of proprietary or semi-closed solutions to address specific problems have emerged, leading to non-interoperable concepts, based on different architectures and protocols. Consequently, the deployment of truly IoT applications, i.e. where information of connectable "things" can be flexibly aggregated and scaled, has been limited to a set of "intranets of things — or goods".

In the emerging IoT economy, voluntary global standards can accelerate adoption, drive competition, and enable cost -effective introduction of new technologies. A certain level of standardisation can facilitate interoperability, compatibility, reliability, security and effective operations on a global scale among different technical solutions, stimulating industry innovation and provide a clearer technology evolution path.

Industry is in the best position to develop the technological standards and solutions to address global IoT ecosystem opportunities and challenges. Therefore, there is a need for a secure solution that is interoperable and scales across a global IoT ecosystem. In this context, the European large-scale pilots (LSP), which were the subject of a call for proposals in 2016. The LSPs will support the deployment of IoT solutions, by enhancing and testing their acceptability and adoption by users and the public, and by fostering new market opportunities for suppliers to the EU.

Large-scale pilots should provide the opportunity to demonstrate actual IoT solutions in real-life settings and should make it possible for providers to test business.

LEGISLATION AND POLICY DOCUMENTS

AT EUROPEAN LEVEL

COM(216) 176: ICT standardisation priorities for the digital single market

COM(2016) 180: Digitising European industry reaping the full benefits of a digital single market

SWD(2016) 110/2: Advancing the internet of things in Europe

COM(2009)278: "Internet of Things — An action plan for Europe": Standardisation will play an important role in the uptake of IoT, by lowering entry barriers to newcomers and operating costs for users, by being a prerequisite for interoperability and economies of scale and by allowing industry to better compete at international level. IoT standardisation should aim at rationalising some existing standards or developing new ones where needed.

BEREC BoR (16)39, Report on enabling the Internet of Things
http://berec.europa.eu/eng/document_register/subject_matter/berec/reports/5755-berec-report-on-enabling-the-internet-of-things

PROPOSED NEW ACTIONS ON STANDARDISATION

The Communication on ICT standardisation priorities for the digital single market proposes priority actions in the domain of internet of things. Actions mentioned below reflect some of them.

OTHER ACTIVITIES AROUND STANDARDISATION

ACTION 1 Finalise the IoT standards gap analysis. This should include an understanding of user needs, including the accessibility needs of users. Continue activities on standards landscaping and gap analysis as set up in ETSI with a specialist task force to perform these tasks, aiming to develop a set of deliverables as a reference for the LSPs:

Standards landscape for IoT (who does what, what are the next milestones) and identification of potential interworking frameworks (e.g. oneM2M)

Analysis of any remaining gaps to be addressed in standards to achieve the IoT vision.

ACTION 2 Establish some cooperation among SDOs working on standards landscaping and gap analysis in order to leverage on the results and reduce duplication of work and efforts.

ACTION 3 Address the semantics of standards for better data interoperability.

ACTION 4 High-level events — Hold thematic workshops for specific industries. DG CNECT is following up internet standardisation and maintains contacts at the highest level with key European and international SDOs that could be used to organise roundtables or other high-level involving key SDO figures, policymakers and global industry and the Commission.

STANDARDISATION NEEDS, ONGOING ACTIVITIES AND PROGRESS REPORT

COMMISSION PERSPECTIVE AND PROGRESS REPORT

The proposed actions on IoT follow the direction as outlined in the EU communication on ICT standardisation priorities which identified the cloud as a key priority for Europe.

ETSI has been asked to map standards for IoT. As many relevant standards already exist, a gap analysis is the next step, taking into account the most promising business models and use-cases.

The need is to correctly position IoT standardisation vis-à-vis existing initiatives such as ISO/IEC JTC 1 WG10, oneM2M, and the ITU Study Group 20.

IoT standards will notably support the emergence of business models unleashing the commercial capabilities of systems and devices integrations. Beyond identifying standards, it is also important to identify reference models of implementation that businesses can share. This approach was followed in the Future Internet PPP (FI-PPP).

ONGOING STANDARDS ACTIVITIES

STANDARDS DEVELOPMENT

CEN

TC 225 is about edgeware data capture: bar code, RFID and RTLS. It is clear that these technologies will be part of the deployment of IoT applications. Some future IoT scenarios will be intended to manage sensitive data and any information leakage could seriously compromise users' privacy.

A dedicated working group (WG6) (Internet of Things — Identification, Data Capture and Edge Technologies) was set up in 2013 to focus on the interface between edge data capture technologies and the IoT. The work to be done will include data structures and associated resolution, authentication, security and privacy issues.

Given the work that was done for mandate M/436 (Privacy and public awareness of RFID applications), CEN/TC225 has the expertise and legitimacy to be involved in future standards development regarding IoT edge technologies and privacy.

Two work items have been approved at stage 0:

One technical specification: AIDC technologies — Internet of Things — AIDC object identifier structures

One technical report: AIDC Technologies — Internet of Things — relevant CEN ICT standards

This TR could be done in collaboration with other CEN/TC involved in the development of IoT. This could be also done in collaboration with other ESOs
http://standards.cen.eu/dyn/www/f?p=204:7:0::::FSP_ORG_ID:6206&cs=1E12277AECC001196A7556B8DBCDF0A1C

ETSI

In ETSI, IoT — in its strictest definition — is mainly developed in ETSI Technical Bodies of the ETSI Connecting Things Cluster.

ETSI is addressing the issues raised by connecting potentially billions of smart objects into a communications network, by developing standards for:

- data security
- data management
- data transport
- data processing

This will ensure interoperable and cost-effective solutions, open up opportunities in new areas such as eHealth and smart metering, and allow the market to reach its full potential.

Machine-to-Machine (M2M) communications will form the foundation for:

- smart devices
- smart appliances
- smart homes
- smart buildings
- smart cities

ETSI's work focuses on services and applications, especially aspects of the IoT and smart appliances. We are addressing an application-independent 'horizontal' service platform which is capable of supporting a very wide range of services including smart metering, smart grids, eHealth, city automation, consumer applications and connected vehicles.

As one of the founding partners of oneM2M, the global M2M

Partnership Project, ETSI plays a key role in ensuring the most efficient deployment of M2M communications systems.

The initial goal of oneM2M is to create a common M2M Service Layer which can be readily embedded within different hardware and software, connecting the numerous devices in the field with M2M application servers worldwide.

oneM2M has published its Release 2 in August 2016. The first oneM2M release includes specifications covering requirements, architecture, protocols, security, and management, abstraction and semantics and Release 2 added new functionality, particularly by expanding management, abstraction and semantics.

Release 2 published in August and freely available at www.oneM2M.org It is made up of 17 Technical Specifications and 9 Technical Reports. In ETSI SmartM2M, cooperation with AIOTI is foreseen to support 2017-2020 H202 IoT LSP on (semantic) interoperability, cross sector shared IoT reference architecture (high-level architecture), security and privacy.

ETSI, with the support of the Commission, has developed the SAREF standard (ETSI TS 103 264 V1.1.1), which is a first ontology standard in the Internet of Things (IoT) ecosystem and sets a template and a base for development of similar standards for the other verticals to unlock the full potential of IoT.

The new standard and SAREF allow appliances, of any type, make or manufacturer, to exchange energy related information, with any energy management system (at home or in the cloud) for energy management and keeping the user informed.

IEEE

The IEEE Standards Association (IEEE-SA) has created a working group to develop its standard for an architectural framework for the IoT (P2413). In addition, IEEE has a number of existing standards, projects in development, activities, and events that are directly related to creating the environment needed for a vibrant IoT, recognising the value of the IoT to industry and the benefits this technology innovation brings to the public http://standards.ieee.org/develop/msp/iot.pdf.

IETF

The IETF has a number of working groups working on IoT.
The 6LOWPAN working group developed standards to ensure interoperability between smart object networks and defining the necessary security and management protocols and constructs for building such networks.

6LO WG is applying IPv6 adaptation mechanisms, similar to those developed by the 6LOWPAN WG, to a wider range of radio technologies, including "bluetooth low energy" (RFC 7668), ITU-T G.9959 (as used in Z-Wave, RFC 7428), and the digital enhanced cordless telecommunications (DECT) ultra-low energy (ULE) cordless phone standard and the low-cost wired networking technology master-slave/token-passing (MS/TP), which is widely used over RS-485 in building automation.

The Lightweight Implementation Guidance (LWIG) Working group focuses on helping implementers of the smallest devices. The goal is to be able to build minimal yet interoperable IP-capable devices for the most constrained environments.

The ROLL working group is developing standards to support the routing of communications within low-power and lossy networks.

The Constrained Restful Environments (CoRE) working group is specifying protocols that allow applications running in resource-constrained environments to interoperate with each other and the rest of the Internet. CoRE is still one of the most active IoT groups. Its main output centres around the "Constrained Application Protocol" (CoAP, RFC 7252), a radically simplified UDP-based analogue to HTTP. Extensions to CoAP enable group communications (RFC 7390) and low-complexity server-push for the observation of resources (RFC 7641). This is complemented by a discovery and self-description mechanism based on a web link format suitable for constrained devices (RFC 6690). Current WG activities focus on extensions that enable transfer of large resources, use of resource directories for coordinating discovery, reusable interface descriptions, and the transport of CoAP over TCP and TLS. The CoRE WG is being retasked to include RESTCONF-style management functions and publish-subscribe style communication over CoAP. CoRE is also looking at a data format to represent sensor measurements, which will benefit from the "Concise Binary Object Representation" (CBOR) (RFC 7049), a JSON analogue optimised for binary data and low-resource implementations.

Security aspects of the IoT are being addressed in the following WGs:

The Authentication and Authorisation for Constrained Environments (ACE) WG (https://tools.ietf.org/wg/ace/charters) is working on a standardized solution for authentication and authorisation to enable authorised access to resources on a device in constrained environments. In such environments, typical for the IoT, the network nodes are limited in CPU, memory and power. This work is supported by the recently chartered COSE WG that is building simplified CBOR analogues for the JSON object signing and encryption methods that were developed in the JOSE WG.

The DTLS In Constrained Environments (DICE) WG (https://tools.ietf.org/wg/dice/charters) focuses on supporting the use of DTLS transport-layer security in these environments. Such constrained environments, including constrained devices (e.g. memory, algorithm choices) and constrained networks (e.g. PDU sizes, packet loss) are typical for the IoT, Smart grids, etc.

While the IoT-oriented IETF working groups have already produced the first wave of mature standards for IoT, new research questions are emerging based on the use of those standards. The IRTF Thing-to-Thing Research Group (T2TRG) was chartered in 2015 to investigate open research issues in IoT, focusing on issues that exhibit standardisation potential at the IETF.
http://trac.tools.ietf.org/group/iab/trac/wiki/Multi-Stake-Holder-Platform#IOT

ISO/IEC JTC 1

ISO/IEC JTC 1 WG 10 (Internet of Things): developing ISO/IEC 30141 — IoT reference architecture

WG 10 work is ongoing on the following work areas:

Terms and definitions for JTC 1 IoT Vocabulary (ISO/IEC 20924)

IoT reference architecture which is flexible and easily extended to various types of applications (ISO/IEC 30141)

Support for interoperability of IoT systems in terms of framework, networking, syntactic and sematic interoperability (ISO/IEC 21823-1)

Diverse use-cases covered by IoT

Monitoring the ongoing regulatory, market, business and technology IoT requirements

IoT standards that build on the foundational standards in relevant JTC 1 subgroups

Documents from JTC 1/WG 10 can be found here:

http://isotc.iso.org/livelink/

livelink?func=ll&objId=16911907&objAction=browse&viewType=1

http://www.iso.org/iso/iso_technical_committee%3Fcommid%3D45020

JTC1/WG10 has also performed a standards gap analysis, and an IoT vocabulary.

SC27 deals with a broad set of standards in the areas of security and data protection ("privacy"). Many of the existing standards can be applied to IoT systems, such as the ISO/IEC 27001 standard on information security management.

SC27 is currently running two separate study groups, one looking at the security of IoT systems and the other examining privacy as applied to IoT systems. It is expected that any new proposed standards for security and for privacy of IoT systems will emerge from these study groups.
http://www.iso.org/iso/jtc1_home.html

ITU

The ITU-T Study Group 20 on "IoT and its applications, including smart cities and communities" was created in June 2015. It provides a specialized IoT standardisation platform for the development of a cohesive set of IoT international standards (ITU-T recommendations). It concentrates in a single TC the core IoT studies and has taken over the work previously done in the IoT Global Standards Initiative (IoT-GSI).

http://itu.int/go/tsg20

Definition of IoT in recommendations ITU-T Y.2060 "Overview of the IoT" http://itu.int/itu-t/Y.2060

IoT-relevant recommendations have been developed in various ITU-T study groups and are now wound under the Y.4000 sub-series of recommendations maintained by ITU-T SG20.

Among the recently approved standards are Y.4111 "Semantics-based requirements and framework of the IoT", Y.4112 "Requirements of the plug and play capability of the IoT" and Y.4552 "Application support models of the IoT".

The ITU-T joint coordination activity on IoT and smart cities and Communities (JCA-IoT and SC&C) continues its role of promoting international coordination among SDOs in this area of standardisation. http://itu.int/en/ITU-T/jca/iot

JCA-IoT and SC&C maintains the global online IoT standards roadmap

http://itu.int/en/ITU-T/jca/iot/Documents/deliverables/Free-download-IoT-roadmap.doc

ITU-T SG11 is active in IoT interoperability testing.

OASIS

OASIS runs a TC on message queuing telemetry transport (MQTT) https://www.oasis-open.org/committees/mqtt. It is producing a standard for the MQTT protocol compatible with MQTT V3.1, together with requirements for enhancements, documented usage examples, best practices, and guidance for use of MQTT topics with commonly available registry and discovery mechanisms. As an M2M/IoT connectivity protocol, MQTT is designed to support messaging transport from remote locations/devices involving small code footprints (e.g. 8-bit, 256KB ram controllers), low power, low bandwidth, high-cost connections, high latency, variable availability, and negotiated delivery guarantees. MQTT also has been approved as ISO/IEC 20922:2016

https://www.oasis-open.org/committees/tc_home.php?wg_abbrev=mqtt

OASIS also runs advanced message queuing protocol (AMQP) description: ubiquitous, secure, reliable internet protocol for high-speed transactional messaging. AMQP also has been approved as ISO/IEC 19464:2014

https://www.oasis-open.org/committees/amqp.

3GPP

GERAN group is in charge of 2G standardisation and the RAN group, of 3G-4G standardisation (including the subgroup for connected objects in 4G, called LTE MTC).

OIC

OIC works on defining the connectivity requirements for devices including the definition of the specification, certification and branding to deliver reliable interoperability; IP protection; and providing an open source implementation of the standard.
http://openinterconnect.org/developer-resources/specs/

W3C

W3C's web of things https://www.w3.org/WoT/ is to support overcoming the fragmentation of the IoT by introducing a web-based abstraction layer capable of interconnecting existing IoT platforms and complementing available standards

OGC

The Open Geospatial Consortium (OGC) defines and maintains standards for location-based, spatio-temporal data and services. Some of the work is related to IoT, e.g. a modular suite of standards for web services allowing ingestion, extraction, fusion, and (with the web coverage processing service (WCPS) component standard) analytics of massive spatio-temporal data like satellite and climate archives. http://www.opengeospatial.org

OTHERS (INCLUDING STAKEHOLDER GROUPS, TECHNOLOGY PLATFORMS, AND RESEARCH PROJECTS

AIOTI

The Alliance for Internet of Things Innovation (AIOTI) was initially created under the Commission's auspices in 2015. Its goals are to promote interoperability and convergence between standards, to facilitate policy debates and to prepare a Commission's initiative for large scale testing and experimentation, tabled for 2016. AIOTI has meanwhile been transformed and set up as a stand-alone organisation. Forging new alliances between IoT sectors, stakeholders, large companies, SMEs and start-ups help Europe get a global lead in this field and will foster a digital single market for IoT.

AIOTI Working group 3 focuses on standardisation.

The Commission published a EUR 51 million call (H2020 ICT-30). The initiative cuts across several technological areas (smart systems integration, cyber-physical systems, smart networks, big data), and targets SME and IoT innovators for to create an open IoT environment.

Among AIOTI's European largest technical and digital companies are:

- Alcatel, Bosch, Cisco, Hildebrand, IBM, Intel, Landis+Gyr, Nokia, ON Semiconductor , Orange , OSRAM, Philips, Samsung , Schneider Electric, Siemens, NXP Semiconductors, STMicroelectronics, Telecom Italia, Telefonica, Telit, Vodafone, Volvo, and start-ups (SIGFOX)…

- Representatives of different industries: nanoelectronics/ semiconductor companies, telecom companies, network operators, platform providers (IoT/Cloud), security, service providers,

sectors: energy, utilities, automotive, mobility, lighting, buildings, manufacturing, healthcare, supply chains, cities etc.

https://ec.europa.eu/digital-agenda/en/news/launch-alliance-internet-things-innovation

EC

Several projects funded by the European Commission, integrated in the Internet of Things Research in Europe Cluster (IERC), deal with aspects of standardisation in IoT: CALIPSO, GAMBAS, IOT.EST, OPENIOT, UIOT6, SPRINT and PROBE-IT. In particular:

- OPENIOT deals with standardisation of open source solution for creating utility/cloud-based environments of internet-connected objects,
- SPRINT has an active contribution to W3C (web services), OMG (e.g. on exchange formats, APIs) and OASIS (data exchange formats),
- PROBE-IT validates standards or pre-standards at European and international level and performs pre-standardisation research work on standardisation requirements.

The Future Internet PPP (FI-PPP) also deals with some issues connected to standardisation for the IoT.

IVA

IoT is a subproject of ´ICT for Sweden´, with the objective of supporting the entire value chain, from business benefits to sensors.

http://www.iva.se/IVA-seminarier/Internet-of-Things-IoT---fran-affarsnytta-till-sensorer/

UK

The KTN (Knowledge Transfer Network) has an IoT interest group

https://connect.innovateuk.org/web/internet-of-things

FINLAND

An IoT cluster supports investment in IoT

http://www.investinfinland.fi/industries/rd-and-innovation/internet-of-things-in-finland/124

LORA ALLIANCE

Specifications intended for wireless battery-operated things in regional, national or global networks. LoRaWAN targets key requirements of the IoT such as secure bi-directional communication, mobility and localisation services

IIC

Works on promoting the uptake of technologies around the industrial internet including:

- building confidence around new and innovative approaches to security;
- developing use-cases and test beds;
- influencing global standards development; and
- facilitating open forums to share and exchange best practices.

MSP MEMBERS' AND STAKEHOLDERS' REMARKS

There are a number of global activities ongoing in the area of IoT standardisation. In particular there are: the oneM2M partnership project, to which ETSI contributes; relevant standardisation activities in IEC; a focus group in ISO/IEC JTC 1; the standards project on MQTT in OASIS; the IoT reference architecture; and the IoT Interoperability standards at ISO/IEC JTC/1 WG10.

The IoT requirements of e.g. from retail manufacturing, the automotive, aeronautics, pharmaceutical, and medical equipment industries and the medical sector in general should be taken fully into consideration. Security, privacy, and management of control of the access to and ownership of data are essential for the development of IoT. Without acceptance by commercial users and consumers, the role of IoT would be limited to specific vertical markets. Wide acceptance is essential in commoditising IoT mechanismes and make them accessible e.g. to manufacturing and for manufactured products, or into m/e/Health applications.

IoT requires the interlinking of often disparate standards. These standards are often the product of different SDOs. There is a need to bring these bodies and their standards together to achieve the often small changes needed to allow products and services to interoperate.

Existing standards should be checked to take account of the protection of individuals with regard to personal data processing and the free movement of such data in the light of the proposal for a General Data Protection Regulation. Specific privacy by design standards should be identified and where necessary developed.

CYBERSECURITY / NETWORK AND INFORMATION SECURITY

POLICY OBJECTIVES

The European cybersecurity strategy and the Directive on network and information security provide for action to promote the development and take-up of ICT security standards.

A network and information security public-private platform (NIS Platform) has been set up by the Commission with representation from various stakeholders.

The communication setting up ICT standardisation priorities for the DSM refers to cybersecurity as a priority domain for Europe.

LEGISLATION AND POLICY DOCUMENTS

AT EUROPEAN LEVEL

- **Cybersecurity Strategy of the European Union:** An Open, Safe and Secure Cyberspace — JOIN(2013) 1 final — 7/2/2013
- **Directive (EU) 2016/1148** of the European Parliament and of the Council of 6 July 2016 concerning measures for a high common level of security of network and information systems across the EU (NIS Directive)
- **Regulation (EU) 2016/679** of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to personal data processing and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation)
- **COM(2016)176** ICT Standardisation Priorities for the Digital Single Market
- **COM(2015)192** A Digital single market strategy for Europe

PROPOSED NEW ACTIONS ON STANDARDISATION

STANDARDS DEVELOPMENT

ACTION 1 SDOs to continue work on ensuring privacy and improving existing standards regarding the protection of individuals with regard to personal data processing.

ACTION 2 SDOs to develop a set of standards for critical infrastructure protection, including identification, reporting, integrity protection, and impact modelling for critical infrastructure.

OTHER ACTIVITIES AROUND STANDARDISATION

ACTION 3 SDOs to onvestigate suggestions for further improvements of standards and specifications in the area of network security. This may include recommendations on further development of DNSSEC DOTS and I2NSF within IETF. In addition the NIST cybersecurity framework may provide some background for further progress on achieving better cybersecurity.

ACTION 4 SDOs to investigate the issue of malware on personal computers. ENISA (the European union agency for network and information security) has concluded that many personal computers contain malware that is able to monitor (financial) transactions. As we are becoming increasingly dependent on eBusiness and e-transactions, a European initiative should investigate this topic.

ACTION 5 SDOs to investigate options for collaboration to defeat and remedy attacks. No single organization has enough information to create and maintain accurate situational awareness of the threats facing itself or its users. This limitation can be overcome by sharing relevant cyber-threat information among trusted partners and communities consistent with the agreed interests of their users.

ACTION 6 SDOs to investigate requirements for secure protocols for networks of highly constrained devices and heavily constrained protocol interaction (low bandwidth/ ultra-short session duration (50ms)/low processing capabilities).

ACTION 7 SDOs to further work on standardisation of cybersecurity capabilities of ICT vendors in terms of strategy governance and control; standards and processes; laws and regulations; human resources; research and development; verification; third-party supplier management; manufacturing; delivering services securely; issue, defect and vulnerability resolution; and audit.

ACTION 8 Create awareness of available international and global standards and frameworks on cybersecurity and promote their use and implementation

ACTION 9 SDOs to investigate the availability of standards as regards to the security and incident notification requirements for digital service providers as defined in the NIS Directive.

Action 10: SDOs to develop a "guided" version of ISO/IEC 27000 specifically addressed to SMEs. This version should be 100% compatible with the ISO/IEC 27000 scheme, providing additional guidance aimed for SMEs on how to practically apply ISO/IEC 27000 requirements effectively in practice, even when resources and competencies for this are at best moderate.

STANDARDISATION NEEDS, ONGOING ACTIVITIES AND PROGRESS REPORT

COMMISSION PERSPECTIVE AND PROGRESS REPORT

The Communication on ICT standardisation priorities for the digital single market proposes actions on cybersecurity, considered as priority domain for Europe

- For security and notification requirements for operators of essential services, the focus will be on establishing a number of reference standards and/or specifications relevant to network and information security, including, where relevant, harmonised standards, to serve as a basis for encouraging the coherent adoption of standardisation practices across the EU.
- For security and notification requirements for digital service providers, in line with the objectives of the Digital single market strategy, the Directive aims to establish a harmonised set of requirements so that they can expect similar rules wherever they operate in the EU.

It is important that all levels of an organisation –particularly the strategic level and the management board - are aware of the need for standards and frameworks for cybersecurity. Moreover, between organisations that are partners in (vital) online chains, clear agreements will have to be made on the different standards.

ONGOING STANDARDS DEVELOPMENT

STANDARDISATION ORGANISATIONS

CEN, CENELEC, ETSI

The Focus group on cybersecurity (CSCG) is the follow-up to the cybersecurity coordination group, after ETSI withdrawal. It supports CEN and CENELEC to explore ways and means for supporting the growth of the Digital Single market.

The group focuses on drafting a European roadmap on cybersecurity standardisation and will actively support global initiatives on cybersecurity standards, in compliance with EU requirements and with a view to develop trustworthy ICT products, systems and services.

Based on the CSCG white paper Recommendations for a strategy on European cybersecurity standardisation, published in April 2014, the group continued to develop recommendations to its parent bodies for international standard-setting, ensuring a level playing-field for businesses and public authorities. Via CSCG recommendations, seven ISO/IEC standards on IT-forensics were recently adopted as EN to enhance the required admissibility of e-evidence and therefore support the fight against cybercrime.
http://www.cscg.focusict.de

ETSI

ETSI's work on cybersecurity ranges from general and transversal guidelines and standards, to securing complete technological systems/areas, down to specific security topics.

ETSI has already published a report containing an analysis of the main threats to personally identifiable information in online services. ETSI TC CYBER is working on technical specifications to i) exploit attribute-based encryption for data access control in the cloud, 5G networks and IoT (TS 103 458), ii) provide data unlinkability in mobile networks and IoT (TS 103 486); and iii) enable assurance of privacy and verification of assurance by ad hoc protocols and policy mechanisms (TS 103 485)

TC CYBER coordinates ETSI cybersecurity work and develops standards mostly of general or transversal applicability. In particular, ETSI TC CYBER published TR 103 306 which describes the global cybersecurity ecosystem providing an overview of cybersecurity work occurring in multiple technical forums worldwide.

ETSI TC CYBER published technical specifications on baseline security requirements regarding sensitive functions for NFV and on security aspects for lawful interception and retained data interfaces. It also published reports which provide guidance on critical security controls and security by default for products and services. Other published reports or guides address critical infrastructure protection, cybersecurity issues related to NFV and Lawful Interception, post quantum computing, security design requirements, and threat information sharing.

TC CYBER started new work to support the network and information security Directive; the TC will identify where new standards are needed in support of the Directive, particularly in the area of critical infrastructure protection. The TC also works on gateway cyberdefence and on a common interface to transfer sensitive functions to a trusted domain. (TC CYBER work programme).

ISG ISI (Information Security Indicators) works on measurement of information security risks (see ISG ISI published standards, ISG ISI work programme).

ETSI works on securing overall systems and technologies such as mobile communications (3GPP SA3), network functions

virtualisation (NFV SEC), intelligent transport systems (ITS WG5), digital enhanced cordless telecommunications (DECT™), M2M/ IoT communications (oneM2M published standards, latest drafts), reconfigurable radio systems (RRS WG3) and emergency telecommunications (including terrestrial trunked radio (TETRA)).

Finally ETSI works on specific security topics: smart cards and secure elements (SCP), cryptography and lawful interception and data retention. In terms of cryptography, ETSI develops security algorithms, works on quantum safe cryptography (QSC) and quantum key distribution (QKD).

OASIS

For the PKCS 11 standardisation project for cryptographic tokens controlling authentication information (such as personal identity), see https://www.oasis-open.org/committees/pkcs11

Key management interoperability protocol (KMIP) for enterprise encryption key administration and deployment.
https://www.oasis-open.org/committees/kmip

Cyber Threat Intelligence (CTI) TC
A committee defining a set of information representations and protocols to support automated information sharing for cybersecurity situational awareness, real-time network defence, and sophisticated threat analysis.
https://www.oasis-open.org/committees/kmip
http://www.oasis-open.org/committees/cti

SAML TC
https://www.oasis-open.org/committees/tc_home.php?wg_abbrev=security

ISO/IEC JTC 1

SC 27 work is ongoing on the following work areas

1. Security requirements capture methodology

2. Management of information and ICT security; in particular information security management systems (ISMS), security processes, security controls and services

3. Cryptographic and other security mechanisms, including but not limited to mechanisms for protecting the accountability, availability, integrity and confidentiality of information

4. Security management support documentation including terminology, guidelines and procedures for the registration of security components

5. Security aspects of identity management, biometrics and privacy

6. Conformance assessment, accreditation and auditing requirements in the area of information security

7. Security evaluation criteria and methodology
http://www.iso.org/iso/home/standards_development/list_of_iso_technical_committees/iso_technical_committee.htm?commid=45306

ISO 29115 entity authentication framework.
http://www.iso.org/iso/iso_catalogue/catalogue_tc/catalogue_detail.htm? csnumber=45138

Ongoing projects and deliverables:

ISO/IEC 27001 — Information security management systems — Requirements

ISO/IEC 29101 — Privacy architecture framework

ISO/IEC 29151 — Code of practice for PII protection

ISO/IEC 29190 — Privacy capability assessment model

IEC 62351 standards series. The different security objectives of this series include authentication of data transfer through digital signatures, ensuring only authenticated access, prevention of eavesdropping, prevention of playback and spoofing, and intrusion detection.

ITU-T

SG17: study group on security: standardises network and information security where numerous ITU-T recommendations have been developed including the security recommendations under the ITU-T X-series
http://itu.int/ITU-T/go/sg17
http://www.itu.int/en/ITU-T/studygroups/2013-2016/17/Pages/default.aspx
http://www.itu.int/ITU-T/recommendations/index_sg.aspx?sg=17.

SG17 / Q10/17 — Identity management architecture and mechanisms
http://www.itu.int/itu-t/workprog/wp_block.aspx?isn=2048

W3C

W3C runs several group in the area of Security :

- Web Cryptography working group, which is defining an API that lets developers implement secure application protocols for web applications, including message confidentiality and authentication services, by exposing trusted cryptographic primitives from the browser.
- Web Application Security "WebAppSec" working group, which is developing standards to ensure that web applications are delivered free from spoofing, injection, and eavesdropping.
- Hardware-based secure services community group, which analyses use-cases where browser (and web application)'s developers could benefit from secure services in the field of cryptographic operation, citizen identity and payment to native applications.
- Web bluetooth community group, which is developing a specification for bluetooth APIs to allow websites to communicate with devices in a secure and privacy-preserving way.
- Web NFC community group, which is creating a near field communication API that is browser-friendly and adheres to the web's security model.
  https://www.w3.org/Security

IEEE

Standardisation activities in the network and information security space and in anti-malware technologies, including in the encryption, fixed and removable storage, and hard copy devices areas, also applications of these technologies and cybersecurity in smart grids.

http://standards.ieee.org/develop/msp/nis.pdf.

IETF

The Managed Incident Lightweight Exchange (MILE) WG (https://tools.ietf.org/wg/mile/charters) develops standards to support computer and network security incident management. The WG is focused on two areas: (1) IODEF (incident object description exchange format, RFC5070), the data format and extensions for representing incident and indicator data, and (2) RID (real-time inter-network defence, RFC6545), the policy and transport protocol for structured data.

The security automation and continuous monitoring (SACM) WG https://tools.ietf.org/wg/sacm/charters is working on standardising protocols to collect, verify, and update system security configurations that allow high degree of automation. This makes it easier to secure information and the systems that store, process, and transmit that information. The focus of the WG is assessment of network endpoint compliance with security policies so that corrective measures can be taken before they are exposed to those threats.

The aim of the DDoS Open Threat Signalling (DOTS) WG (https://tools.ietf.org/wg/dots/charters) is to develop a standards-based approach for the real-time signalling of DDoS-related telemetry and threat-handling requests and data between elements concerned with DDoS attack detection, classification, traceback, and mitigation.

The goal of I2NSF is to define a set of software interfaces and data models for controlling and monitoring aspects of physical and virtual NSFs (A network security function (NSF) is a function used to ensure integrity, confidentiality, or availability of network communications, to detect unwanted network activity, or to block or at least mitigate the effects of unwanted activity. The hosted, or cloud-based, security service is especially attractive to small and medium size enterprises who suffer from a lack of security experts to continuously monitor networks, acquire new skills and propose immediate mitigations to ever increasing sets of security attacks), enabling clients to specify rulesets.

3GPPP

SA WG3 is responsible for security and privacy in 3GPP systems, determining the security and privacy requirements, and specifying the security architectures and protocols. The WG also ensures the availability of cryptographic algorithms which need to be part of the specifications.
http://www.3gpp.org/specifications-groups/sa-plenary/sa3-security

OTHERS

OIDF

Risk and incident sharing and coordination working group [RISC] RISC (chartered 2015) provides data sharing schemas, privacy recommendations and protocols to share information about important security events in order to thwart attackers from using compromised accounts with one service provider to gain access with other service providers. RISC focuses on peer to peer sharing of information related to the state of individual accounts.
http://openid.net/wg/risc/charter/

NIST

NIST has started work in several areas, active documents with two reports already published which provide guidance on critical security controls and security by default for products and services. Other areas of work include critical infrastructure protection, privacy matters, cybersecurity issues.

- Cyber-Physical Systems for Global Cities Project
- Cybersecurity for Smart Grid Systems
- Cybersecurity for Smart Manufacturing Systems
- National Institute of Standards and Technology Initiates Development of New Cybersecurity
- Reference Architecture for Cyber-Physical Systems Project Framework

CYBER SECURITY PPP

The cPPP will be instrumental in structuring and coordinating digital security industrial resources in Europe
https://ec.europa.eu/digital-single-market/en/cybersecurity-industry

MSP MEMBERS' AND STAKEHOLDERS' REMARKS

The Dutch government has selected a group of security standards for its comply-or-explain policy: DNSSEC, DKIM, SAML, ISO 27001/2, TLS, and is actively using different adoption strategies to get the standards implemented.

In addition to the actions and objectives addressed so far there may be further work on cyber resilience within the broad scope of topics under discussion, in particular on real-time availability; availability architecture; availability management; threat management/intelligence; data breach notification; security breach notification; data centric security; code scanning; and the APT control maturity model of framework.

There are also some overlaps with the Rolling Plan item covering electronic identification and trust services such as electronic signatures (M460) which contribute to the building of trust in the European digital environment. The output of the CRISP project (evaluation and certification schemes for security products) will allow further standardisation activities in this area.

Stakeholder alliances like CSA (the Cloud Security Alliance) and others in addition provide best practices in the area of cybersecurity.

e-PRIVACY

POLICY OBJECTIVES

The enforcement of the EU data protection and privacy legal framework would be made easier if data processing products and processes are designed and built from the beginning with legal requirements in mind. This is referred as 'data protection by design'. Standards may lay out the basic requirements for data protection by design for products and processes, minimising the risk of (i) divergent national approaches, with their related risks to freedom of movement of products and services, and (ii) the development of several, potentially conflicting, private de-facto standards.

This could be combined with the emergence of certification services: businesses who want their products and processes audited as being "privacy by design"-compliant, would have to fulfil a set of requirements defined through appropriate EU standards and robust, independent third-party certification mechanisms.

Article 17 of the data protection Directive 95/46/EC requires that data controllers implement appropriate technical and organisational measures to prevent unlawful data processing. Instruments like privacy by design and privacy risk assessment by controllers may help minimise these risks, though the cooperation of processors also is required.

The principles of data protection by design and by default , as well as the need to undergo a data protection impact assessment for data protection and privacy are included in the recently adopted General Data Protection Regulation 2016/679/EU (GDPR). This regulation replaces the Data Protection Directive 95/46/EC and will apply from 25 May 2018. In the meantime, national laws implementing the Directive 95/46/EC remain valid.

LEGISLATION AND POLICY DOCUMENTS

AT EUROPEAN LEVEL

The following legal instrument should be considered at European level:

The Directive 2002/58/EC of the European Parliament and of the Council of 12 July 2002 concerning the processing of personal data and the protection of privacy in the electronic communications sector (ePrivacy Directive). This Directive is under revision with the Commission that adopted on 10 January 2017 a proposal a Regulation on privacy and electronic communications that will replace the old directive and address its flaws to ensure an increased level of protection of citizens' confidentiality of communications[27].

- **Regulation (EU) 2016/676** on the protection of natural persons with regard to personal data processing and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation). Article 253 calls for data protection by design and by default.
- **The Directive 2014/53/EU** on the harmonization of the laws of the Member States relating to the making available on the market of radio equipment and repealing the Radio Equipment and Telecommunications Terminal Equipment (R&TTE) Directive 1999/5/EC. Article 3(3)(c) of this Directive requires that radio equipment within certain categories or classes shall be so constructed that it [...] incorporates safeguards to ensure that the personal data and privacy of the user and of the subscriber are protected". The Commission is empowered to adopt delegated acts specifying which categories or classes of radio equipment are concerned by each of the requirements.

27 Proposal for a Regulation of the European Parliament and of the Council concerning the respect for private life and the protection of personal data in electronic communications and repealing Directive 2002/58/EC (Regulation on Privacy and Electronic Communications), 10.01.2017, COM (2017)10 final https://ec.europa.eu/digital-single-market/en/news/proposal-regulation-privacy-and-electronic-communications

OTHERS

In June 2015, the Commission published a study on the "ePrivacy Directive: assessment of transposition, effectiveness and compatibility with the proposed data protection regulation, SMART 2013/0071". It contains an in-depth analysis of the national implementation of several key provisions (namely Article 1 and 3 on the scope, Article 5 on confidentiality of communications, Article 5(3) on cookies and similar technologies, Article 6 and 9 on traffic and location data and Article 13 on commercial communications. See the study: http://ec.europa.eu/digital-agenda/en/news/eprivacy-directive-assessment-transposition-effectiveness-and-compatibility-proposed-data

The internet architecture board (IAB) provides a list of the national transpositions of Article 5.3 of the ePrivacy Directive, see http://www.iabeurope.eu/policy/e-privacy.

PROPOSED NEW STANDARDISATION ACTIVITIES

STANDARDS DEVELOPMENT

In the light of the accountability and privacy by design principles, ICT standards generally should be created in order to ensure a high-level of protection of individuals with regard to personal data processing, and the free movement of such data, and the application of privacy by design methodologies. Privacy and data protection standards should thus be examined, developed or improved if necessary, so as to provide standardised methods that support that review and improvement in due respect of EU data protection rules.

Proposed specific areas for SDOs to focus on are:

ACTION 1 Continuing work on standardising browser functionalities and defaults to enable users to easily control whether they want to be tracked.

ACTION 2 Location data used by mobile applications.

ACTION 3 Develop a certification scheme, based as much as possible on existing best practices and standards, in order to create a EU reference point on the topic.

OTHER ACTIVITIES AROUND STANDARDISATION

ACTION 4 Promote EU-wide attention to standardisation of privacy statements and terms & conditions, given that there is mandatory acceptance of diverse, ambiguous and far-reaching online privacy conditions, and taking into account the new data protection Directive. The Kantara CIS work and the data use statements described in ISO/IEC 19944 could be used as a basis for this action.

ACTION 5 SDOs to continue investigating technical measures apt to make personal data anonymous or pseudonymised (and therefore unintelligible by those who are not authorised to access them).

ACTION 6 SDOs to continue investigating how to warrant a user-centric approach in privacy & access management: see http://www.laceproject.eu/blog/give-students-control-data/ and http://www.lvm.fi/julkaisu/4440204/mydata-a-nordic-model-for-human-centred-personal-data-management-and-processing.

ACTION 7 SDOs to prevent unwarranted pervasive monitoring by default when developing standards. This is not only relevant in the context the internet but also the IoT.

ACTION 8 SDOs to develop secure coding standards for secure application development: EU-wide attention to standardisation of privacy statements and terms & conditions, given the existing state of mandatory acceptance of diverse, ambiguous and far-reaching online privacy conditions, taking into account the new data protection directive and the emergence of the IoT, where (embedded) devices process the device owner's personal data, creating additional challenges to transparency and informed consent.

STANDARDISATION NEEDS, ONGOING ACTIVITIES AND PROGRESS REPORT

COMMISSION PERSPECTIVE AND PROGRESS REPORT

The focus will be on establishing a number of reference standards and/or specifications relevant to privacy in the electronic communications environment, including, where relevant, harmonised standards, to serve as a basis for encouraging the consistent adoption of standardisation practices across the EU.

The Commission has recently proposed a mandate to European standards organisations seeking to routinely include privacy management methodologies in both the design and production phases of cybersecurity technologies generally.

ONGOING STANDARDS DEVELOPMENT

Various activities are in place, as detailed in the table below. Due account should also be taken of the activities of the DG GROW working group on "Privacy by Design", which includes standardisation participants and other stakeholders. The Commission issued in October 2014 the standardisation request M/530 "Standards for privacy & personal data protection management", in support of privacy management in design, development, production, and service provision processes of security technologies. The goal is that manufacturers & providers manage privacy & personal data protection issues through privacy-by-design. At the beginning of 2015, CEN-CENELEC JWG 8 "Privacy management in products and services" was set up to execute M/530. A work programme should be elaborated in the second half of 2015 with work started in 2016".

ETSI

In co-operation with CEN and CENELEC, ETSI is responding to M/530. Following the Commission's acceptance of the ESO's proposals on developing standards to manage privacy and personal data protection issues from the earliest stages in the design and development of security technologies and services, and during production and provision, the ESO expect to complete up to 11 standards in response to M/530. In particular, the cybersecurity TC (TC CYBER) has begun work on a practical introductory guide to privacy and a technical report outlining a high-level structured ecosystem of security design requirements for communication and IT networks and attached devices.

In addition, TC CYBER works on the protection and retention of personally identifiable information (PII) and defines the technical means to enable the assurance of privacy and the verification of that assurance. It also addresses identity management and naming schema protection mechanisms, with the aim of establishing a means to prevent identity theft and resultant crime.
CYBER work programme

CEN/CENELEC

CEN-CENELEC JWG 8 is addressing M/530 in cooperation with ETSI
In addition there is the CEN Workshop on a "Unique identifier for personal data usage control in big data" (CEN WS ISÆN)

IEEE

The IEEE is startingwork on a recommended practice to specify a privacy threat model for IEEE 802 technologies and provide recommendations on how to protect against privacy threats. This is important as IEEE 802 technologies play a major role in Internet connectivity. The IEEE also has other new projects for privacy in consumer wireless devices and drones.
http://standards.ieee.org/develop/msp/eprivacy.pdf

W3C

An initiative to develop specifications by which Internet users may exress their permission (or the withholding of their permission) to have their presence and activities on websites tracked (the "Do Not Track" concept), and to help Internet users to express their consent or refusal to be tracked on the internet.
http://www.w3.org/2011/tracking-protection/

OASIS

Privacy by design documentation for software engineers standards project (PbD-SE):
https://www.oasis-open.org/committees/pbd-se

Privacy management reference model (PMRM)
https://www.oasis-open.org/committees/pmrm

IETF

The IETF's internet architecture board established a privacy program to serve as a forum for synthesising IETF privacy thinking and privacy design considerations.
http://www.iab.org/activities/programmes/privacy-program/

Privacy Considerations
http://tools.ietf.org/html/draft-iab-privacy-considerations-09

ISO/IEC JTC1

Subcommittee 27 on IT Security Technologies published a Code of Practice for the protection of personally identifiable information (PII) in the public cloud (ISO/IEC 27018:2014), and is developing a draft international standard privacy capability assessment model (ISO/IEC DIS 29190)
http://www.iso.org/iso/iso_technical_committee?commid=45306

ITU-T

The ITU, through a variety of activities, is examining matters related to building confidence and security in the use of ICT, including stability and measures to combat spam, malware, etc., and the protection of personal data and privacy (ref. Plenipotentiary Conference, Guadalajara 2010, Resolution 130). ITU-T has been developing ITU-T standards which address protection of personally identifiable information such as in Recommendations ITU-T H.233, H.234, H.235.0, H.235.9, J.93, J.96, J.125, T.807, X.272, X.1081, X.1086, X.1092, X.1142, X.1144, X.1171, X.1250, X.1252, X.1275, X.1580, Y.2720, and Y.2740

OTHERS (INCLUDING STAKEHOLDER GROUPS, TECHNOLOGY PLATFORMS, AND RESEARCH PROJECTS

KANTARA

User-Managed Access (UMA)
UMA is an OAuth-based protocol designed to ensure the privacy of websites by giving web users a unified control point for authorising access toonline personal data, content, and services, no matter where they are hosted.
http://kantarainitiative.org/confluence/display/uma/Home

Consent & Information Sharing Workgroup (CIS)
People's capacity to manage their privacy is increased if they are able to aggregate and manage consent & information sharing relationships with consent receipts. Standardised consent receipts also provide the opportunity for organisations to advertise trust. The core receipt specification addresses general, or regulatory, consent requirements. More elaborate consent receipts can become a vehicle for trust networks, federations, trust marks, privacy icons, assurances, certifications and self-asserted community and industry reputations.
https://kantarainitiative.org/confluence/display/infosharing/Home

MSP MEMBERS' AND STAKEHOLDERS' REMARKS

Management of controls over the access to and ownership of data should be considered essential for effective implementation of privacy measurements.

E-INFRASTRUCTURES FOR RESEARCH DATA AND COMPUTING-INTENSIVE SCIENCE

POLICY OBJECTIVES

Research data and computing infrastructures fostering a paradigm shift in science (digital science/eScience).

The emergence of data driven science reflects the increasing value of a range of observational, sensor, simulation, streaming and experimental data in every field of science. Data e-Infrastructures link knowledge territories, which blur geographical and disciplinary boundaries.

The present European and global research data landscape is highly fragmented, by disciplines or by domains (oceanography, life sciences, health, agriculture, space, climate, etc.). A variety of institutions, some national, some international, strive to deal with some aspects of data, but there is no effort to seek or achieve some degree of coherence.

Some research domains are experiencing exponential growth in data produced with the rate doubling in a timeframe that can be as short as a few months (seven months in the case of second generation sequencing of genes), while others plan new instruments that will suddenly produce enormous amounts of data.

To create a competitive European research area, Europe has already invested a significant amount of resources into modernising the European landscape of research infrastructures and facilities of excellence.

The ESFRI roadmap stretches across a range of scientific disciplines in different European nations and includes recommendations for a suite of ambitious initiatives in areas such as biological and medical sciences, environment, social sciences and humanities, geophysics and astronomy, physical and engineering.

Underpinning the efforts of the research communities, e-infrastructures foster innovation and scientific progress across disciplines and between the private and public sector. A large number of data e-Infrastructures, mixing the capabilities of scientific communities and technology providers, have been launched in domains of astronomy, earth and ocean observation, climate, environment and biodiversity, etc. Moreover, pan European e-Infrastructures initiatives were launched across disciplinary domains providing a participatory network of open access repositories at European scale. These initiatives fill the gap between user-application and generic e-Infrastructure layers for high-volume storage, data interoperability, high-performance computing and connectivity layers.

Building on these existing EU-funded e-Infrastructures, the European Open Science Cloud and the European Data Infrastructure, as presented in the Communication "European Cloud Initiative", will consolidate the efforts to accelerate and support the transition to more effective open science and open innovation in the digital single market. In this context, the implementation of standards and recommendations will be of utmost importance in order to allow for interoperability, avoid fragmentation and improve the efficiency and effectiveness of research by optimizing resources and encouraging economies of scale.

LEGISLATION AND POLICY DOCUMENTS

EUROPEAN LEGISLATION AND POLICY DOCUMENTS

The European Commission adopted in April 2016 the digital single market technologies and public service modernisation package in which the following Communication was included:

COM(2016) 178 final Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: "European Cloud Initiative — Building a competitive data and knowledge economy in Europe". This Communication sets out a strategy to strengthen the EU's position in data-driven innovation, improve its cohesion, and help create a digital single market. This is a fundamental step towards the reinforcement of the EU's competitiveness in digital technologies and in innovation. The European Cloud Initiative will provide European science, industry and public authorities with world-class data infrastructures, high-speed connectivity and increasingly powerful high performance computers. It will make it easier for researchers, businesses and public services to fully exploit the benefits of big data by making it possible to move, share, re-use and process data seamlessly across global markets and borders, and among institutions and research disciplines.

The initiative will establish the European Open Science Cloud (EOSC) as a virtual environment to store and process large volumes of information generated by the big data revolution. This will be supported by the European Data Infrastructure (EDI), deploying the high-bandwidth networks and the supercomputing capacity necessary to access and process large datasets stored in the cloud.

Both the EOSC and the EDI will build on existing EU-funded e-infrastructures and will bring networking, data and computing services closer to European researchers and innovators.

Together with the European Cloud Initiative, the package includes also the following Communications which are relevant within the e-infrastructure context:

- **COM(2016) 180 final:** Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Digitising European Industry - Reaping the full benefits of a Digital Single Market.
- **COM(2016) 176 final:** Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: ICT Standardisation Priorities for the Digital Single Market.

Back in 2012, the European Commission adopted in July 2012 a package consisting of a Communication and a Recommendation on aspects of open access, preservation and e-Infrastructures for scientific information. It outlines a framework to optimise the incentives for scientific discovery and support collaboration across disciplinary and geographical boundaries, and to further develop the European innovation capacity.

- **COM(2012) 401 final:** Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions — Towards better access to scientific information: Boosting the benefits of public investments in research.
- **COM(2012) 4890** final: Commission Recommendation on access to and preservation of scientific information.

PROPOSED NEW ACTIONS ON STANDARDISATION

STANDARDS DEVELOPMENT

In 1991 the Commission recommended the common European research information format (CERIF) data model to Member States. CERIF was initially conceived to document and exchange research information (funding programmes and projects, researchers and research institutions, etc.) and has since been adopted by many Member States and institutions. The data model continues to be developed and currently work is ongoing within the EuroCRIS (CERIF host organisation) and OpenAIRE initiatives to expand the model to also include also research outputs.

There will be synergies with the open data domain (see also the Rolling Plan contribution on 'Data'). An example of an initiative that is being transferred through a multi-stakeholder collaboration from the open data domain to research data widely understood is linked open data (LOD), a method of publishing data in a structured form so that it can be interlinked. LOD is based on standards such as RDF (a W3C recommendation). Its applications are discussed and implemented within the Research Data Alliance (RDA) and OpenAIRE for example.

In concrete terms the CERIF data model could be the first standard to be explored. It is already widely used in research related information (grants, researchers, publications, etc.). Its implementation is being considered now for the Commission's research information system (CORDA). Next steps will include discussions with EuroCRIS and also on the framework of the RDA more generally. Related activity could be included in future research infrastructure funding programmes.

In addition, the RDA has been approached and has engaged in the process of identifying candidates for standards development in the research data field. These might come from existing initiatives in specific research fields or from established general purpose initiatives (e.g. RDF).

ACTION 1 SDOs to identify standards needs and develop them in the area of research data.

ACTION 2 SDOs to explore opportunities for collaboration on the use of the digital object architecture (DOA) as an e-Infrastructure for enhanced information management e.g. ITU-T is active in this area.

ACTION 3 SDOs to explore use of array databases, such as rasdaman, for large-scale datacube service infrastructures in application domains as heterogeneous and manifold as possible, in both scientific and industrial setups.

STANDARDISATION NEEDS, ONGOING ACTIVITIES AND PROGRESS REPORT

COMMISSION PERSPECTIVE AND PROGRESS REPORT

Research/science funders have a common problem when tackling the area of research data infrastructure. The landscape is geographically fragmented and different disciplines have different practices. It is difficult to build critical mass and provide common services to different scientific disciplines and to take advantage of economies of scale. Some scientific communities are pushing the envelope and adopting new technologies while others are lagging behind. Scientists are, at the end of the day, the generators and users of research data in their experiments, simulations, visualization of complex data arrays, etc. There is a need to bring together capabilities from different scientific fields and also the competences of technology and service providers to use the potential of ICT.

Interoperable data infrastructures will allow researchers and practitioners from different disciplines to access and process the data they need in a timely manner. They can collaborate across different domains of science and engineering. The innovative power of industry and enterprise will be used trough by clear and efficient arrangements for data exchange between private and public sectors.

Today, EU-funded e-Infrastructures play a fundamental role in the life of European researchers and innovators. E-Infrastructure projects funded under the Horizon 2020 work programme 2014-2015 and 2016-2017 are helping researchers tackle the challenges posed by one specific societal challenge.

HOW CAN RDA CONTRIBUTE TO THE EUROPEAN "OPEN SCIENCE" AGENDA?

The current global research data landscape is highly fragmented, either by disciplines or by domains. RDA is an international organization focused on the development of infrastructure and community activities, recommendations designed to reduce barriers to data sharing, and the acceleration of data-driven innovation worldwide.

Future data infrastructures will require standards not only for security and privacy, but also for metadata, data preservation, semantics, data values, and others. In the context of scientific research data, the Commission supports the Research Data Alliance (RDA) in building both social and technical bridges that enable open sharing of research data, with a view to work effectively across multiple disciplines, and to define options for data storage for sustainable use and re-use.

ONGOING STANDARDS DEVELOPMENT

The Research Data Alliance (RDA) is not a standardisation body but is a mechanism to speed-up the adoption of standards for research data and computing infrastructures. The Commission with the advice of the Multi-Stakeholder Platform on ICT standardisation has engaged in the process of identifying four RDA Technical Specifications as ICT specifications for public procurement within the EU.

In order to facilitate and improve the process of developing recommendations that are relevant and have the potential of becoming ICT specifications, there is an ongoing effort of promoting industrial participation within the RDA processes.

RESEARCH DATA ALLIANCE (RDA)

Supports the Commission's strategy to achieve global scientific data interoperability in a way that real actors (users and producers of data, service providers, network and computing infrastructures, researchers and their organisations) are in the driving seat.
It has memorandums of understanding (MoUs) with related standardisation activities/organisations: IETF, W3C, ICSU/CODATA. Synergies with other organisations/activities will need to be identified in the future.

ITU-T

Regarding the global e-Infrastructure, the ITU is using the digital object architecture (DOA), on which the recommendation ITU-T X.1255 "Framework for discovery of identity management information" is based.

SG11 is studying the global problem of combating counterfeiting. Within this activity, SG11 developed the Technical Report on Counterfeit ICT Equipment and started a new draft Recommendation Q.FW_CCF "Framework for solution to combat counterfeit ICT Devices".

http://itu.int/ITU-T/go/sg11

SG13 is working on a recommendation on the basic principles to create a trusted environment. To this end, it published the technical report on Trust provisioning for future ICT infrastructures and services. It also started the work on recommendations in the field of trust overview provisioning in ICT infrastructures and services and the framework of trustworthy smart media services. The work on trust-based ICT services and business models is in the initial phase. It will be followed by trustworthy device selection for data transmission, a framework of trustworthy communication network and an architectural framework for trust provisioning in ICT infrastructures and services.
http://itu.int/ITU-T/go/sg13

OTHER ACTIVITIES RELATED TO STANDARDISATION

Related topics in H2020 WP on research infrastructures including e-Infrastructures (proposals selected within these calls may contribute to standardisation):

EINFRA-1-2014

Managing, preserving and computing with big research data

EINFRA-3-2014

Towards global data e-Infrastructures — research data alliance

EINFRA-8-2014

Research and education networking — GÉANT

INFRASUPP-7-2014

e-Infrastructure policy development and international cooperation

EINFRA-22-2016

User driven e-infrastructure innovation

EINFRA-21-2017

Platform-driven e-infrastructure innovation

EINFRA-12-2017

Data and Distributed Computing e-Infrastructure for Open Science

INFRASUPP-02-2017

Policy and International cooperation measures for research infrastructures (RDA)

MSP MEMBERS' AND STAKEHOLDERS' REMARKS

RDA will be a good support to turn the proposed framework for action for data infrastructures into practice. The Commission run a public consultation on the key priority areas for H2020 on data Infrastructures which received an excellent feedback. Stakeholders are motivated and, above all, ready to come together and turn the identified priorities into real action. Europe will consolidate its role of a global partner and a global leader in research data infrastructures.

BROADBAND INFRASTRUCTURE MAPPING

POLICY OBJECTIVES

The digital single market[28][1] must be built on reliable and trustworthy data. In this context, the European Commission has launched a project to map fixed and mobile quality of broadband services in Europe. This tool, currently under deployment, consists of an interactive online mapping application that aggregates and visualizes various dimensions of quality of service (QoS) delivered by broadband networks (fixed and mobile) in the European Union. The project constitutes a crucial instrument to assess and monitor the achievement of the new connectivity goals as described in the Communication on Connectivity for a Competitive Digital Single Market – Towards a European Gigabit Society[29][2]. In November 2016, the first data collection campaign started, 13 Member States have already provided data sets to the Platform and 9 more will do so in the next months.

In 2017, in order to complement the deployment of the EU broadband mapping platform, the Commission has launched a new study on Fixed and Mobile Convergence in Europe (SMART 2016/0046). On the basis of the datasets collected in the EU broadband mapping platform, the study will support the EU policy-making process by assessing the technical/political/economic obstacles that prevent the definition of common (fixed and mobile) network performance measurements in the Union.

LEGISLATION AND POLICY DOCUMENTS

AT EUROPEAN LEVEL

- **Directive 2002/22/EC** of the European Parliament and of the Council on universal service user's rights relating to electronic communication networks and services **(Amended by Directive 2009/136/EC)**
- **Directive 2002/ 21/EC** of the European Parliament and of the Council on a common regulatory framework for electronic communications networks and services **(amended by Directive 2009/140/EC)**
- **Directive 2007/2/EC** of the European Parliament and of the Council establishing an Infrastructure for Spatial Information in the European Community (INSPIRE)
- **BEREC** Net Neutrality Guidelines (August 2016)
- **BEREC** Common Position on monitoring of mobile network coverage (December 2016)
- **RSPG and BEREC** joint report on mobile connectivity in 'challenge areas' (December 2016)

PROPOSED NEW STANDARDISATION ACTIVITIES

STANDARDS DEVELOPMENT

ACTION 1 SDOs to develop an inventory of existing standards or standardisation in progress related to the broadband infrastructure mapping activity (e.g. ITU-T SG 11 draft Recommendation Q.int_speed_test).

ACTION 2 SDOs to develop standardised ways and guidelines to map broadband infrastructures, services offered, demand status and (future) investments.

STANDARDISATION NEEDS, ONGOING ACTIVITIES AND PROGRESS REPORT

COMMISSION PERSPECTIVE AND PROGRESS REPORT

Telecom manufacturers, operators and other stakeholders have an interest in assuring a minimum of interoperability of broadband infrastructure mapping to facilitate the deployment of next-generation networks, simplify their operation, reduce cost and finally open up a single market dimension.

In order to achieve the EU broadband objectives of the Digital Agenda Europe, it is fundamentally important that there is reliable and valid data on existing and planned broadband infrastructures, services offered; and demand and investment. A standardised mapping of broadband infrastructures and other related data will help identify gaps of broadband coverage and take-up in the EU and identify suitable areas of investment. Additionally, it will avoid duplication of financing as subsidies can be allocated to areas truly affected by market failure.

ONGOING STANDARDS DEVELOPMENT

STANDARDS DEVELOPMENT

28 [1] COM (2015) 192 final A Digital Single Market Strategy for Europe
29 [2] COM (2016)587 final Connectivity for a Competitive Digital Single Market – Towards a European Gigabit Society

CEN/CENELEC

TC 209 has developed and maintains a complete set of European standards in the field of cable networks for television signals, sound signals and interactive services. This EN series, EN 60728, deals with cable networks, including equipment and associated methods of measurement for headend reception, processing and distribution of television and sound signals and for processing, interfacing and transmitting all kinds of data signals for interactive services using all applicable transmission media. These signals are typically transmitted in networks by frequency-multiplexing techniques.

These include:

a) regional and local broadband cable networks (i.e. based on optical fibre and coaxial cables)

b) extended satellite and terrestrial television distribution networks or systems

c) individual networks or systems that receive satellite and terrestrial television, and all kinds of equipment, systems and installations used in such cable networks, distribution and receiving systems.

The extent of this standardisation work is from the antennas and/or special signal source inputs to the headend or other interface points to the network up to the terminal input of the customer premises equipment.

The standardisation takes into account coexistence with users of the RF spectrum in wired and wireless transmission systems.

Typical data rates for internet access in these kind of networks range from 30 Mbit/s to 200 Mbit/s, with cable network operators now introducing 400 Mbit/s to their customers for the first time.

https://www.cenelec.eu/dyn/www/f?p=104:7:327929463237701::::FSP_ORG_ID,FSP_LANG_ID:1258287,25

CLC/TC 215 have published, among others, EN 50173-4 on broadband cabling of private homes (both copper and optical fibre cabling) and EN 50700 on fibre optic access network cabling design.

ITU-T

SG11 approved a new Recommendation ITU-T Q.3960 on a "Framework for Internet related performance measurements" which describes a framework for Internet related performance measurements which can be established at the national or international level. These give public telecom networks' customers the chance to estimate the access related performance. http://www.itu.int/itu-t/q.3960

SG11 is currently developing a companion draft Recommendation ITU-T Q.3961 (Q.TM_sp_test "Testing methodologies of Internet speed measurement system to be used on the fixed and mobile networks". It describes the testing methodologies of internet speed measurements which specify the requirements and test scripts on the fixed and mobile networks for assessing the Internet speed access connection according to the concept specified in ITU-T Q.3960. http://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=9972

SG15 works on an optical transport network, access network, home network, and power utility network infrastructures, systems, equipment, optical fibres and cables, and their related installation, maintenance, management, test, instrumentation and measurement techniques, and control plane technologies to enable the evolution toward intelligent transport networks, including the support for smart grid applications.

http://www.itu.int/ITU-T/go/sg15

Study Group 12, the lead ITU-T study group on Quality of Service (QoS) and quality of experience, has made extensive progress on draft new Recommendation Y.FMIPQoS "Framework for Monitoring the QoS of IP network services". This was guided by the discussion that took place in its QoS development group. This Recommendation will serve as a diagnostic reference for IP network QoS monitoring. It will also serve as a guide to assist regulators, subscribers, and network service providers to monitor the QoS of internet connectivity that is provided by service providers. Development of the work item will continue with a strong foundation, making references to the normative specifications for the performance parameters of the ITU-T, and the standards track RFCs of the IETF as the appropriate scope of measurements for active testing/monitoring.

http://www.itu.int/ITU-T/go/

IETF

IETF has some relevant work in this area, such as RFC 3432 on Network performance measurement or RFC 6703 on Reporting IP Network Performance Metrics
https://tools.ietf.org/html/rfc3432 https://tools.ietf.org/html/rfc6703

OTHERS (INCLUDING STAKEHOLDER GROUPS, TECHNOLOGY PLATFORMS, RESEARCH PROJECTS):

INSPIRE

Thematic working group utility and government services from European Commission Joint Research Centre set out on 2013 "Data Specification on Utility and Government Services — Technical Guidelines", a "non-paper" document.

SMART 2012/2022

A "Broadband and infrastructure mapping study" contracted by the European Commission. http://www.broadbandmapping.eu.

SMART 2016/0046

"Study on Fixed and Mobile Convergence in Europe"

The project is expected to facilitate the identification of key elements to define a common European standard to measure network performance taking into account on-going international standardisation activities for network performance measurements with a view to align European and international efforts in this domain while ensuring the involved of relevant stakeholders.

VIRGO

In the context of standards-based infrastructure mapping, a European project VIRGO (Virtual Registry of the Ground Infrastructure) began in 2014 with a focus on mapping cloud computing. It is coordinated by Infratel Italia which is active in broadband mapping in Italy.

ECC REPORT 195

The Electronic Communications Committee (ECC) drafted Report 195, ´Minimum Set of Quality of Service Parameters and Measurement Methods for Retail Internet Access Services´.

http://www.erodocdb.dk/Docs/doc98/official/pdf/ECCREP195.PDF

ECC recommendation (15)03, ´Provision of Comparable Information on Retail Internet Access Service Quality´.

http://www.erodocdb.dk/Docs/doc98/official/pdf/REC1503.PDF

ITU-T PROJECTS

The ITU-T reference guide G.1011: ITU-T has a suitable recommendation for the QoS of different types of most important services in its reference guide G.1011, Table 9-1.

https://www.itu.int/rec/T-REC-G.1011/en

ITU-T interactive transmission maps of backbone broadband connections worldwide. The scope of this ITU project is to research, process and create maps of core transmission networks (optical fibres, microwaves, submarine cables and satellite links) for the following ITU regions: Arab region, CIS region, the EUR region, the Asia-Pacific region, the North America region, Latin America and the Caribbean region, and the Africa region.

http://www.itu.int/en/ITU-D/Technology/Pages/InteractiveTransmissionMaps.aspx

SMART 2012/0046

The internet is important basic infrastructure, but public efforts to monitor this complex system have been somewhat scattered. This study is analysing existing internet monitoring tools and methodologies. It provides concrete recommendations about the needs and the next steps that Europe should take in this area. http://internet-monitoring-study.eu/

SMART 2014/0016

The Commission launched the project SMART 2014/0016 — Mapping of broadband services in Europe on 05/07/2015. This mapping project aims at the development of an EU integrated monitoring platform that will gather and benchmark mapping measurements of the services provided by broadband networks, notably from two dimensions: quality of service (QoS — data on marketed speeds/quality) and quality of experience (QoE — actual data from user experiences to be pulled from crowdsourcing applications). The contractor will build a sustainable database which can be easily updated and be statistically relevant doing data pulling and collection from existing sources while designing the qualification process of the self-reporting applications and an associated mapping application. This will allow the mapping of broadband at EU, national and regional levels using GIS-based state of the art applications.
https://etendering.ted.europa.eu/cft/cft-display.html?cftId=747

ELECTRONIC IDENTIFICATION AND TRUST SERVICES INCLUDING E-SIGNATURES

POLICY OBJECTIVES

This relates to Regulation (EU) No 910/2014 of the European Parliament and of the Council of 23 July 2014 on electronic identification and trust services for electronic transactions in the internal market and repealing Directive 1999/93/EC.

LEGISLATION AND POLICY DOCUMENTS

AT EUROPEAN LEVEL

- **Regulation (EU) No. 910/2014** of the European Parliament and of the Council of 23 July 2014 on electronic identification and trust services for electronic transactions in the internal market and repealing Directive 1999/93/EC
- **Commission Implementing Regulation (EU) 2015/1501** of 8 September 2015 on the interoperability framework
- **Commission Implementing Regulation (EU) 2015/1502 of 8 September 2015** on setting out minimum technical specifications and procedures for assurance levels for electronic identification means
- **Commission Implementing Decision (EU) 2015/1984 of 3 November 2015** defining the circumstances, formats and procedures of notification
- **Commission Implementing Regulation (EU) 2015/806** of May 2015 laying down specifications relating to the form of EU trust mark for qualified trust Services
- **Commission Implementing Decision (EU) 2015/1506** of 8 September 2015 laying down specifications relating to formats of advanced electronic signatures and advanced seals to be recognised by public sector bodies
- **Commission Implementing Decision (EU) 2015/1505** of 8 September 2015 laying down technical specifications and formats relating to trusted lists
- **Commission Implementing Decision (EU) 2016/650** of 25 April 2016 laying down Standards for the security assessment of qualified signature on seal creation devices

PROPOSED NEW ACTIONS ON STANDARDISATION

STANDARDS DEVELOPMENT

ACTION 1 **Complete and complement the work done under Mandate M/460,** e.g. in the following way: address the trust service providers (TSP) providing signature creation services, the TSPs providing signature validation services, and standards for trust application service providers (current work is limited to an ETSI Special Report (to be ETSI SR 019 530), which will propose a rationalised and well organised set of standards for electronic registered delivery applying electronic signatures). .

ACTION 2 The Commission intends to request the ESOs (for instance via standardisation requests) and other relevant bodies to update existing standards and to develop additional ones in order to address the new requirements and the innovations of the eIDAS Regulation (EU) N°910/2014 adopted by the European Parliament and Council, and related Implementing Regulations. Alternatively or additionally, ESOs may autonomously submit requests for Commission support for these standardisation activities. Further domains of interest include eIdentification, eDelivery, and website authentication certificates.

ACTION 3 Take ongoing EU policy activities into account in standardisation, e.g. in ISO/IEC JTC 1 SC 27 WG5 (identity management and privacy technologies) and other working groups of ISO/IEC JTC 1 SC 27. Furthermore, in order to promote the strengths of the European approach to electronic trust services at global level and to foster mutual recognition of trust services with non-EU countries, European and international standards should be aligned wherever possible. The "internalisation" and promotion of related European standards should be favoured.

Finally, e-signatures standards ensure accessibility for people with disabilities (see mandate 376 on European accessibility requirements for public procurement of products and services in the ICT domain).

OTHER ACTIVITIES AROUND STANDARDISATION

ACTION 4 Support and improve the development of interoperable standards by facilitating the organisation of plugtests (interoperability events) and developing and enhancing conformity testing tools. Such interoperability events may address CAdES, XAdES, PAdES, ASiC, use of trusted lists, signature validation, etc.

ACTION 5 Disseminate information to raise awareness and promote the uptake of standards, in particular encourage the industry to develop new solutions and use trust services embedded in sector applications.

STANDARDISATION NEEDS, ONGOING ACTIVITIES AND PROGRESS REPORT

COMMISSION PERSPECTIVE AND PROGRESS REPORT

In the context of the e-signatures Directive, in January 2010, the Commission mandated the ESOs to rationalise the standards for e-signatures and related trust services to form a coherent and up-to-date framework (mandate M/460).

The eIDAS Regulation adopted on 23 July 2014 addresses in one comprehensive piece of legislation, electronic identification, electronic signatures, electronic seals, time stamping, electronic delivery, electronic documents and website certificates as core instruments for electronic transactions. To support the implementation of this highly technical regulation, further standardisation work will be needed. In the case of trust services, the planned secondary legislation refers extensively to the availability of standards as possible means to meet the regulatory requirements. Existing standards should be checked to take account of the protection of individuals with regard to personal data processing and the free movement of such data. Specific privacy by design standards should be identified and where needed developed. The accessibility needs of persons with disabilities should also be taken into account.

ONGOING STANDARDS DEVELOPMENT

STANDARDS DEVELOPMENT

CEN

Under the standardisation mandate M/460 on e-signatures, CEN (TC224) and ETSI have undertaken activities to update and rationalise their standards on e-signatures and related trust services (see ETSI SR 001 604). Also, adoption by citizens/consumers and SMEs and accessibility of electronic signatures and other related electronic identification services should be carefully taken into account in standardisation. CEN is producing guidelines for that purpose which will be used as reference documents by a public with no expertise in this area. With the adoption of the new Regulation, all ongoing standards under development are being re-assessed to comply with the Regulation.

CEN, ETSI

Under the standardisation mandate M/460 on e-signatures, CEN (TC224) and ETSI TC ESI have undertaken activities to update and rationalise their standards on e-signatures and related trust services (see ETSI TR 119 000). Also, the adoption by citizens/consumers and SMEs and accessibility of electronic signatures and other related electronic identification services shall be carefully taken into account by standardisation. CEN is producing guidelines for that purpose which will be used as reference documents by a public with no expertise in this area. With the adoption of the new Regulation, all ongoing standards under development are being re-assessed to comply with the Regulation.

Five grant agreements were running until June 2016, supporting

CEN and ETSI to carry out the above rationalisation work. ETSI published a set of standards for trust services providers (TSP), trusted lists, digital signatures (supporting electronic signatures and electronic seals) and electronic time-stamps (ETSI ESI standards). These deliverables aim at supporting Regulation (EU) No 910/2014 and supporting the general requirements of the international community to provide trust and confidence in electronic transactions. ETSI is now working on complementing this set of standards with specifications on registered eDelivery trust services, registered email trust services, signature creation and signature validation by trust service providers, support for evidence records by digital signatures, and signatures preservation (ETSI ESI work programme).

In line with the new Regulation (EU) No. 910/2014, CEN/TC224 is working on new standards particularly on eSeal and Server Signing. eSeal functionalities in a further edition of EN 419212 "Application Interface for smart cards used as secure signature creation devices" will cover the need for mass-signing. Concerning Server Signing, TS 419241 (security requirements for server signing) is currently being updated taking advantage of the implementation by the market and to comply with the new Regulation. In addition, CEN/TC 224 decided to introduce a new part of this standard with the objective of defining a Protection Profile (419241-2: PP for trustworthy signature creation module) to allow certification of products.

ISO

ISO/TC 154: Processes, data elements and documents in commerce, industry and administration

http://www.iso.org/iso/iso_technical_committee%3Fcommid%3D53186

Ongoing work:

Requirements and roles & responsibilities for fulfilling trusted e-communications in commerce, industry and administration

Qualified trust services for long-term signature of kinds of electronic documents

Validation of long-term signature

Trusted (or qualified) electronic registered delivery services (or platform)

Dematerialisation and proof of dematerialisation

Requirements for providing trusted e-communications in the mobile environment

Requirements for providing trusted e-communications in the cloud environment

Projects include:

ISO 14533-1:2014 — Processes, data elements and documents in commerce, industry and administration -- Long term signature profiles -- Part 1: Long term signature profiles for CMS Advanced Electronic Signatures (CAdES)

ISO 14533-2:2012 — Processes, data elements and documents in commerce, industry and administration -- Long term signature profiles -- Part 2: Long term signature profiles for XML Advanced Electronic Signatures (XAdES)

ISO/DIS 14533-3 — Processes, data elements and documents in commerce, industry and administration -- Long term signature profiles -- Part 3: Long term signature profiles for PDF Advanced Electronic Signatures (PAdES)

ISO JTC1 SC27 is responsible for international IT security standards and therefore one of the primary stakeholders affected.

ISO/IEC JTC 1

TC 37 is responsible for the standardisation of generic biometric technologies pertaining to human beings to support interoperability and data interchange among applications and systems. Generic human biometric standards include: common file frameworks, biometric application programming interfaces, biometric data interchange formats, related biometric profiles and other standards in support of technical implementation of biometric systems, evaluation criteria to biometric technologies, methodologies for performance testing and reporting, cross-jurisdictional and societal aspects of biometric implementation. SC 37 Biometrics home page: http://www.iso.org/iso/home/standards_development/list_of_iso_technical_committees/jtc1_home/jtc1_sc37_home.htm. The complete list of standards published or under development can be found in ISO Standards Catalogue of ISO/IEC JTC 1/SC 37 — Biometrics

Published standards and ongoing projects related to the topics include the series of biometric data interchange standards for different biometric modalities, biometric technical interfaces, related biometric profiles and other standards in support of technical implementation of biometric systems, and cross jurisdictional and societal aspects of biometric implementation. Representative projects: amendments of ISO/IEC 19794-x: 2011/Amd. 2:2015 data format standards specifying XML encoding, extensible biometric data interchange formats ISO/IEC 39794-x. e.g., generic extensible data interchange formats for the representation of data: a tagged binary data format based on an extensible specification in ASN.1 and a textual data format based on an XML schema definition (both capable of holding the same information), ISO/IEC 30107-x Biometric presentation attack detection multi-part standard and ISO/IEC 24779-x — Cross-Jurisdictional and societal aspects of implementation of biometric technologies — pictograms, icons and symbols for use with biometric systems multi-part standard.

ITU-T

Study Group 17 is responsible for the study of the appropriate core questions on identity management. In addition, in consultation with other relevant study groups and in collaboration, where appropriate, with other standards bodies, SG17 has the responsibility to define and maintain the overall framework and to coordinate, assign (recognising the mandates of other study groups) and prioritise the studies to be carried out by the study groups, and to ensure the preparation of consistent, complete and timely recommendations.

http://www.itu.int/en/ITU-T/studygroups/com17/Pages/idm.aspx

OASIS

Projects for e-identity and e-signature management and functionality, including standards for cross-enterprise security and privacy authorisation (XSPA); digital signature services; the extensible access control markup language (XACML, also ITU-T Recommendation X.1144); the key management interoperability protocol (KMIP); the security assertion markup language (SAML, also ITU-T Recommendation X.1141); Web Services Federation (WS-Fed); web services trust (WS-Trust); Web Services Secure Exchange (WS-SX), and the extensible resource identifier (XRI) and XRI data interchange (XDI) standards; OASIS identity-based attestation and open exchange protocol specification (IBOPS). OASIS also hosts standardisation projects on biometrics device calls and on e-ID credential trust elevation methods.

OIDF

Set of standards and related certification profiles addressing identity transactions over the internet. Active working groups in this area include: the OpenID Connect WG, AccountChooser WG, Native Applications WG, Mobile operator Discovery, Registration and Authentication WG (MODRNA), Health Related Data Sharing WG (HEART), and Risk and Incident Sharing and Coordination WG (RISC)

http://openid.net/wg/

IETF

The OAUTH (https://tools.ietf.org/wg/oauth/charters) working group developed a protocol suite that allows a user to grant a third-party web site or application access to the user's protected resources, without necessarily revealing their long-term credentials, or even their identity. It also developed security schemes for presenting authorisation tokens to access a protected resource.

The ongoing standardisation effort within the OAUTH working group is focusing on enhancing interoperability of OAUTH deployments.

The Public Notary Transparency (TRANS) WG (https://tools.ietf.org/wg/trans/charters) develops a standards-track specification of the Certificate Transparency protocol (RFC6962) that allows detection of the mis-issuance of certificates issued by CAs or via ad-hoc mapping by maintaining cryptographically verifiable audit logs.

The Automated Certificate Management Environment (ACME) WG (https://tools.ietf.org/wg/acme/charters) specifies conventions for automated X.509 certificate management, including validation of control over an identifier, certificate issuance, certificate renewal, and certificate revocation. The initial focus of the ACME WG is on domain name certificates (as used by web servers), but other uses of certificates can be considered as work progresses.

There is the non-WG Vectors of Trust (VoT) work which may or may not develop into a WG at some point https://www.ietf.org/mailman/listinfo/vot

W3C

The Web Authentication Working group (http://www.w3.org/2015/12/web-authentication-charter.html) is tasked with reducing the use of shared secrets, i.e. passwords, as authentication credentials, facilitating instead multi-factor authentication support and hardware-based key storage while respecting the 'same origin policy'.

W3C also runs a community-driven group (not standard track) on WebID: https://www.w3.org/wiki/WebID and has in the past run a workshop on Identity in the Browser (https://www.w3.org/2011/identity-ws/report.html).

The W3C Credentials Community Group discusses credential storage and exchange systems for the web. Some of their ideas are being discussed in the Web Payments Interest Group via the Verifiable Claims Task Force (as of January 2016).

OTHERS (INCLUDING STAKEHOLDER GROUPS, TECHNOLOGY PLATFORMS, AND RESEARCH PROJECTS)

E-SENS

e-SENS (Electronic Simple European Networked Services) is a large-scale pilot launched within the ICT policy support programme (ICT PSP), under the competitiveness and innovation framework programme (CIP). The aim of the project is to develop an infrastructure for interoperable public services in Europe. It builds upon and consolidates building blocks such as eID, e-Documents, e-Delivery, and e-Signature etc. from previous pilot projects and integrates them into a European digital platform for cross-sector, interoperable eGovernment services.
http://www.esens.eu/home.html.

STORK

EU co-funded project to establish a European eID interoperability platform that will allow citizens to establish new e-relations across-borders, just by presenting their national eID.

The STORK 2.0 project was the continuation of STORK and has worked on extending the specification to roles and mandates.

In the context of the eIDAS Regulation and the implementing act on the interoperability framework for eID technical specifications are being developed for the eIDAS nodes. These technical specifications will provide further details on technical requirements as set out in the Regulation. The specifications for the eIDAS were developed through Member State collaboration in a technical sub-committee of the eIDAS Expert Group.
https://www.eid-stork.eu/.

SSEDIC

Scoping the single European digital identity community –SSEDIC
http://www.eid-ssedic.eu

FIDIS

Future of identity in the information society — FIDIS
http://www.fidis.net

PRIME

Privacy and identity management for Europe — PRIME
https://www.prime-project.eu

SOCIETAL CHALLENGES

eHEALTH

POLICY OBJECTIVES

eHealth, the application of ICT to health and healthcare systems, can increase their efficiency, improve quality of life and unlock innovation in health markets. The European Commission has been developing targeted policy initiatives aimed at fostering widespread adoption of eHealth throughout the EU.

The eHealth network (eHN), a network of Member States' national authorities responsible for drawing up guidelines in this area, was set up pursuant to Article 14 of Directive 2011/24 on the application of patients' rights in cross-border healthcare. A Joint Action to provide scientific and technical support for the eHealth Network (JAseHN) was launched in May 2015. It aims to prepare political recommendations and other instruments for cooperation in the four specific priority areas set out in the eHN's multiannual work plan: (1) interoperability and standardisation, (2) monitoring and assessment of implementation, (3) exchange of knowledge and (4) global cooperation and positioning.

Member States have responded quickly, demonstrating a high-level commitment to the eHealth policy agenda, notably through their participation in the eHN, in JAseHN, and in the eHealth Digital Service Infrastructure (DSI) to exchange electronic prescriptions and patient summaries. In 2016, 16 Member States committed to deploy eHealth services (exchange of patient summaries & eprescriptions) with the support of the connecting Europe facility (CEF) work programme.

Notwithstanding this substantial progress, there are still difficulties that need to be addressed in order to reap all the benefits of a fully mature and interoperable eHealth system in Europe. One of them is the lack of interoperability between eHealth solutions and the piecemeal adoption of common standards in eHealth systems.

It is important to put measures in place in the areas of eGovernment and eHealth to ensure the accessibility of the relevant services to the general public and to patients in the health service using assistive technologies.

LEGISLATION AND POLICY DOCUMENTS

AT EUROPEAN LEVEL

- **Directive 2011/24** on the application of patients' rights in cross-border healthcare http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2011:088:0045:0065:en:PDF
- **(COM(2016) 179 final):** " EU eGovernment Action Plan 2016-2020: Accelerating the digital transformation of government" http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52016DC0179&from=EN
- **COM(2015) 192** : "A Digital single market strategy for Europe http://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1447773803386&uri=CELEX-:52015DC0192
- **COM(2010) 245:** "A Digital Agenda for Europe", actions 76, 77 and 78 http://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52010DC0245R(01)&-from=EN
- **COM(2008) 689:** Communication of the Commission on telemedicine for the benefit of patients, healthcare systems and society, https://ec.europa.eu/transparency/regdoc/rep/1/2008/EN/1-2008-689-EN-F1-1.Pdf
- **SWD(2012) 413 final** — eHealth Action Plan 2012-2020 — Innovative healthcare for the 21st century http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=SWD:2012:0413:FIN:EN:PDF
- **European Commission Green Paper** on mobile health ("mHealth") issued to stakeholders for comments April 2014' (now completed) http://ec.europa.eu/digital-agenda/en/news/green-paper-mobile-health-mhealth
- **Refined eHealth European Interoperability Framework (ReEIF) adopted by the eHN on 23.11.2015** http://ec.europa.eu/health/ehealth/docs/ev_20151123_co03_en.pdf
- **EU-US memorandum of understanding** http://ec.europa.eu/digital-agenda/en/news/memorandum-understanding-eu-us-ehealth

OTHERS

- **Directory for eHealth policies, World Health Organisation,** http://www.who.int/goe/policies/en
- **French national strategy** http://proxy-pubminefi.diffusion.finances.gouv.fr/pub/document/18/17721.pdf#page=23

- Strategy of the Federal Council for an Information Society in Switzerland: [30] http://www.e-health-suisse.ch/index.html?lang=en
- Legally eHealth — Putting eHealth in its European Legal Context http://www.epsos.eu/uploads/tx_epsosfileshare/Legally-eHealth-Report_01.pdf

PROPOSED NEW ACTIONS ON STANDARDISATION

STANDARDS DEVELOPMENT

Listing key aspects requiring identification (patients, hospitals, clinics, doctors, diseases, etc.) should be considered at European level as a priority for work on eHealth, since many other areas depend on identifiers. In particular, agreement should be reached on the categories of healthcare professionals who can access patient summaries, including a solution for secure authentication of these professionals and their authorisations. The eIDAS Regulation (EU) No 910/2014 may solve parts of the issues on identification and authentication processes, and the eHN is working in that specific area. Work is ongoing in the Member states to finalise the transposition of the eIDAS Regulation. The following items should be covered as far as possible:

- Accommodation of different identification processes implemented by Member States
- specific eHealth purpose identification mechanisms, or
- cross-sectoral identification mechanisms

Standardised drug identifiers[31] to achieve national and international interoperability of health services (online or other), while complying with the legislation protecting patients, and including specific rules of enforcement of delivery on medical prescriptions1. Agreements on standards in this field should take into account the needs of cross-border exchange of electronic health records since their medication part faces similar terminological challenges.

Agreements on a terminological profile for a revised minimum set of fields included in the patient summary, and on a technical profile for the cross-border exchange of patient summaries, in particular with regard to security aspects, based on the guidelines on a minimum/non exhaustive patient summary dataset for electronic ex-change (eHN, November 2016). With regard to patient consent to the creation or sharing of electronic health records, the eHN has given guidance which could eventually be completed by standards on the procedure and information given for patient consent. This could be made for all eHealth services including the secondary use of data. In accordance to eHN guidelines, the consent of patient must carefully be accounted in the standard to develop.

The ICT services to be provided to European reference networks (ERNs) and healthcare providers, to satisfy the needs of communication and data sharing within and between the reference networks ,addressing areas such as fast and easy sharing of digital medical images through picture archive and communication systems (PACS); telemedicine solutions, allowing healthcare providers to share real-time knowledge and decisions; sharing of best practices and clinical decision-making tools (i.e. guidelines); solutions to support collaborative research between healthcare providers, through the development of clinical trials and/or epidemiological studies; and establishment of shared databases and registries.

The move towards personalised medicine requires standardisation of **data** related to the field of **biology and biomarkers.** In particular, clinical laboratories are subject to a process of accreditation according to ISO 15 189 that should be supplemented by standardisation processes in ICT.

Quality criteria for the development of health and wellness apps. Taking into account the fast growing market of health and wellness applications and the concerns about their quality and reliability, there is a need for technical specifications at the European level that would provide guidance to app developers by setting out quality criteria and principles to be followed throughout the app development life cycle. These technical specifications could be based on the publicly available specification PAS:277 published by the British Standards Institution (BSI).

ACTION 1 Evaluate the need to produce an initial report listing all the necessary types of identifiers and identification processes and, where possible, all identifiers needed as components in a European eHealth system[32].

ACTION 2 For the further development of the patient summary, evaluate the need for solutions on a terminological profile for a minimum set of fields to be included and on a technical profile for the cross-border exchange of patient summaries, in particular with regard to the security aspects and patient consent, while keeping in mind the different regulatory and technical approaches in Member States.

30 "eHealth Suisse" tries to link regional projects under national rules (the middle-out approach); standards are recommended for use according to the needs emerging from use-cases that are being implemented; interoperable IHE integration profiles are crucial

31' Drug identifier' means, in this context, the 'unique identifier' to be laid down by the European Commission in implementation of Article 54a, item2(a) of the FMD (Directive 2011/62/EU), 'that enables the authenticity of medicinal products to be verified and individual packs to be identified'

32 This report should be used as input for possible improvements in the recently published ITU-T H.860

ACTION 3 CEN/TC 251 has signed an agreement with the Commission on 1 May 2016, starting standardisation of specific elements of the patient summary data set guidelines adopted by the eHealth Network. This action entails:

- Ensuring the European participation and input in international standardisation aiming at an international solution;
- Supporting the development of European standards and implementation guides based on the guidelines of the eHealth Network. This activity will be subject to formal adoption by the eHealth Network.

ACTION 4 CEN/TC 251 will vote on accepting a work item to develop a European guidance document based on BSI PAS 277, for use by eHealth and wellness apps' developers by setting out quality criteria and principles to be followed throughout the app development life cycle. These may include guidelines for users.

STANDARDISATION NEEDS, ONGOING ACTIVITIES AND PROGRESS REPORT

COMMISSION PERSPECTIVE AND PROGRESS REPORT

Interoperability of ICT-enabled solutions and of data exchange is the precondition for an improved coordination and integration of healthcare unlocking the EU eHealth single market.

The use of European and international standards is a way to ensure the interoperability of ICT solutions in general. In eHealth however, such standards have often not been specific enough. The eHealth network identified more detailed specifications, which could be used for public procurement, in the framework of the new EU standardisation regulation, contributing to the technical and semantic levels of the eHealth Interoperability Framework. One example is the IHE set of specifications identified for use in procurement by Commission Decision (EU) 2015/1302 of 28 July 2015[33] under Article 14 of the EU Regulation 1025/2012.

A refined eHealth European interoperability framework (ReEIF) was adopted by the eHealth Network in November 2015. It represents a common refined framework for managing interoperability and standardisation challenges in the eHealth domain in Europe, offering a framework of terms and methodologies for reaching a common language, and a common starting point for the analysis of problems and the description of eHealth solutions throughout Europe.

In addition to European and international standards and specifications, interoperability testing, labelling and certification processes are also essential. Several projects are successfully testing and implementing standards, open and secure architecture, clinical workflows and subsets of terminologies and making policy recommendations, to prepare the deployment of eHealth services on a large scale.

To boost interoperability there is a need in some cases for further specifications and components development and validation; this may be by launching standardisation mandates, projects or direct grants.

The JAseHN is in the process of setting up an arrangement with standards developing organisations and profiling organisations relevant to eHealth in Europe.

With the purpose of developing health data exchange the eHN adopted three guidelines on cross-border exchange of health data: the guidelines on a minimum/non exhaustive patient summary dataset for electronic exchange (2013, revised in 2016), on an ePrescription dataset for electronic exchange (2014, revised in 2016); and on an Organisational Framework for eHealth National Contact Points (2015). In addition, a recommendation to promote the use of patients' registries has been adopted in 2015, and a guideline on the electronic exchange of health data under Cross-border directive 2011/24/EU was adopted in 2016.

The Commission is working on the setting up of European reference networks (ERN) pursuant to Article 12 of Directive 2011/24 on patients' rights in cross-border healthcare. The main aim is to provide health care in a networking environment. To meet their goals, the reference networks would need an IT platform allowing healthcare providers to discuss and share knowledge and clinical information on concrete and real-time patient cases (a virtual consultation system) including the use of PACS systems.

33 http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=OJ:JOL_2015_199_R_0011

The reference network model will provide an excellent showcase for the piloting and implementation of other related ICT standards common to many other areas of healthcare.

The eHealth Interoperability Framework Study[34] is identifying a representative set of the most relevant use-cases within the eHealth environment and initiating the specification of requests to foster ICT products and services. Further user-centred work may be needed to cover different forms of user integration in the systems. The framework covers:

- patient summaries, ePrescription, common cross-border semantics approaches and subsets of ontologies in clinical contexts[35];
- standardised processes in a specific clinical context;
- technical specifications (including immunity) for eHealth systems, especially cross-border .

Three H2020 projects on eHealth standardisation and interoperability have been launched in 2015:

- OpenMedicine, for building a common EU, standards-based, database of medicines;
- eStandards to support the optimisation of standardisation processes;
- AssessCT to assess SNOMED CT[36] terminology.

Two new projects on eHealth standardisation will run through 2016 till 2018:

- EURO-CAS, a European eHealth Interoperability Conformity Assessment Scheme aiming at maintaining and developing the adoption and take-up of testing the interoperability of ICT solutions.
- Trillium-II, advancing further the global Electronic Health Record (EHR) interoperability with activities surrounding the International Patient Summary (IPS) standards

The following links provide additional information of ongoing work.

- Guidelines for assessing the validity and reliability of mHealth apps, https://ec.europa.eu/digital-single-market/en/news/open-stakeholder-meeting-mhealth-assessment-guidelines-presentations-and-survey
- Code of Conduct on privacy for mobile health apps, https://ec.europa.eu/digital-single-market/en/news/code-conduct-privacy-mhealth-apps-has-been-finalised
- Consultation on safety of apps https://ec.europa.eu/digital-single-market/en/news/public-consultation-safety-apps-and-other-non-embedded-software

ONGOING STANDARDS DEVELOPMENT

STANDARDS DEVELOPMENT

BSI

PAS 277:2015 Health and wellness apps — Quality criteria across the life cycle — Code of practice

CEN

Technical Committee 251 — Health Informatics: providing a focal point for standards in this domain, in close collaboration with ISO C215. TC251, as of 1 May, is taking forward the eHN guidelines, contributing to an international solution while providing Europe with a Patient Summary standard and an implementation guide.
https://www.cen.eu/work/Pages/default.aspx

EHN

Guidelines on:

a minimum/non exhaustive patient summary dataset for electronic exchange (2013), to be revised in 2016

an ePrescription dataset for electronic exchange (2014); to be revised in 2017

on an Organisational Framework for eHealth National Contact Points (2015)

http://ec.europa.eu/health/ehealth/key_documents/index_en.htm

ISO

The European Medicines Agency is part of a project to finalise the implementation guides to support the adoption of the ISO standards for the identification of medicinal products (IDMP).

This set of standards and implementation guides are being developed jointly by ISO/TC 215 and CEN/TC 251, where this work started originally.

http://www.ema.europa.eu/ema/index.jsp?curl=pages/regulation/general/general_content_000645.jsp&mid=WC0b01ac058078fbe2

ETSI

ETSI is developing digital enhanced cordless telecommunications (DECT) ultra-low energy (ULE), a low-power wireless technology providing optimal radio coverage in indoor scenarios for reliable audio and data services suitable for many eHealth applications, e.g. health monitoring, emergency alarms for vulnerable people and remote medical monitoring.

It is also working on smart body area networks. Standards for a dedicated radio technology for these networks are being developed.

EP eHealth provides a focus point in ETSI on issues such as mHealth

34 http://ec.europa.eu/digital-agenda/en/news/ehealth-interoperability-framework-study
35 See ITU-T rec. H.860, and enhanced experiences reported to ITU-T SG16
36 http://www.ihtsdo.org/snomed-ct/

and telemedicine. Currently, there is the development of standards to facilitate telemedicine and the "Internet Clinic".
http://www.etsi.org/technologies-clusters/technologies/medical

IEC

IEC SC 62B is developping standard IEC 61910-1, which describes a high-level data exchange language between systems making medical imagery.

IEEE

The IEEE has unique standards programmes supporting the eHealth area, extending from body area networks to 3D modelling of medical data, and integrating the IEEE 11073™ family of informatics/personal health devices communication standards for data interoperability and architecture.

ITU

The ITU published the continua design guidelines in the ITU-T H.810 series (2016), Interoperability design guidelines for personal health systems (which is complemented by 37 conformity testing specifications); ITU-T H.860 (4/2014), Multimedia e-health data exchange services; Y.2065, Service and capability requirements for e-health monitoring services; Y.2075, Capability framework for e-health monitoring services; technical papers HSTP-H810 (7/2014) and HSTP-H810-XCHF (2015) with an introduction to the H.810 series and data exchange within it. Updated editions of the ITU-T H.810 series architecture are produced regularly (annually or so).

http://itu.int/en/ITU-T/e-Health

JIC

Joint Initiative on SDO global health informatics standardisation in which CEN/TC 251, ISO/TC 215, HL7, GS1, IHTSDO, CDISC, IHE and DICOM participate as members.

http://www.jointinitiativecouncil.org/

STAKEHOLDER GROUPS, TECHNOLOGY PLATFORMS, AND RESEARCH PROJECTS

ACT PROJECT (PHILIPS / LONDON HOSPITAL)

Advancing Care Coordination and Telehealth Deployment
http://www2.med.auth.gr/act/news.php

ASSESS CT

Investigating the fitness of the clinical terminology SNOMED CT as a potential standard for EU-wide eHealth deployments, scrutinising clinical, technical, financial, and organisational aspects.
http://assess-ct.eu/

JASEHN

Joint Action to Support the eHealth Network
http://jasehn.eu/

EESSI

Electronic exchange of social security information (EESSI). EESSI is an IT system that will help social security bodies across the EU to exchange information more rapidly and securely, as required by EU regulations on social security coordination.
http://ec.europa.eu/social/main.jsp?catId=869&langId=en

EHDSI

eHealth Digital Service Infrastructure (eHDSI) under the Connecting Europe Facility.

eHEALTH GOVERNANCE INITIATIVE — SEHGOVIA

Supporting the European eHealth Governance Initiative and Action

http://ec.europa.eu/information_society/apps/projects/factsheet/index.cfm?project_ref=270941

EHR4CR PROJECT

IMI project with a focus on the use of electronic Health Records for Clinical Research
http://www.ehr4cr.eu/

EPSOS

European patient smart open services
www.epsos.eu

E-SENS

Electronic Simple European Networked Services is a new large-scale project that embodies the idea of European digital market development through innovative ICT solutions.
http://www.esens.eu/home/

EURECA

Enabling information re-Use by linking clinical REsearch and Care
http://eurecaproject.eu/about/

EURO-CAS

This European eHealth Interoperability Conformity Assessment Scheme aims at maintaining and developing the adoption and take-up of testing the interoperability of ICT solutions against identified eHealth standards and profiles defined in the eHealth European Interoperability Framework (eEIF). The key deliverable is a sustainable Conformity Assessment Scheme (CAS) for Europe.

eSTANDARDS

The project works on the alignment of eHealth standards, on producing an evidence-based roadmap and on contributing to an eHealth quality management system (interoperability testing & certification of eHealth systems).

It also contributes to the coexistence of standards in large-scale eHealth deployments. It contributes to the EU/US MoU roadmap and provides insights on the socioeconomic aspects of interoperability. The main deliverables (the Report 'The case for formal standardisation' and the 'Roadmap for essential standards development') are offered to the eHN for their endorsement.
http://www.estandards-project.eu/

EXPAND

aims to exploit a number of selected eHealth assets developed in various initiatives
http://www.expandproject.eu/

HAIVISIO

European project which aims to identify and enhance awareness of the results generated by eHealth, active ageing and independent living European projects.
http://haivisio.eu/

LINKED2SAFETY

A next-generation, secure linked data medical information space for semantically-interconnecting electronic health records and clinical trials systems advancing patients safety in clinical research
http://www.linked2safety-project.eu/node/23

MOMENTUM

Momentum is a platform where key players in telemedicine share their knowledge and experience in deploying telemedicine services in routine care.
http://telemedicine-momentum.eu/

OPENMEDICINE

This project explicitly considers the IDMP standards and the context in which they need to be implemented. The project aims to produce recommendations on how to:

1) Solve the problem of identifying a medicinal product in a cross-border setting

2) Address the issue of substitution across the European Union
http://www.open-medicine.eu/openmed/

PHS FORESIGHT (PERSONAL HEALTH SYSTEMS FORESIGHT PROJECT)

This ongoing project has been researching indicators and milestones for key areas of transformation required by the implementation of eHealth systems
http://www.phsforesight.eu/

PONTE PROJECT

Efficient Patient Recruitment for Innovative Clinical Trials of Existing Drugs to other Indications
http://www.ponte-project.eu/

RENEWING HEALTH

REgioNs of Europe WorkINg toGether for health (Renewing health): a European project which aims at implementing large-scale real-life test beds for the validation and subsequent evaluation of innovative telemedicine services using a patient-centred approach and a common rigorous assessment methodology.
http://www.renewinghealth.eu

SALUS PROJECT

Scalable, standard-based interoperability framework for sustainable pro-active post market safety studies
http://www.salusproject.eu/

SEMANTICHEALTHNET

Network of excellence in semantic interoperability
www.semantichealthnet.eu

TRANSFORM PROJECT

Translational research and patient safety in Europe
http://www.transformproject.eu/

TRILLIUM BRIDGE

The Trillium Bridge support action extends the European patient summaries used in epSOS and Meaningful Use II, Transitions of Care in the United States, to establish an interoperability bridge between the EU and the US systems.
http://www.trilliumbridge.eu/

TRILLIUM II

Trillium-II steps forward with an outstanding consortium to further advance global Electronic Health Record (EHR) interoperability. Activities surrounding the International Patient Summary (IPS) standards can nurture digital health innovation, lower trade barriers, and advance patient safety & trust, bridging the gap between strategic intent and capability for action by Standards Development Organization (SDOs) striving for interoperability, quality, and safety through standards adoption.

UNITED4HEALTH

European project which aims to adapt and tailor telehealth services from regions and institutions in Europe to large scale deployment within other regions and institutions and maximise the transferability of services and knowledge among European healthcare providers at large scales and in collaboration.
http://ec.europa.eu/information_society/apps/projects/factsheet/index.cfm?project_ref=325215

MSP MEMBERS' AND STAKEHOLDERS' REMARKS

Coexistence arrangements and the interoperability of medical devices (including application aspects), need to be improved to enable devices and services for personal health management and healthcare delivery to be easily installed (plug-and-play connectivity) and fully functional.

This aspect is currently handled by the international Personal Connected Health Alliance (PCHA), maker of the Continua Guidelines, which the ITU has adopted as official standards (Recommendation ITU-T H.810).

ESOs should be encouraged to investigate the implications for coexistence and interoperability of lessons from the experiences of the US Initiative experts taking also into consideration the identified IHE set of specifications they identified.

There may be needs for further actions after appropriate analysis and experience gained from the eHealth Interoperability Framework Study, e.g. for the identification of further gaps in standardisation and regulation (including 'mobile health') and for the creation of an appropriate glossary of terms and definitions. Future actions should be treated in line with the principles of a multidisciplinary standardisation approach (incl. linkage to common clinical professional standards), covering:

- home health monitoring devices using optimised low-power wireless technologies, covering all aspects of the problem, from application semantics to radio reliability considerations.
- European interoperable health alarm devices (such as battery-powered pendants for vulnerable people), including the provision of reliable audio, video and data services (radio or not) in home scenarios, interoperability between manufacturers, interworking to other networks (internet, mobile), security considerations, reliable "stay-alive" checking and ultra-low power consumption.
- security, privacy (e.g. privacy by design) and accessibility aspects (see chapter on security and privacy).

It is essential to support the creation of interoperable eHealth by developing common initiatives/standards that improves citizen's private lives, and developing sensitive health data, that people can collect themselves for use during treatment.

These measures need to consider the protection of the practitioner who is responsible for collecting and storing the data, and also the approval of the devices used for data collection, under the Medical Device Directive and the national rules on data protection.

ACTIVE AND HEALTHY AGEING

POLICY OBJECTIVES

One of the main trends shaping our future society and economy is demographic change[37]. Due to its wide ranging impact on society, demographic ageing requires a holistic policy approach to adapt society to the needs of the ageing population, to preserve the quality of life of our citizens while ageing, to maintain solidarity between generations, to promote social and economic inclusion, and to ensure sustainable health and care systems and age-friendly products, services and environments that are designed for all. Demographic ageing population transforms many dimensions of our society and economy, and a thorough reorientation in the domains of policy and economy is needed to make the transition in a way that benefits all. The Commission is already pursuing many relevant initiatives across key policy areas, which jointly provide the "fabric" and boundary conditions for a successfully tackling of the ageing challenge and stimulate the Silver Economy market.

The demographic change is also the opportunity for Europe to address the safety, security, affordability and accessibility of assistive technologies for older people. New products and services based on ICT for active and healthy ageing (AHA) can increase the efficiency and sustain the long-term viability of health and care systems, improve quality of life and offer considerable potential for Europe to unlock new markets and growth in Europe and globally. The European Commission has been developing targeted policy initiatives and funding opportunities (e.g. societal challenge 1 on health, wellbeing and active ageing of Horizon 2020) aimed at fostering widespread adoption of ICT for active and healthy ageing throughout the EU. Member States and regions have also dynamically responded by demonstrating a high-level of commitment to the active and healthy ageing policy agenda, notably through their participation in the European Innovation Partnership on active and healthy ageing, to the creation of the active and assisted living joint programme, and through major large scale-pilot projects such as UniversAAL, SMART-CARE, CASA and ReAAl.

37 People aged 50+ account for 37% of the population, i.e. 190 million European citizens. Eurostat population projections foresee that the number of people aged over 60 will increase by about two million a year in the coming decades, while the working-age population, as a result of lower fertility rates among post-baby-boom generations, will start to shrink. The number of very old persons, 80 years and older, who are most likely to be in need of care, will increase. At the same time fewer young people will be available to provide informal and formal support and care.

Notwithstanding the substantial progress, barriers continue to exist that need to be addressed in order to reap all the benefits from active and healthy ageing systems in Europe. Some of them are the lack of open and interoperable solutions for supporting active and healthy ageing and the rather poor adoption of standards in active and healthy ageing systems.

LEGISLATION AND POLICY DOCUMENTS

AT EUROPEAN LEVEL

- The European Innovation Partnership on active and healthy ageing http://ec.europa.eu/research/innovation-union/index_en.cfm?section=active-healthy-ageing
- The ageing report http://ec.europa.eu/economy_finance/publications/european_economy/2012/2012-ageing-report_en.htm
- Decision on the participation of the EU in the Active and Assisted Living Research and Development Programme jointly undertaking by several Member States http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//TEXT+REPORT+A7-2014-0076+0+DOC+XML+V0//EN
- Council Conclusions on Healthy Ageing across the Lifecourse http://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/en/lsa/134097.pdf
- Guiding Principles for Active Ageing and Solidarity between Generations http://ec.europa.eu/social/main.jsp?langId=en&catId=89&newsId=1743&furtherNews=yes
- **Decision 940/2011/EU** of the European Parliament and of the Council of 14 September 2011 on the European Year for Active Ageing and Solidarity between Generations (2012) http://eur-lex.europa.eu/legal-content/EN/ALL/;ELX_SESSIONID=qpQzJ3rKbByvsdtqBxK2p41dV8f25pHvG8TknfSjGkNd3QxnC5pr!1323026245?uri=CELEX:32011D0940
- **Recommendation CM/Rec(2014)**2 of the Committee of Ministers to member States on the promotion of the human rights of older persons http://www.coe.int/t/dghl/standardsetting/hrpolicy/other_committees/cddh-age/Document_CDDH_AGE/CMRec(2014)2_en.pdf
- Active Ageing Index: work of the European Center of Vienna http://ec.europa.eu/social/main.jsp?langId=nl&catId=89&newsId=1837&furtherNews=yes
- The Dublin Declaration on Age-Friendly Cities and Communities in Europe (2013) http://ec.europa.eu/digital-agenda/en/news/dublin-declaration-age-friendly-cities-and-communities-europe-2013

OTHERS

- WHO guidelines on age friendly cities http://www.who.int/ageing/publications/Global_age_friendly_cities_Guide_English.pdf
- Madrid International Plan of Action on Ageing (2002) http://undesadspd.org/Ageing/Resources/MadridInternationalPlanofActiononAgeing.aspx

PROPOSED NEW ACTIONS ON STANDARDISATION

STANDARDS DEVELOPMENT

Future standardisation efforts are needed in these areas:

- Open service platforms APIs
- Possibly building on FI-WARE (see note 1), UniversAAL in joint action under H2020 WP 2016-2017 for smart homes and smart cities
- Service robotics for independent living
- Identify standardisation needs to support ageing issues, e.g. memory deficiency.
- Integration profiles for EIP-AHA use-cases
- Building on EIP-AHA work + PPI calls in H2020 SC1
- Examples of key aspects that should be considered on ICT standardisation work for active and healthy ageing are:
  - Facilitate the involvement of societal stakeholders in the development of standards in the field of active and healthy ageing; ensure user participation from the beginning to avoid purely technical-driven innovation.
  - Ensure interoperability of devices to enable plug-and-play connectivity of the different devices and services for personal management and delivery of the actual services for an active and healthy ageing.
  - Given the challenge of the aging population, the standardisation work must also take into account aspects of personal services dedicated to the autonomy including ICT solutions in order to promote secure and harmonised solutions at the European level;
  - All the standardisation work on active and healthy ageing should ensure a high-level of privacy protection and of security.

ACTION 1 Produce a report planning the standardisation work required in the areas designated above, listing existing relevant standards, identifying gaps and offering an initial formulation for the scope of the proposed standards.

ACTION 2 As a complement to action 4 in eHealth, ESOs should make sure that standards reflects the principles of protection of individuals with regard to the processing of personal data and the free movement of such data.

NOTE 1: The ongoing H2020 Coordination and Support Action PROGRESSIVE will provide a dynamic and sustainable framework for standards and standardisation around ICT for AHA. The project is pan-European but also draw on wider international experience – especially in the context of interoperability and standards harmonisation. PROGRESSIVE recognises four domains - age friendly communities; reformed and empowering services; accessible, affordable and supportive homes; and active, health and empowered older people and 22 fields. PRORGRESSIVE will establish parameters by which good practice in standards and the standardisation process around ICT for AHA can be identified. A platform to be developed will promote discussion and debate. The work will lay the foundation for standards that will be increasingly fit for purpose. PROGRESSIVE will build upon the work performed within PROEIPAHA –see note 3- and in particular the Roadmap.

NOTE 2: For the above mentioned actions, particular care should be taken to avoid duplication with work already undertaken in relation to accessibility.

NOTE 3: It is important to point out that in the context of the CSA "PROEIPAHA", a gap analysis is being carried out regarding standardization needs in AHA and producing a Roadmap document to be published by December 2016..

STANDARDISATION NEEDS, ONGOING ACTIVITIES AND PROGRESS REPORT

COMMISSION PERSPECTIVE

Interoperability of ICT-enabled solutions and data exchange is a precondition for better coordination and integration across the entire delivery chain in the market for active and healthy ageing with ICT and the data exchange surrounding it, and thereby unlock the EU single market for ICT for active and healthy ageing.

The use of European and international standards is a way to ensure the interoperability of ICT solutions in general. In the area of ICT for an active and healthy ageing, however, such standards are often not specific enough. In addition to interoperability testing and European and international standards and specifications, labelling and certification processes are also important.

Two promising, currently parallel, interoperability strategies are the 'concurrent use initiative' standards with the IEEE 11073™' family of `Health Informatics/Personal Health Device Communication' , and the CEN/TC 251 'Concurrent use initiative', which has developed a set of health informatics standards (ContSys, EHRcom, and HISA) that links the digitalization of health care processes with the (open) electronic health record and the medical devices, proposing a set of harmonised standards for architecture and interoperability of health information data communication. The IEEE 11073™ family of Health Informatics/Personal Health Device Communication standards for data interoperability and architecture however are not harmonised with HISA and therefore do not communicate with the open EHR standards. Continuity of care demands a solution to the communication between the different interoperability strategies.

Several projects are successfully testing and implementing standards, open and secure architecture and subsets of terminologies and making policy recommendations, to prepare the deployment of ICT services for an active and healthy ageing on a large scale.

It is proposed to boost interoperability by further developing and validating specifications and components, partly through the launch of standardisation mandates, projects or direct grants, the definition of interoperability profiles and certification, if deemed necessary. Coordination with the JIC and other SDOs will be pursued.

The availability of new infrastructure for the Internet of Things (IoT), such as Lora and Zigbee provides promising new opportunities for the development of ICT applications for monitoring care of people living at home.

Ensuring the right mechanisms are in place for collaboration and coherence on ICT for active and healthy ageing standardisation issues at European level, is the task of the eHealth network of Member States in charge of coordination on eHealth standards at EU level. See also previous section on eHealth.

ONGOING STANDARDS DEVELOPMENT

CEN
TC 431, Social Alarms over IP http://www.sis.se/terminologi-och-dokumentation/dokumentation-av-tekniska-produkter/service-chain-for-social-care-alarms-cen-tc-431

IEC

SyC-AAL (Active Assisted Living)

The IEC systems committee active assisted living (SyC AAL) is responsible for the IEC AAL standardisation effort that spans the socio-technical gap, and has an outreach to standards communities (international, regional and other) working with the aim of responding to the needs of AAL users throughout the globe (http://www.iec.ch/dyn/www/f?p=103:186:0::::FSP_ORG_ID,FSP_LANG_ID:11827)

ISO

Standard 17347 on hyper-ontologies for interoperability
http://interop.cim3.net/file/pub/OntoIOp/2013-02-20_confcall_n.27_LucianoSerafini/Integrating-DDLs-into-OntoIOp--TillMossakowski-OliverKutz-ChristophLange_20130220.pdf

OASIS PROJECT

Open architecture for Accessible Services Integration and Standardisation, a large scale integrating project co-financed by the European Commission
http://www.oasis-project.eu/

ZIGBEE OSGI

Reference implementation
http://zb4osgi.aaloa.org/

It should be noted that some standards developed in the field of eHealth can be used in the AHA field as well (e.g. those developed by the 'concurrent use initiative' or ISO 13131:2014 Health informatics -- Telehealth services -- Quality planning guidelines.

STAKEHOLDER GROUPS, TECHNOLOGY PLATFORMS, AND RESEARCH PROJECTS

AALIANCE2

Project standards wiki; the full presentation of Alliance2 recommendations is available in the link: http://tinyurl.com/nnrbter
http://www.aaliance2.eu/; http://nero.offis.de/projects/aaliance2/

AFE-INNOVNET PROJECT

It develops a thematic network that will support and enhance the operational implementation of the EIP AHA D4 Action Group's work plan; taking stock of the work done in the D4 Action Group and upscaling working ICT-based solutions.
http://www.afeinnovnet.eu

PERSONAL CONNECTED HEALTH ALLIANCE (FORMERLY, CONTINUA HEALTH ALLIANCE)

An independent living use-case
http://www.continuaalliance.org/

EASTIN

Independent of commercial interests, provides a comprehensive overview on a website in all EU languages of assistive technology products available in the European market, including technical details of each product and related helpful information (companies, projects, service providers, articles, case descriptions, ideas, etc.); this helps companies to develop, manufacture and supply products and services based on assistive technology components.
www.eastin.eu

EIP-AHA

Independent living
http://ec.europa.eu/research/innovation-union/index_en.cfm?section=active-healthy-ageing&pg=action_group_c2

ENGAGED

European innovation partnership on active and healthy ageing; thematic network on innovative and sustainable active and healthy ageing services that make best use of new technologies.
http://www.engaged-innovation.eu/

EUROPEAN INNOVATION PARTNERSHIP ON ACTIVE AND HEALTHY AGEING

Action plan B3 (integrated care)
http://ec.europa.eu/research/innovation-union/pdf/active-healthy-ageing/b3_action_plan.pdf

Action plan C2 (independent living)
http://ec.europa.eu/research/innovation-union/pdf/active-healthy-ageing/c2_action_plan.pdf

Action plan D4 (innovation for age-friendly buildings, cities & environments)
http://ec.europa.eu/research/innovation-union/pdf/active-healthy-ageing/d4_action_plan.pdf#view=fit&pagemode=non

REALL PROJECT

This is closely connected to the UniversAAL project; it aims to deploy a critical mass of ambient assisted living applications and services based upon the UniversAAL platform with the intent of kick-starting the market for interoperable AAL services, applications and devices
http://www.cip-reaal.eu/about/project-description/

UNIVERSAAL PROJECT

The UniversAAL framework is a reference model and architecture with an open source platform that consists of middleware and service components with tools to develop applications
http://universaal.org/index.php/en/

PROGRESSIVE PROJECT

Coordination and Support Action under H2020 aimed at linking together the standardisation needs from the different domains and addressing them in a coordinated way

MSP MEMBERS' AND STAKEHOLDERS' REMARKS

Considering the demographic change occurring in Europe, standardisation work should contribute to the development of accessible and supportive environments reducing the demand for care and assistance for the ageing population. Promoting accessibility through standardisation will benefit society and the economy in general, making life easier for everyone and supporting active and productive labour market participation by people with disabilities, including older people. ICT products supporting active and healthy ageing should be built upon older users' needs, expectations and abilities; a 'design for all' approach and the involvement of older users and consumers in the relevant standardisation processes are essential.

Given the challenge of the ageing population, the standardisation work might also take into account aspects of personal services dedicated to the autonomy including ICT solutions in order to promote **secure, safe, accessible, affordable, human friendly (for elderly and less ICT-educated users) and harmonised solutions** at the European level. In general, this aspect should also be taken into consideration in eHealth and the proposed work items, as should accessibility aspects like design guidelines for reduced motor control and guidelines on accessibility for people with disabilities from illnesses related to their ageing process, e.g. memory loss. All the standardisation work on e-health should ensure a high-level of accessibility, privacy protection and security. In this context, the Health On the Net Foundation (HON) established a code of conduct for medical and health web sites (HONcode) [38].

Aspects such as interoperability, testing and implementing standards, open and secure architecture and subsets of terminologies, as well as making policy recommendations need to be seen in close connection with 'eHealth' and in a technology-neutral context as mentioned in the first action of 'eHealth' (C.1). Coordination with 'eGovernance', 'eAccessibility', 'eLearning' and the other areas that concern older people should also be considered.

38 http://www.healthonnet.org/HONcode/Conduct.html

ACCESSIBILITY OF ICT PRODUCTS AND SERVICES

POLICY OBJECTIVES

Accessibility of ICT products and services includes telecommunications, TV and broadcasting, the web and new emerging technologies both mainstream and in assistive technology, including interoperability of the two.

This area is related to EU implementation of the UN Convention on the Rights of Persons with Disabilities to which the EU and Member States are a party.

The Commission adopted the European disability strategy 2010-2020[39] with the aim of supporting the implementation of the Convention in the EU. Regulation 1025/2012[40] states:

"(24) The European standardisation system should also fully take into account the United Nations Convention on the Rights of Persons with Disabilities. It is therefore important that organisations representing the interests of consumers sufficiently represent and include the interests of people with disabilities. In addition, the participation of people with disabilities in the standardisation process should be facilitated by all available means".

In this specific policy area, the Directive on the accessibility of public sector bodies' websites is covered through the use of a harmonised standard based on globally agreed web accessibility guidelines. This area also relates to the proposal for a Directive on accessibility of products and services, also referred to as the European Accessibility Act.

39 http://ec.europa.eu/justice/discrimination/disabilities/disability-strategy/index_en.htm

40 http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=O-J:L:2012:316:0012:0033:EN:PDF or http://ec.europa.eu/enterprise/policies/european-standards/standardisation-policy/#h2-1

LEGISLATION AND POLICY DOCUMENTS

AT EUROPEAN LEVEL

On 2 December 2015, the Commission adopted a proposal for a Directive on the approximation of the laws, regulations and administrative provisions of the Member States as regards the accessibility requirements for products and services (the 'European Accessibility Act COM(2015) 615 final) to improve the functioning of the internal market of accessible goods and services. Some ICT goods and services are among the areas under examination to be covered.

COM(2012)721 3/12/12: Proposal for a Directive on the accessibility of public sector bodies' websites, aiming to make sure that public sector websites and mobile applications are accessible.

Accessibility of ICT relates to the following documents:

The Commission's eGovernment Action Plan 2011-2015 to develop eGovernment services that ensure inclusiveness and accessibility
https://ec.europa.eu/digital-agenda/en/european-egovernment-action-plan-2011-2015

The Disability Strategy 2010-2020
http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2010:0636:FIN:EN:PDF

The UN Convention on the Rights of Persons with Disabilities (UN CRPD)
http://www.un.org/disabilities/convention/conventionfull.shtml or http://www.un.org/disabilities/default.asp?navid=14&pid=150

NOTE: The Audiovisual Media Services Directive (AVMS), which is in the final process of adoption, may include additional requirements in terms of eAccessibility, which may have an impact on future standardisation work.

OTHERS

The UN Convention establishes accessibility as one of its general principles, which also applies to ICT and systems, including internet and electronic services; Article 9, on accessibility, requires the State Parties to take the necessary measures to ensure to persons with disabilities have access on an equal basis with others. Under the Convention, this includes measures related to all services open or provided to the public.

PROPOSED NEW ACTIONS ON STANDARDISATION

STANDARDS DEVELOPMENT

ACTION 1 SDOs to adapt EN 301 549 to include additional specifications for accessibility of mobile applications to comply with the essential requirements of perceivability, operability, understandability and robustness set out in the Directive on the accessibility of the websites and mobile applications of public sector bodies.

ACTION 2 SDOs to develop a methodology/framework for testing compliance with EN 301 549 Clauses 9, 10 and 11

ACTION 3 SDOs to develop a live consolidated inventory of accessibility standards, improving the information in existing lists such as http://standards.cen.eu/dyn/www/f?p=204:105:0. This may include coverage of potential causes of problems reported by hearing impaired people, and identification of areas where the standard models for predicting speech quality may need to be updated.

ACTION 4 SDOs to produce a technical report, based on the relevant European projects, delivering quality of service parameters addressing intelligibility of telecommunication as perceived by people with disabilities, in particular those with hearing and visual disabilities.

ACTION 5 SDOs to produce a technical report describing requirements for ICT products and services to be designed to meet the needs of persons with cognitive and learning disabilities; the report should propose enhancements to relevant existing standards and identify needs for further standardisation.

ACTION 6 SDOs to continue work on M/473, providing the deliverables agreed including the European standard and methodology for mainstream accessibility in standardisation processes

ACTION 7 Stimulate further global cooperation on web accessibility standardisation based on work by the World Wide Web Consortium (W3C) on web content accessibility guidelines (WCAG) work in order to overcome fragmentation in meeting user needs with accessible products within the existing structures.

Note: The European Commission is working on a standardisation request to develop a harmonised standard to cope with the essential requirements included in the Directive on the accessibility of the websites and mobile application of public sector bodies, based on the EN 301 549 V1.1.2 (2015-04).

STANDARDISATION NEEDS, ONGOING ACTIVITIES AND PROGRESS REPORT

COMMISSION PERSPECTIVE AND PROGRESS REPORT

Standardisation needs arise, for instance from the UN Convention, Article 9 of which requires the development of accessibility standards, and from the general obligations to promote universal design when drafting standards. Work on this area needs to advance at European level in coordination with related work at international level, to support harmonised market requirements within Europe.

The Directive on the accessibility of public sector bodies' websites and mobile application includes a presumption of conformity that websites and mobile applications which meet the relevant harmonised standards will comply with the Directive's essential requirements. It also states that until references to harmonised standards have been published, the European standard EN 301 549 V1.1.2 (2015-04) (result of Mandate M/376 on accessibility requirements for products and services in the ICT domain suitable for public procurement purposes) should provide a presumption of conformity. Regarding mobile applications, the Directive includes the task of setting technical specifications that meet the Directive's accessibility requirements, until the harmonised standards include the specification needed. The Directive also requires drafing of a methodology for monitoring the conformity of websites and mobile applications with the requirements.

There is therefore a need to adapt EN 301 549 to include provisions on the accessibility of mobile applications, and to develop methodologies to test compliance with the essential requirements of perceivability, operability, understandability and robustness set in the Directive.

ONGOING STANDARDS RELATED DEVELOPMENTS

MANDATED STANDARDISATION WORK

M/376

This addresses ICT accessibility standardisation at European level; it takes into consideration relevant national and international standards on accessibility, e.g. those adopted by the US Access Board, W3C WAI and some related ISO work. The resulting EN 301 549 standard and other related deliverables have been published and contains the requirements of WCAG 2.0 Level AA. The possibility of proposing it as an international standard is under consideration within the JWG on eAccessibility which decided to wait until the US has published its revised standards under Section 508 in order to consider further possible alignments to the EN standard.
http://ec.europa.eu/enterprise/standards_policy/mandates/database/index.cfm?fuseaction=search.detail&id=333#; http://webapp.etsi.org/WorkProgram/Report_WorkItem.asp?WKI_ID=30873

M/473

This is ongoing standardisation work aiming to mainstream accessibility following `design for all' principles in relevant European standardisation initiatives (other than M/376); in addition it requires the development of standards to support manufacturers and service providers including accessibility following design for all, and to facilitate the implementation of the accessibility provisions in European standards, which could cover the majority of the standardisation work covered by this Rolling Plan.
http://www.etsi.org/images/files/ECMandates/m473.pdf

M/420

This mandate, while focusing on accessibility of the built environment, might also include ICT that is used in that context
http://ec.europa.eu/enterprise/standards_policy/mandates/database/index.cfm?fuseaction=refSearch.search#

STANDARDS DEVELOPMENT

BSI

BS 8878:2010 is the first British standard to outline a framework for web accessibility when designing or commissioning web products http://www.ihs.com/products/industry-standards/organisations/bsi/index.aspx

W3C

ISO/IEC JTC 1

The W3C WCAG-EM project has published a stable "working group note": https://www.w3.org/TR/WCAG-EM/. See also https://www.w3.org/WAI/eval/ .
The work ISO/IEC JTC1 SWG-A was doing (TR 29138-2) was passed to JTC1 SC35

CEN

CEN formed a Strategic Advisory Group on Accessibility (SAGA) to consider how to address accessibility throughout the standardisation process; this group includes representatives of national standards bodies, CENELEC and ETSI, and organisations representing disabled and older persons
http://www.cencenelec.eu/standards/Sectors/Accessibility/Pages/default.aspx

ETSI

ETSI continues to produce accessibility standards on specific ICT topics and is planning to produce a guide to user-centred terminology for existing and upcoming devices and services and recommendations for the design of ICT devices for persons with cognitive disabilities; initial early investigations are being made into transmission quality and its possible link to reported intelligibility problems for some hearing impaired people; see also EG 202 952, a set of guidelines to identify "Design for All" aspects in ETSI deliverables

http://www.etsi.org/technologies-clusters/technologies/human-factors/accessibility; http://webapp.etsi.org/WorkProgram/Report_WorkItem.asp?WKI_ID=35174; http://webapp.etsi.org/WorkProgram/Report_WorkItem.asp?WKI_ID=37153; http://webapp.etsi.org/WorkProgram/Report_WorkItem.asp?WKI_ID=35796

IEC

IEC TC 100/TA 16 is producing international publications addressing aspects of active assisted living (AAL), including issues related to accessibility, usability and specific user interfaces related to audio, video and multimedia systems and equipment within the scope of TC 100.
http://www.iec.ch/dyn/www/f?p=103:7:0::::FSP_ORG_ID,FSP_LANG_ID:11009,25

IETF

Relevant work may be found in the RAI area, e.g. RFC 3551 identifies the requirements for SIP to support the hearing impaired and RFC 4103 defines the RTP payload for text conversation; RFCs 4103 and 5194 are referenced in various accessibility draft regulations being proposed in the US

http://trac.tools.ietf.org/area/rai/; http://trac.tools.ietf.org/group/iab/trac/wiki/Multi-Stake-Holder-Platform#ICTAccess; http://www.rfc-editor.org/rfc/rfc3551.txt; http://www.rfc-editor.org/rfc/rfc4103.txt; http://www.rfc-editor.org/rfc/rfc5194.txt;

http://www.section508.gov/section-508-standards-guide

ISO

ISO/IEC Guide 71, Guidelines for standards developers to address the needs of older persons and persons with disabilities was published in 2014 and adopted by CEN and the CENELEC as CEN/CENELEC guide 6:2014.

JTC1 SWG-A (special working group on accessibility) has been disbanded. Work has been transferred to SC35 (User Interfaces)
http://www.iso.org/iso/catalogue_detail?csnumber=33987
http://www.iec.ch/etech/2011/etech_1011/tc-14.htm

ITU

The ITU produced relevant work on accessibility and human factors, a sample of which is found in the ITU Accessibility Portal. Related technical groups include question 26/16 on accessibility and question 4/2 on human factors. The checklist in FSTP-TACL on how to prepare ICT standards that include accessibility from their inception is also available, as is ITU-T F.790.

ITU H-series Supplement 17 (2014) mirrors the new edition of ISO/IEC Guide 71 containing guidelines for standards developers to address the needs of older persons and persons with disabilities.

The Recommendation ITU-T F.791 contains recommended terminology for accessibility to be used in the international context.

Two ITU-T technical papers describe arrangements for accessible meetings and for accessible remote participation in meetings (FSTP-AM — Guidelines for accessible meetings; and FSTP-ACC-RemPart — Guidelines for supporting remote participation in meetings for all) that aim at increasing the participation of persons with disabilities at real and virtual meetings
http://www.itu.int/en/ITU-T/accessibility; http://www.itu.int/rec/T-REC-F.790/recommendation.asp?lang=en&parent=T-REC-F.790-200701-I

W3C

Develops and maintains the internationally recognized "web content accessibility guidelines (WCAG) 2.0": https://www.w3.org/WAI/intro/wcag and https://www.w3.org/TR/WCAG20

WCAG 2.0 is also available as ISO/IEC 40500:2012, and is partially included in EN 301 549 (only Level A and Level AA requirements).

Currently W3C is working on improvements to WCAG for the following areas: mobile accessibility, cognitive and learning disabilities, low vision, conformance testing. Some of these improvements are expected for WCAG 2.1, which is currently being pursued by W3C. W3C is also exploring the development of the third-generation version of WCAG.

The Authoring Tool Accessibility Guidelines (ATAG) 2.0 is a W3C standard ("Recommendation") that addresses the accessibility of code editors, content management systems (CMS), and other software used to create web content, include some types of social media websites; and support for production of accessible content by these tools. https://www.w3.org/WAI/intro/atag https://www.w3.org/TR/ATAG20

The User Agent Accessibility Guidelines (UAAG) addresses accessibility aspects of web browsers, media players, and some types of assistive technologies. It also addresses some types of mobile applications. UAAG 2.0 is currently at a normative Working group Note. https://www.w3.org/WAI/intro/uaag https://www.w3.org/TR/UAAG20

The Website Accessibility Conformance Evaluation Methodology (WCAG-EM) 1.0 is currently at a working group note status. It addresses aspects of website evaluation. https://www.w3.org/WAI/eval/conformance https://www.w3.org/TR/WCAG-EM

STAKEHOLDER GROUPS TECHNOLOGY PLATFORMS, AND RESEARCH PROJECTS

AALIANCE2

Next Generation European Ambient Assisted Living Innovation; FP7 repository of existing standards
http://www.aaliance2.eu/

WAI ACT

A cooperation framework for guidance on advanced technologies, evaluation methodologies, and research agenda setting to support eAccessibility.
http://www.w3.org/WAI/ACT/

WAI DEV

Developing strategies to support mainstream production of inclusive components and services and showcasing good practice in inclusive design.
http://www.w3.org/WAI/DEV/

EACCESS+

Hub providing resources notably on standards and guidelines for web accessibility (CIP ICT PSP)
http://hub.eaccessplus.eu/wiki/Category:Standards

EIII

European Inclusion Internet Initiative: partners among others Dutch, Danish, Italian and Island governments. The initiative is now completed
http://eiii.eu/

PROSPERITY4ALL

Develops the infrastructure and ecosystem that will allow for a ubiquitous auto-personalisation of interfaces and materials, based on user needs and preferences, to grow; it builds on the infrastructure provided by Cloud4All in order to create more parts of the GPII
http://www.prosperity4all.eu; http://www.cloud4all.info/; http://gpii.net/

RAISING THE FLOOR CONSORTIUM

Mission is to make the web and mobile technologies accessible to everyone with disability, literacy and ageing-related barriers, regardless of their economic status
http://raisingthefloor.org

SMART 2014 /0061

Monitoring methodologies for web accessibility in the European Union. The objective of the study is to collect information on the monitoring methodologies for verification of compliance with web accessibility requirements in the different Member States.
www.monitor-wa.eu

THE NETHERLANDS, 'SIMPLY ACCESSIBLE'

Other countries are invited to participate in this initiative which is the first European initiative involving all relevant stakeholders (government, market parties that build websites and market parties that test websites) to working together on continuously improving the accessibility of government websites by supporting both governments and market parties with proper instruments, e.g. an accessibility plug-in to support content managers and monitor: accessibility of public websites on organisational and product levels, software conformity with the WCAG standard, any mismatch found with the WCAG standard, and suggestions to improve compliance
https://www.gewoontoegankelijk.nl/en

MSP MEMBERS' AND STAKEHOLDERS' REMARKS

Accessibility needs to be reflected in ICT and many other areas (like emergency communication, digital cinema, health, public transport, tourism, and learning) both for users with disabilities in the general public and for staff/ entrepreneurs with disabilities in industry or public administration.

The following list has been compiled from views expressed by some Member States and experts in the field. The list is intended to trigger further discussion with all stakeholders on possible future actions:

- Investigating how mobile devices are useful to people with dexterity problems and reduced mobility and other type of disability when interacting with other ICT products and services; widening the scope (i.e. beyond mobile devices) of guidelines related to diminished motor control e.g. people with advanced Parkinson or similar disorders who can hardly or no longer write is also needed
- Applying standardisation of broadcasters accessible interfaces to IP (and other) systems.
- Convergence and interoperability of video relay services.
- Accessible hybrid TV services.
- Specification of requests for translation among languages, image and text representations, particularly those overcoming accessibility issues, e.g voice to text like automation of relay services for telephony and capturing/ subtitling TV transmissions for hearing-impaired people.
- Interoperability of the most common text transmission techniques like IM — SMS- and email for hearing impaired people.
- Text to voice, like automatically generated audio description for blind citizens.
- Text to sign language, like automatically generated sign language for deaf and hearing-impaired people.
- Identification of accessibility issues, requirements and associated standardisation needs related to:
  - non-literate and dyslexic users; these requirements may turn out to be equally applicable for foreign users unable to understand available user interface languages.
  - security and privacy features of ICT services and devices (see below and sections security and ePrivacy) .

Users have to use increasingly complex security procedures to access the services that they rely on. Attempts to increase security frequently include mechanisms that many users, particularly those with physical and cognitive disabilities, are unable to successfully handle without adopting highly insecure strategies such as writing down complex usernames and passwords. There is a need to provide standards and guidance on accessible security mechanisms that are compatible with human abilities, and appropriate to the type of service being used. In this context the benefit of using of new technologies like biometrics or RFID could be evaluated.

This accessibility component of privacy and security issues could be addressed in general development following M/473 or, preferably, be mainstreamed in general privacy and security work.

Standards could be evaluated to produce a guide to user-centred terminology for all potential users in several EU languages, focusing on the benefits for those with learning and cognitive disabilities. The preponderance of different names for the same ICT features and functions is confusing for all people, but this can be a significantly more important problem for older users or users with learning and cognitive disabilities. This has a negative impact on individual citizens and on the size of the ICT market. This would provide benefits for all potential users, particularly older users and users with learning and cognitive impairments who are currently partly excluded from benefiting from the use of modern ICT.

E-SKILLS AND E-LEARNING

POLICY OBJECTIVES

The development and promotion of ICT professionalism, ICT skills and e-learning require a strong consensus and cooperation among Member States and stakeholders.

LEGISLATION AND POLICY DOCUMENTS

AT EUROPEAN LEVEL

- **COM(2016) 381.** On 10 June 2016 the European Commission published "A new skills agenda for Europe — Working together to strengthen human capital, employability and competitiveness". It presents a number of actions and initiatives aiming to tackle the digital skills deficit in Europe. One of these actions is the launch in December 2016 of the Digital Skills and Jobs Coalition to develop a large digital talent pool and ensure that individuals and the labour force in Europe are equipped with adequate digital skills. This new coalition builds on the work already done under the Grand Coalition for Digital Jobs and the EU e-skills strategy, and will bring together a broader set of stakeholders beyond ICT-sector, including ICT-using sectors, training organisations, academia, social partners and Member States.
- **COM(2016) 180.** On 18 April 2016 the European Commission published the Communication Digitising European industry, which introduced a set of coherent policy measures as part of a digital single market technologies and public service modernisation package. Part of the communication is devoted to digital skills. In particular, it calls for human capital ready for the digital transformation with the necessary skills.
- **COM(2013)654** Communication Open up education: innovative teaching and learning for all through new technologies and open educational resources".
- **IP/13/182** Grand coalition for digital jobs
- **SWD(2012) 446:** Digital agenda for Europe — a good start and stakeholder feedback"
- **COM(2012) 173:** Toward a job-rich recovery and SWD(2012) 96: Exploiting the employment potential of ICTs

- **Recommendation 2009/C 155/01** on the establishment of a European quality assurance reference framework for vocational education and training (EQAVET).
- **COM(2007) 496** e-skills for the 21st century: fostering competitiveness, growth and jobs

PROPOSED NEW ACTIONS ON STANDARDISATION

STANDARDS DEVELOPMENT

REGARDING E-SKILLS:

General recommendation: Standardisation proposals must be based on clear and well-defined market needs and be developed in full coherence with multi-stakeholder initiatives and public policies (such as the EU e-skills strategy, the New skills agenda for Europe, the Digital agenda and the Grand coalition for digital jobs) aiming at reducing e-skills shortages, gaps and mismatches and at fostering ICT professionalism in Europe.

In support of the objectives set out in the Communications COM(2016) 381 final "A new skills agenda for Europe", COM(2015) 192 final "A digital single market strategy for Europe and COM(2007) 496 "e-Skills for the 21st century: Fostering competitiveness, growth and jobs", the Commission is planning to issue in 2017 a standardisation request to develop standards for a comprehensive European framework for the ICT profession which would complement and build on the existing European e-Competence framework.

REGARDING E-LEARNING:

ACTION 1 European e-learning standards to ensure harmonisation, usage and implementation. The focus should be on specifications and guidelines for e-learning opportunities designed for all kinds of users, learning outcomes, credit points, assessment and e-portfolios.

OTHER ACTIVITIES AROUND STANDARDISATION

REGARDING E-SKILLS:

The public and private sectors need to collaborate on the following topics :

ACTION 2 SDO to further develop the European e-competence framework **(e-CF)** for and progress towards a comprehensive framework for ICT professionals: Maintain the e-CF and continue work on job profiles, Body of Knowledge, qualifications and certifications, and methods and tools for the development, promotion, implementation and maintenance of the e-CF to promote and strengthen ICT professionalism in Europe (including international cooperation);

ACTION 3 SDOs to develop curriculum guidelines on e-skills and ICT industry training and certification: development, promotion and implementation of e-competence curriculum guidelines and quality labels to facilitate transparency and the recognition of learning outcomes between formal, non-formal and industry education and training.[41] As e-skills and e-competences are relevant to all ICT users and board members (see C1) this action is not specifically aimed at the ICT industry (see D3)

ACTION 4 Organisational capability: SDO to consider the capability of organisations in the context of the e-skills/e-competence of the personnel. Match personnel competence with organisational processes and procedures to ensure best return on investment in ICT.

REGARDING E-LEARNING:

ACTION 5 Standardisation potential around e-learning: SDO to investigate e-learning courses, content repositories and exchange mechanisms with a focus on metadata, learning design and structure, technical and semantic interoperability supported by agreed protocols, exchange formats and vocabularies. Interoperability should include context-aware, adaptable and mobile/ambient e-learning systems and also cross-domain aspects. This may include the learning trajectory or learning route including, e.g. the didactic approach, aimed learning & learner's profiles and the availability of additional tools that support e-learning.

ACTION 6 Standardisation potential around interoperability and transfer of learners' data: SDO to investigate the possible standardisation of the exchange of learning & learners data which may be generated in the different learning spaces. By the use of a Caliper or xAPI-like framework, the exchange and therefore effective usage might be facilitated.

ACTION 7 Connecting detailed curricula on a pan-European basis: Start a programme, beginning with mathematics and English. It is very important that the semantics, i.e. the terminology being used for the data being exchanged is first described clearly and standardised for the whole educational sector. Best practices that exist globally should be taken into account. This includes but is not limited to the US Common Core State Standards and the Dutch Onderwijsbegrippenkader, the Dutch database for detailed curriculum for primary and secondary education.

41 As e-Skills and competences are relevant for all ICT-users and board-room-members (see D1) this action is not specifically aimed at the ICT-industry. (see C3)

STANDARDISATION NEEDS, ONGOING ACTIVITIES AND PROGRESS REPORT

COMMISSION PERSPECTIVE AND PROGRESS REPORT

REGARDING E-SKILLS:

Pan-European e-competence frameworks and tools and efficient and interoperable e-learning solutions are indispensable to reduce e-skills shortages, gaps and mismatches. Similar activities are under development in the US, Russia, Japan, Australia, Canada, South Africa and Latin America, and other parts of the world. In the early 2000s the development of national frameworks had already begun in the UK, Germany, France, and other countries. In the Council Conclusions of 23 November 2007, Member States supported the Commission's intention to continue to provide a platform for the exchange of best practices, and to promote a regular dialogue on e-skills and develop a European e-Competence Framework.

REGARDING E-LEARNING:

Efficient and interoperable e-learning solutions are necessary to promote the development of a large e-learning and technology-enhanced learning market in Europe.

Progress has been made over the last year with e-Competence Framework 3.0 being available and with the establishment of a CEN technical committee. CEN TC 428 published standard EN 16234. See details in D.2 below.

ONGOING STANDARDS DEVELOPMENT

REGARDING E-SKILLS: STANDARDS DEVELOPMENT

CEN/TC 428

CEN/TC 428 is responsible for the standardisation of a common language of professional digital and ICT competences, skills and knowledge applied in all domains. A non-exhaustive list of areas where CEN/TC 428 can develop its activity follows:

- EN 16234:2016 (e-CF) maintenance and evolution
- interaction with different Frameworks
- curricula guidance
- professional profiles
- provide guidance for the assessment against EN 16234 (e-CF)

http://www.cen.eu/cen/Sectors/Sectors/ISSS/CWAdownload/Pages/ICT-Skills.aspx http://www.ecompetences.eu/e-cf-3-0-download/

See also the previous CEN workshop agreements and the e-CF at

http://www.cen.eu/cen/Sectors/Sectors/ISSS/CWAdownload/Pages/ICT-Skills.aspx

http://www.ecompetences.eu/e-cf-3-0-download/

The CEN workshop on ICT Skills will continue with relevant projects including the updating of the European Job Profiles CWA.

Additionally the CEN workshop on ICT skills provides a suitable forum for initial work on standards to support ICT professionalism. In particular it provides expertise in the area of curriculum guidelines, professional ethics, ICT certification and related activities and competences.

ISO/IEC JTC1

SC 27 Competence requirements for information security management systems professionals

SC 7/WG 20 Software and Systems Bodies of Knowledge and Professionalisation and related activities

SC 36 on Information Technology for Learning, Education and Training (ITLET) runs activities in the following areas Business planning and communications; vocabulary collaborative and intelligent technology; learner information; management and delivery; quality assurance and descriptive frameworks; platform, services and specification integration; culture, language and individual needs; learning analytics interoperability

http://isotc.iso.org/livelink/livelink?func=ll&objId=8917700&objAction=browse&viewType=1

REGARDING E-LEARNING:

CEN/TC 353

Information and Communication Technologies for learning, education and training. It has been dormant for a while.

CEN/TC 428

Professions for ICT. See also the previous CEN workshop agreements and the e-CF at framework for ICT professionalism:

http://www.cepis.org/index.jsp?p=940&n=3016
http://www.cen.eu/cen/Sectors/Sectors/ISSS/CWAdownload/Pages/ICT-Skills.aspx
http://www.ecompetences.eu/e-cf-3-0-download/

IEEE

Activities in several eLearning areas, including digital rights expression languages, computer managed instruction, learning object metadata, resource aggregation models for learning, education and training, competency data standards
http://standards.ieee.org/develop/msp/elearning.pdf

ISO/IEC JTC 1 SC 36

Subcommittee (SC) 36 on Information Technology for Learning, Education and Training (ITLET) has the following work programme underway: http://www.iec.ch/dyn/www/f?p=103:22:0::::FSP_ORG_ID:3410

Standards to ensure interoperability between information technology systems used in ITLET;

The identification of generic LET requirements for information technology systems and services used in ITLET situations (example: types of digital content)

Standards projects being addressed:

The description of metadata for learning resources

- ITLET vocabularies
- the personalization of the IT-enabled educational environment (individualized accessibility)
- models for describing competency
- the creation of an ITLET quality framework
- the advancement of e-Assessments, e-textbooks and related learning services, virtual experiments

Future work planned

- learning analytics
- massive open online course (MOOC) standardisation
- how existing standards and specifications may work together to better the LET environment
- ISO TR 20514: EHR Definition scope and context http://www.iso.org/iso/home/standards_development/list_of_iso_technical_committees/iso_technical_committee.htm?commid=45392

ITU-T

Study Group 16 on multimedia has produced a series of standards that enable remote collaboration and Recommendation ITU-T F.742 on service description and requirements for distance learning services. A Recommendation on a ubiquitous learning (u-learning) framework is under development in Study Group 13. The ITU also published a technology watch report on technology-based learning http://itu.int/en/ITU-T/techwatch/Pages/learning-standards.aspx

MSP MEMBERS' AND STAKEHOLDERS' REMARKS

REGARDING E-SKILLS:

Such a topic is suitable for standardisation for well-documented needs. Fostering ICT professionalism is a challenging task that should reach the whole population, including those who usually find more barriers in accessing ICT, such as old people and people with disabilities. As new technologies and new areas of application of technologies emerge rapidly, establishing standardised skill sets is a great challenge requiring timely and regular updates. Since the 1990s, this topic has primarily been addressed by Public-private partnerships with the ICT industry playing a leading role (e.g. in the Career Space initiative). More recently, many countries around the world have launched standardisation efforts. There is a need to maintain a European platform for exchanging best practices, implementing a master plan and coordinating across Europe. The existing structure of the CEN TC 428 and CEN ICT skills workshop constitute a good place for such a piece of work — following the already successful development of the e-CF.

The e-skills manifesto also contains contributions from various stakeholders, see http://ec.europa.eu/enterprise/sectors/ict/documents/e-skills/index_en.htm

EN 16234-1 is the only existing standard in the field of e-Competences at the European and national level. Tough several European organisations have started promoting and using the e-CF, those local implementations do not always comply with EN 16234-1. Many new initiatives in the area of digital competences are ongoing e.g. body of knowledge, ESCO, the quality label project, e-Leadership projects, e-CF/ SFIA convergence, and the ICT professionalism framework project. At the same time, new initiatives on ICT competences are ongoing internationally as well, e.g. in ISO/IEC JTC 1/SC 7 and ISO/IEC JTC 1/SC 27. New standards may be available, which might conflict with European standards. The fragmentation of the global market could undermine interoperability which so far has led the European action. There is the need to support initiatives which assure European governance and influence in the ISO.

EMERGENCY COMMUNICATIONS

POLICY OBJECTIVES

Emergency communications are defined primarily as communication by individual citizens to public safety answering points (PSAPs), using individual electronic communication devices, with a view to requesting and receiving emergency relief from emergency organisations. Reverse services (i.e. communication between PSAPs and individuals) may also be considered.

This service should be independent of the network and access technologies used and the individual's physical and mental abilities.

LEGISLATION AND POLICY DOCUMENTS

AT EUROPEAN LEVEL

- Directive 2009/136/EC of the European Parliament and of the Council of 25 November 2009 amending Directive 2002/22/EC on universal service and users' rights relating to electronic communications networks and services, Directive 2002/58/EC concerning the processing of personal data and the protection of privacy in the electronic communications sector and Regulation (EC) No 2006/2004 on cooperation between national authorities responsible for the enforcement of consumer protection laws.
- Directive 2009/140/EC of the European Parliament and of the Council of 25 November 2009 amending Directives 2002/21/EC on a common regulatory framework for electronic communications networks and services, 2002/19/EC on access to, and interconnection of, electronic communications networks and associated facilities, and 2002/20/EC on the authorisation of electronic communications networks and services
- Directive 2002/21/EC of the European Parliament and of the Council of 7 March 2002 on a common regulatory framework for electronic communications networks and services (Framework Directive)
- Directive 2002/58/EC of the European Parliament and of the Council of 12 July 2002 concerning the processing of personal data and the protection of privacy in the electronic communications sector (Directive on privacy and electronic communications)
- Directive 2002/22/EC of the European Parliament and of the Council of 7 March 2002 on universal service and user's rights relating to electronic communications networks and services (Universal Service Directive)
- Recommendation 2003/558/EC of the Commission of the European Communities of 25 July 2003 on the processing of caller location information in electronic communication networks for the purpose of location-enhanced emergency call services
- P7_TA (2011)0306, European Parliament Resolution of 5th July 2011 on Universal Service and the 112 emergency number (2010/2274(INI))
- Mandate M/493 — Standardisation request in support of the location-enhanced emergency call service

PROPOSED NEW ACTIONS ON STANDARDISATION

STANDARDS DEVELOPMENT

ACTION 1 SDOs to address data protection and privacy requirements (privacy by design) in ongoing standardisation activities concerning location accuracy.

OTHER ACTIVITIES ON STANDARDISATION

ACTION 2 Identify standardisation needs for the deployment of 112 smartphone applications enhanced with caller location and multimedia features accessible for the widest range of users.

ACTION 3 SDOs to complete the M/493 standards to support the location-enhanced emergency call service. Global standards bodies are invited to contribute taking into account next-generation networks and location accuracy and reliability.

ACTION 4 SDOs to identify the standardisation needs for the transmission of the GNSS location data from the handset to the PSAPs by mobile network operators.

ACTION 5 SDOs to define dictionaries for warning messages for a reverse-112 service based on the input of various civil protection agencies.

ACTION 6 SDOs to add rich media to the EU-Alert (reverse-112).

STANDARDISATION NEEDS, ONGOING ACTIVITIES AND PROGRESS REPORT

COMMISSION PERSPECTIVE AND PROGRESS REPORT

The lack of commonly agreed standards in support of electronic communications networks for the emergency call service in Europe is a barrier to implementing future proof solutions which meet the requirements of the amended Universal Service Directive (Directive 2002/22/EC).

Standards for total conversation access to 112 are required to meet special needs for users' rights under Directive 2009/136/EC.

The lack of harmonised values for location accuracy and reliability hampers Member State's efforts to develop adequate solutions.

ONGOING STANDARDS DEVELOPMENT ORGANISATION

ETSI

ETSI is performing work in response to M943 and has developed the single functional architecture (ES 203 178). It is currently working on the protocols to be applied and their exact specification. Work on total conversation access to emergency services resulted in the publication of TR 103 201, total conversation for emergency communications, implementation guidelines.

ITU-T

The focus group on "Disaster relief systems, network resilience and recovery" produced several technical specifications that were published (http://www.itu.int/pub/T-FG/e) and are being refined for further standardisation in ITU-T SG2 and SG15.

- The Recommendation ITU-T L392 "Disaster management for improving network resilience and recovery with movable and deployable ICT resource units' was approved by ITU-T SG15 in April 2016.
- The draft Recommendations ITU-T L.nrr.frm "Framework of disaster management for network resilience is under development within ITU-T SG15.
- Recommendation ITU-T E.108 "Requirements for a Disaster Relief Mobile Message Service" was approved by ITU-T SG2.
- Draft new Recommendations ITU-T E.TD-DR "Terms and definitions for DR&NRR", ITU-T E.RDR "Requirements for Disaster Relief Systems" and ITU-T E.rdr-scbm "Requirements for Safety Confirmation and Broadcast Message Service for Disaster Relief" are being developed in ITU-T SG2.

ITU also produced an amendment to its E.123 standard for quickly identifying next-of kin (or other emergency contact) in a mobile handsets' directory, for use in case of emergency, and has established a framework for international emergency call priority (ITU-T E.106 and E.107).

OASIS Common Alerting Protocol versions 1.1 and 1.2 were transposed into ITU-T X.1303 and X.1303bis.

Finally, ITU-T SG13 has a numbers of Recommendations ITU-T Y.2074, Y.2222, Y.2705, Y.1271, Y.2205 and Supplement 19 to the ITU-T Y.2200-series —covering different aspects of emergency communication operation.

SG11 approved ITU-T Q.3615 which describes the Open GeoSMS Standard, which was developed by the Open Geospatial Consortium (OGC); geo-localisation is a key part of rapid and effective emergency responses. SG11 also drafted a number of Supplements to the Q-series Recommendations (e.g. Supplements 47, 53, 57, 61, 62, 63 and 68) to support emergency telecommunications. The ITU's radio communication sector (ITU-R) is also carrying out studies on emergency communications.

CEPT/ECC/WG NAN/PT ES

Are investigating criteria for location accuracy and reliability.

W3C

WebRTC, the web's real-time communication service is currently being developed and specified jointly between the IETF and W3C. The IETF is working on the protocol level. The group heading this effort is called RTCweb.

W3C specifies the necessary API to connect the service to the web — application framework created by, among others, by HTML5. The group working on this part is called WebRTC. A good overview of the technology developed can be found in the STREWS project's security report on WebRTC.

IETF

The ECRIT working group in the IETF has developed a general architecture for enabling IP applications to discover and connect to emergency services. The GEOPRIV working group has developed protocols that allow IP networks to in- form end devices about their geolocation, a pre-requisite for emergency calling. The application-specific working groups in the IETF (for example, the SIPCORE working group) have developed extensions to support emergency calling as required.

A secure telephone identity revisited (STIR) WG (https://datatracker.ietf.org/wg/stir/charter/) is developing internet-based mechanisms that allow verification of the calling party's authorisation to use a particular telephone number for an incoming call. The main focus is on the SIP as one of the main VoIP technologies used by parties that want to misrepresent their origin, in this context the telephone number of origin. See, for example, RFC7375 "Secure telephone identity threat model" (https://datatracker.ietf.org/doc/rfc7375/)

ISO

ISO/TC 204: intelligent transport systems (ITS). This covers standardisation of information, communication and control systems in the field of urban and rural surface transportation, including intermodal and multimodal aspects thereof, traveller information, traffic management, public transport, commercial transport, emergency services and commercial services in the intelligent transport systems (ITS) field.

Projects include:

ISO/AWI 19083-2: ITS — Public transport — Emergency evacuation and disaster response and recovery — Part 2: Data flow

ISO/PRF TR 19083-1: ITS — Public transport — Emergency evacuation and disaster response and recovery Part 1: Framework

ISO/NP 20530: ITS — Information for emergency service support via personal ITS station — General requirements and technical definition

ISO/PWI 21344: ITS– Public transport — Emergency services E-Call device for emergency on connected vehicles using ITS station

ISO 22951:2009 (Ed. 1): Data dictionary and message sets for preemption and prioritisation signal systems for emergency and public transport vehicles (PRESTO)

ISO 24978:2009 (Ed. 1): ITS Safety and emergency messages using any available wireless media — Data registry procedures

ISO/DTR 18317: ITS — Pre-emption of ITS communication networks for disaster relief and emergency communications http://www.iso.org/iso.iso_technical committee%3Fcommid%3D54706

EGOVERNMENT

POLICY OBJECTIVES

In the digital single market strategy, interoperability appears as an important enabler for boosting competitiveness. Cross-border interoperability is also considered key for modernising public administrations.

In addition to the multilingual challenge, interoperability is compromised by the lack of commonly agreed and widely used data models, divergent interpretations of the same data and the absence of common reference data (e.g. code-lists, identifiers, taxonomies, references to organisations, geospatial references, license collections, etc.).

The European Commission, in the context of the ISA and ISA^2 programmes (Interoperability solutions for public administrations, businesses and citizens), is undertaking a number of initiatives to reduce semantic interoperability conflicts in Europe.

The ISA^2 programme develops, maintains and promotes a holistic approach to public sector interoperability in the EU in order to eliminate fragmentation in the interoperability landscape in the EU.

The ISA^2 programme is contributing in this area through three streams of work, further described in the relevant subsections: DCAT-AP as a data standard to describe open data catalogues and datasets; ADMS as metadata description of semantic specifications and standards; and Core Vocabularies as generic, simplified and reference data models of important master data types used across public administration information systems and applications. In all three, care should be taken to ensure compatibility between the public sector and what the private sector can achieve, noting existing standards and specifications.

There are three main technology areas that need to be addressed further and where standards are important for supporting the implementation of EU policy objectives:

- DCAT — This is addressed in detail in the section on Public Sector Information (PSI), Open Data and Big Data including a number of proposed actions;
- Exchange of metadata on re-usable interoperability assets among national and international repositories: The Asset Description Metadata Schema (ADMS) is a metadata description of interoperability solutions;
- Core Vocabularies to facilitate the development of interoperable IT solutions by ensuring a minimum level of interoperability for public administration master data usually stored in base registries.

LEGISLATION AND POLICY DOCUMENTS

AT EUROPEAN LEVEL

- Decision (EU) 2015/2240 on interoperability solutions and common frameworks for European public administrations, businesses and citizens (ISA^2 programme) as a means for modernising the public sector (ISA^2)
- Directive 2003/98/EC of the European Parliament and of the Council of 17 November 2003 on the re-use of public sector information (public service information directive)

Others National eGovernment strategies are in place in many EU Member States and the EFTA countries. Please also see Annex I.

PROPOSED NEW ACTIONS ON STANDARDISATION

OTHER ACTIVITIES AROUND STANDARDISATION

ACTIONS WITH RELEVANCE FOR ALL THE THREE STREAMS OF WORK DESCRIBED ABOVE (DCAT, ADMS AND CORE VOCABULARIES):

ACTION 1 organise a workshop on ISA topics. In order to promote standardisation in this area the organisation of a workshop via an ESO involving European organisations (e.g. the Publications Office and DG DIGIT/ISA unit), Member States representatives, industry and relevant research institutes and universities to frame the issue is considered to be a key starting point.

ACTION 2 contribution of specifications developed under ISA programme to international standardisation. In order to leverage the applicability of technical specifications which are or have been developed under the ISA and ISA^2 programmes, it might be advisable to promote them beyond Europe by proposing them as international standards via ISO, IEC or ITU, as relevant, e.g. ISO/IEC JTC1 SC32 (data management and interchange), ITU-T study group 16 (multimedia), and study group 17 (security).

EXCHANGE OF METADATA ON RE-USABLE INTEROPERABILITY ASSETS (EGOVERNMENT)

No action specific to ADMS

CORE VOCABULARIES TO FACILITATE THE DEVELOPMENT OF INTEROPERABLE IT SOLUTIONS

ACTION 3 W3C to consider core location vocabulary as important input to standardisation (new working group that is currently discussed in W3C with the participation of the JRC, INSPIRE team).

STANDARDISATION NEEDS, ONGOING ACTIVITIES AND PROGRESS REPORT

COMMISSION PERSPECTIVE AND PROGRESS REPORT

EXCHANGE OF METADATA ON RE-USABLE INTEROPERABILITY ASSETS (EGOVERNMENT)

Public administrations, businesses, standardisation bodies and academia are already producing interoperability solutions that, if (re)used, can facilitate interoperability among public administrations' services. However, these are not always easy to find. ADMS is a common way to describe interoperability solutions making it possible for everyone to search and discover them once shared through the forthcoming federation of repositories containing solutions for promoting interoperability.

With the intention to facilitate the visibility and re-usability of interoperability solutions across-borders and sectors, the Commission has made available a large set of interoperability solutions described using ADMS, through a federation of asset repositories of Member States, standardisation bodies and other relevant stakeholders. Through this federation, accessible through the Joinup[42] platform, semantic interoperability solutions may be searched and are made available through a single point of access.

CORE VOCABULARIES TO FACILITATE THE DEVELOPMENT OF INTEROPERABLE IT SOLUTIONS

The Commission's ISA programme is reducing semantic interoperability conflicts in Europe.

Agreement on definitions for the fundamental concepts should come firstly. These concepts are simplified data models which capture the minimal, global characteristics/attributes of an entity in a generic, country- and domain-neutral manner. Using a different terminology, these specifications are data models for important master data types used by numerous information systems and applications. These specifications are called "Core Vocabularies" in the ISA Programme.

The Commission has made available four core vocabularies with high reusability potential: the core person, the core business, the core location and the core public service vocabularies.

In 2015, the core public service vocabulary application profile (CPSV-AP) became also available. By the end of 2016, two more vocabularies are expected to be added in this set: the core public organisation vocabulary and the core criterion and evidence vocabulary.

ONGOING STANDARDS DEVELOPMENT

EXCHANGE OF METADATA ON RE-USABLE INTEROPERABILITY ASSETS (EGOVERNMENT):

W3C

ADMS specification has been published as a W3C note by the WC3 Linked Government Data Working group. Moreover, the ADMS specification has been extended by the ISA Programme to describe technical, legal and organisational interoperability solutions and thus to facilitate their re-usability. This extended specification has already been implemented in the Joinup platform.
https://dvcs.w3.org/hg/gld/raw-file/default/adms/index.html

CORE VOCABULARIES TO FACILITATE THE DEVELOPMENT OF INTEROPERABLE IT SOLUTIONS:

W3C

The Registered Organization Vocabulary which is based on the Business Core Vocabulary has been published as a W3C Note by the W3C Linked Government Data Working group.
http://www.w3.org/TR/vocab-regorg/

MSP MEMBERS' AND STAKEHOLDERS' REMARKS

EXCHANGE OF METADATA ON RE-USABLE INTEROPERABILITY ASSETS (EGOVERNMENT):

Several Member States already use ADMS to export interoperability solutions from national catalogues (e.g. Germany).

The Open Geospatial Consortium (www.opengeospatial.org) has also standardisation work available relevant to e-Government.

42 https://joinup.ec.europa.eu/asset/dcat_application_profile/asset_release/dcat-application-profile-data-portals-europe-draft-1

ECALL

POLICY OBJECTIVES

The pan-European in-vehicle emergency call, 'eCall', is an interoperable service to be available in all vehicles in order to reduce fatalities.

LEGISLATION AND POLICY DOCUMENTS

AT EUROPEAN LEVEL

- **Regulation (EU) 2015/758** of the European Parliament and of the Council of 29 April 2015 concerning type-approval requirements for the deployment of the eCall in-vehicle system based on the 112 service and amending Directive 2007/46/EC http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2015.123.01.0077.01.ENG
- **Commission delegated regulation (EU) of 26 November 2012 305/2013** supplementing Directive 2010/40/EU of the European Parliament and of the Council with regard to the harmonised provision for an interoperable EU-wide eCall
- **COM 2011/750/EU:** Commission Recommendation of 8 September 2011 on support for an EU-wide eCall service in electronic communication networks for the transmission of in-vehicle emergency calls based on 112 (eCalls)
- **Directive 2010/40/EU** of the European Parliament and of the Council of 7 July 2010 on the framework for the deployment of Intelligent Transport Systems in the field of road transport and for interfaces with other modes of transport
- **COM(2009) 434 final:** eCall: Time for Deployment
- **Directive 2002/22/EC** of the European Parliament and of the Council of 7 March 2002 on universal service and users' rights relating to electronic communications networks and services (Universal Service Directive).
- **Decision 585/2014** http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=OJ:JOL_2014_164_R_0002

Note: If an eCall is an emergency call, all relevant regulations applicable to emergency communication apply as well. See emergency communications section.

PROPOSED NEW ACTIONS ON STANDARDISATION

STANDARDS DEVELOPMENT

ACTION 1 SDOs to develop technical specification and standards for the implementation of eCall in vehicles of categories other than M1 and N1 and for other user types, taking into account requirements included within type-approval regulation and ongoing activities in this area (pilots, the Connecting Europe Facility (CEF), etc).

ACTION 2 SDOs to lay down physical and operating requirements for aftermarket in-vehicle devices

ACTION 3 SDOs to draft guidelines on certification of eCall Systems including aftermarket in-vehicle devices

ACTION 4 SDOs to map existing standards development to packet-switched networks (HLAP E-UTRAN — LTE/4G).

ACTION 5 SDOs to develop technical specification/standards for the provision of the eCall service eCall via shared vehicle platforms (C-ITS).

ACTION 6 SDOsto produce detailed conformity test specifications (TTCN-3), based on the high-level testing specifications (EN 16454) in support of certification schemes.

OTHER ACTIVITIES ON STANDARDISATION

ACTION 7 SDOs to carry out plugtest interoperability events [43].

ACTION 8 SDOs to collect feedback about the early versions of the standards and their implementation with technical representatives from vendors and implementers.

43 such as the eCall Testfest interoperability event which was held in Ostrava, Czech Republic, in November 2015 http://www.etsi.org/news-events/events/1002-4th-ecall-tesfest-2015

STANDARDISATION NEEDS, ONGOING ACTIVITIES AND PROGRESS REPORT

COMMISSION PERSPECTIVE AND PROGRESS REPORT

In the event of an accident, in-vehicle sensors will automatically trigger an eCall. A voice connection is made with the European emergency number 112 and routed to the PSAP. At the same time, an emergency message is sent, providing information such as the time, location and driving direction (the minimum set of data, or MSD). The emergency call can also be triggered manually.

The next generation of standards on eCall service should take into account future developments in mobile communication networks and the IP environment, in particular LTE and IPv6 networks. Standards for the extension to other vehicles types and services should also be developed — such as heavy duty vehicles, power two wheelers or hazardous goods tracking, and other classes of vulnerable road users, taking into account requirements from type-approval regulation and the results of other initiatives in this area (pilots, the CEF, etc).

The European eCall Implementation Platform is making recommendations to ensure the best operation of the service and to take full advantage of all its possibilities.

Recognising that introducing the service via new vehicle models will mean taking considerable time to equip all cars, EU regulation has already encouraged automotive manufacturers to voluntarily introduce eCall in existing models. However, once the public land mobile network (PLMN) and PSAP support networks are in place and operational, there is a considerable aftermarket opportunity to bring the benefits of eCall to the current stock of light vehicles throughout Europe, and several equipment vendors (both from within Europe and abroad) have already shown interest to fill this market niche, in some cases directly for 112-eCall, and in others for third-party service-supported eCall. Other entrants are expected. However, as it will prove more difficult to control the performance and quality of such aftermarket devices, there is an urgent need to develop standards for the physical parameters, installation and operational performance of such aftermarket devices, to enable adequate certification. This will be essential if PSAPs are not to be potentially inundated with false messages from such devices, and so that such devices may be safely operated.

ONGOING STANDARDS DEVELOPMENT

CEN

CEN/TC 278 WG15 has developed several technical specifications (TS), EN standards, and other deliverables to define the MSD structure and the application protocols to transfer it from the vehicles to the PSAP, and the E2E test suites.

ETSI

ETSI TC MSG has defined the transport protocol to send MSD from the vehicle system to the PSAP, via the GSM/UMTS network in several ETSI TS along with the service principles.

Its STF 456 has looked at the issue of the migration of the Networks and has adopted and published ETSI TR 102 140.

PILOTS

CIP Pilots HeEROs (Harmonised eCall European Pilot) tested the standards in real conditions.

The iHeERO pilof under the 2014 CEF call for proposals is expected to produce relevant contributions for eCall standardisation.
http://iheero.eu/

ITU

Study Group 12 approved Recommendation ITU-T P.1140 (ex. P.emergency): "Speech communication requirements for emergency calls originating from vehicles".

The revised Recommendation ITU-T E.212 "The international identification plan for public networks and subscriptions" was issued by ITU-T Study Group 2. Under the revised E.212, mobile network code may be assigned to other applicants (e.g. for GSM-R networks) and these assignments are to be made according to procedures and criteria set by the national numbering plan administrator. It also encourages applications to the ITU's shared mobile country and network codes if networks and services are provided in more than one country.

ISO

ISO/TC 204: ITS. These cover standardisation of information, communication and control systems in the field of urban and rural surface transportation, including intermodal and multimodal aspects, traveller information, traffic management, public transport, commercial transport, emergency services and commercial services in the intelligent transport systems (ITS) field.

The project includes:

ISO/DIS 15638-10: ITS– Framework for cooperative Telematics Applications for Regulated commercial freight Vehicles (TARV) — Part 10: Emergency messaging system/eCall (EMS)

ISO/PWI 21344: ITS– Public transport — Emergency services eCall device for emergency on connected vehicles using ITS station

http://www.iso.org/iso/iso_technical_committee%3Fcommid%3D54706

IETF

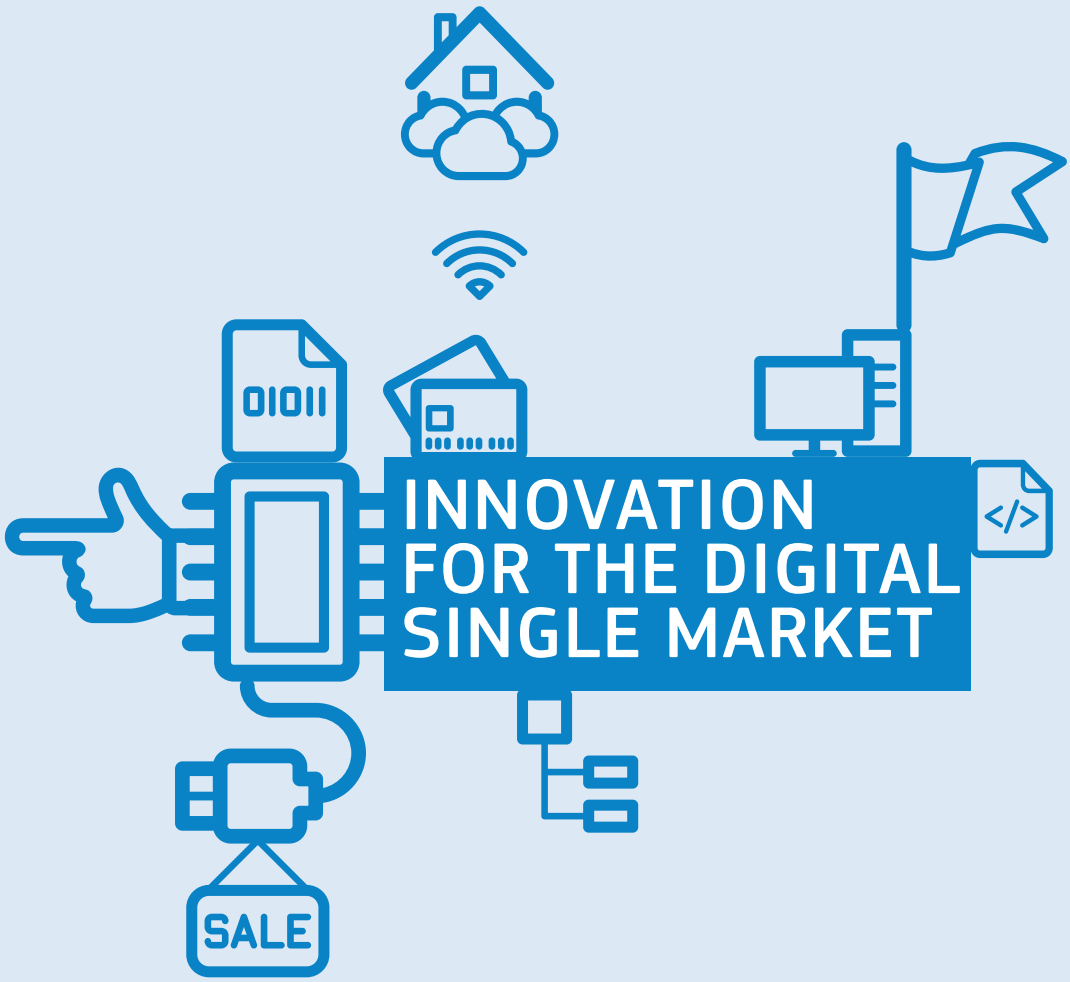
Work in progress — IETF is working on an IP based next-generation eCall internet draft: https://tools.ietf.org/html/draft-ietf-ecrit-ecall-13 (expires: March 25, 2017)

MSP MEMBERS' AND STAKEHOLDERS' REMARKS

The Commission wants all new vehicle types placed on the market after 31 March 2018 to implement eCall, and the PSAPs to be upgraded to handle the eCalls as from 1 October 2017, and the Commission is making recommendations to Member States to draw up detailed rules on handling eCalls for public mobile network operators operating in their countries.

As part of HeERO, EUCARIS (the European car and driving licence information system) has developed a module with which vehicle information can be exchanged internationally.

On the basis of the vehicle identification number (VIN) this module enables a link between the national vehicle registration authorities of the participating countries. When a foreign vehicle is involved in an accident, this module enables an instant Europe-wide search via EUCARIS to support the respective national 112 emergency centre(s).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FOR THE DIGITAL
SINGLE MARKET
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SALE

E-PROCUREMENT — PRE AND POST AWARD

POLICY OBJECTIVES

Public procurement must be modernised, including pre-award and post-award, and e-procurement (the procurement of goods, services and works by electronic means).

LEGISLATION AND POLICY DOCUMENTS

AT EUROPEAN LEVEL

- **COM(2012) 179 final** — Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on a strategy for e-Procurement
- **COM(2013) 453 final** on end-to-end e-Procurement to modernise public administration
- **Directive 2014/55/EU** of the European Parliament and of the Council on electronic invoicing in public procurement (especially the part on contract management which is linked to e-Procurement; please note there is a separate chapter on e-Invoicing).
- **Directive 2014/23/EU** of the European Parliament and of the Council on the award of concession contracts
- **Directive 2014/24/EU** of the European Parliament and of the Council on public procurement and repealing Directive 2004/18/EC.
- **Directive 2014/25/EU** of the European Parliament and of the Council on procurement by entities operating in the water, energy, transport and postal services sectors and repealing Directive 2004/17/EC

PROPOSED NEW ACTIONS ON STANDARDISATION

STANDARDS DEVELOPMENT

ACTION 1 CEN/TC440 was created for electronic public procurement to facilitate efficient and effective exchange of electronic information in the (public) procurement processes, between the buyer and the seller. A roadmap and an e-Procurement business term vocabulary including standardisation deliverables that implements business interoperability, e-notification, e-tendering, e-catalogue, e-ordering, and e-fulfilment is available on the CEN website[44]. These deliverables will be based on the equivalent deliverables from CEN workshop on business interoperability interfaces (CEN WS BII) in alignment with the deliverables of the CEN/TC 434, to support the electronic information exchange iin public procurement and in business-to-business (B2B) transactions.

CEN/TC440 was established to enable a focused and co-ordinated approach to development of appropriate European standards that:

1. build upon and complement existing initiatives, such as CEN WS/BII3 and CEN/TC 434, and be part of a wider eBusiness standardisation portfolio coordinated by the CEN eBusiness coordination group.

2. provide standards that facilitate end-to-end e-procurement and thus support European policy objectives expressed in the Digital Agenda for Europe and A strategy for e-procurement (COM(2012) 179 final), End-to-end e-procurement to modernise public administration (COM(2013) 453 final), the public procurement directive and Directive 2014/55/EU on e-invoicing in public procurement.

3. recognise the rather ambitious timeline envisaged for implementing the e-procurement Directive, stressing the importance of available European standards as a basis for compliant software solutions to be available in the market.

4. allow for user engagement and participation and effective production of the standards required by being focused on public procurement needs (but take generic applicability for 'business-to-business' into account as and when relevant).

5. facilitate improved efficiency and cost reduction in both public and private sector entities.

44 https://standards.cen.eu/dyn/www/f?p=204:22:0::::FSP_ORG_ID,FSP_LANG_ID:1976650,25&cs=1E026AD4CB03AEF2261F2F13227B40F25

6. focus on cross-border and cross–platform interoperability in order to allow businesses to select the platform of their choice and still be able to participate in procurement opportunities across the full European market

ACTION 2 To create an e-Procurement ontology (this action which is part of the ISA[2] work programme). The action owner for the ontology is the Publications Office of the EU (Publications Office).

ACTION 3 To work on aligning the CEN/TC440 and TC434 efforts with the ISA core vocabularies to develop a common semantic model for the e-procurement domain. This joint working group is under establishment between the two TCs. This work should build synergies with the ontology being developed by the Publications Office.

The Commission's expert group on e-Tendering (e-TEG) identified the actions below. To a large degree those are expected to be accomplished through the CEN/TC440 deliverables. Aspects of cross-border and cross-platform interoperability are also being piloted in initiatives such as e-SENS and OpenPEPPOL, based on the pre-standard deliverables provided by CEN WS/BII3. SDOs to develop standards on :

ACTION 4 the qualification of suppliers (eAttestations/certificates/virtual company dossier);

ACTION 5 a process model for procurement procedures in compliance to the Public Procurement Directives, including on negotiated procedures and competitive dialogue;

ACTION 6 system models that may achieve interoperability among and across multiple differing e-tendering platforms without necessarily requiring a business to change its favourite system (For example, see http://www.xvergabe.org);

ACTION 7 structures for de-materialisation of tenders.

STANDARDISATION NEEDS, ONGOING ACTIVITIES AND PROGRESS REPORT

COMMISSION PERSPECTIVE AND PROGRESS REPORT

The revised Public Procurement Directives aim to make e-Procurement the mainstream method for carrying out public procurement to achieve broader competition (even across-borders), increased transparency, value for money on procurement expenditure and savings on procedural costs, and creating opportunities for innovation.

The Directives specifically mentions that tools and devices used for communicating electronically should be non-discriminatory, generally available, and interoperable. The Directive has made the use of e-Procurement progressively mandatory, as follows:

- Electronic notification and electronic access to tender documents became mandatory by April 2016;
- by April 2017, electronic submission of tenders (e-Submission) will become mandatory for central purchasing bodies (public buyers buying on behalf of other public buyers); and
- by October 2018, e-Submission will become mandatory for all contracting authorities.
- At the same time, contracting authorities will have to turn primarily to e-Certis to ask for certificates and other documents: e-Certis will become a sort of clearing house for these documents. From 2016 onwards Member States have to keep e-Certis up-to-date. As soon as Member States implement the new public procurement Directives, the European single procurement document (ESPD) will be the standard document used to ask businesses about the exclusion and selection criteria. Together with national registers and national prequalification services e-Certis and ESPD will support the `once only' principle.
- The EU's e-Procurement internal market is facing several types of barriers, including cross-border interoperability and interfaces complexity.
- Proliferation of platforms: small and medium-sized enterprises (SMEs) (and anyone doing business in multiple locations) are experiencing another hindering factor; the proliferation of platforms for e-Tendering (and consequently of user interfaces), which makes it complicated for a company to respond to several calls for

tenders that are run on multiple platforms. To achieve a true single market, bidders including SMEs should ideally communicate and participate in multiple markets across various systems through their favourite or a common system. E-Procurement technology, interoperability and standardisation are key elements for removing technical barriers or extra costs when supplier bid on a plurality of systems. Interoperability and standardisation will therefore deal on different levels to make data exchange possible like the work on a standardised syntax or defined infrastructure. The certification of e-Procurement platforms (either pre- or post-award) is relevant in this context.

- The Directive recognises this, therefore empowering the Commission to adopt delegated acts in a number of specific areas to ensure that specific technical standards are mandatorily used to ensure widespread interoperability.
- The need for standardisation in the e-Procurement domain was strongly reaffirmed by the eTEG group, set up by the Commission, as envisaged in the 2012 Communication, to advise on the actions needed to achieve interoperable, accessible and SME-inclusive systems.
- A multi-stakeholder expert group on e-Procurement (EXEP) assists and advises the Member States and the Commission on implementing the provisions of the new public procurement Directives relating to electronic procurement. It contributes to monitoring the uptake of e-Procurement across the EU, sharing best practices, following new developments in the field, and addressing interoperability issues. The EXEP liaises closely with the European multi-stakeholder forum on e-invoicing (EMSFEI) and with national forums, to further promote the uptake of end-to-end e-Procurement across the EU, including in the post-award phase. The group is responsible for ensuring the coherence between the recommendations arising from the EMSFEI and broader policies on end-to-end e-Procurement. In addition, EXEP provides governance and support for initiatives like CEF and e-SENS, and governs the standardisation process in the area of e-Procurement.

ONGOING STANDARDS DEVELOPMENT

STANDARDS DEVELOPMENT

CEN/TC440

CEN/TC 440 — "Electronic public procurement" — established to standardise e-procurement in support of the electronic public procurement process and the related information flows in the physical and financial supply chain. This facilitates end-to-end e-procurement, including both pre- and post-award processes. It succeeded the CEN workshop WS/BII3, which was closed on the 9 March 2016.

STAKEHOLDER GROUPS, TECHNOLOGY PLATFORMS, AND RESEARCH PROJECTS

ISA² ACTIONS

SEMIC action on CCEV (Core Criteria/Evidence Vocabulary) to help making the ESPD data model domain independent like the other Core Vocabularies

E-Procurement ontology to enable the rationalisation and interoperability within the public procurement workflow for the various actors concerned and thus will facilitate the creation, exchange, dissemination and reuse of the resulting data.

See the work programme
http://ec.europa.eu/isa/library/documents/isa2-work-programme-2016-detailed-action-descriptions_en.pdf

NETHERLANDS

Among the best practices available in Member States, the Dutch central government financed the development of DigiInkoop for its e-Procurement processes. The DigiInkoop architecture comprises of a workflow based e-Procurement application and a communication hub (Digipoort) to facilitate electronic messaging between government buyers and suppliers.

PEPPOL

PEPPOL was a EU large-scale pilot project (LSP) from 2008-2012. It provided a set of technical specifications that can be implemented in existing e-Procurement solutions, and enables trading partners to exchange standards-based e-Procurement documents over a PEPPOL network.
http://www.peppol.eu.

OPENPEPPOL

Following the closing of the PEPPOL-project, OpenPEPPOL AISBL took over governance of the solutions developed. The PEPPOL transport infrastructure is now implemented by hundreds of service providers throughout Europe, servicing thousands of public and private entities, including the post-award processes of e-procurement:

http://www.peppol.eu/about_peppol/about-openpeppol-1 ;
http://www.peppol.eu/about_peppol/openpeppol-communities

E-SENS

The 'Electronic Simple European Networked Services' (e-SENS), is an EU LSP project integrating results from PEPPOL and other eGovernment LSPs. The e-SENS Work Package 5.1 focuses on e-Procurement. There is an e-Tendering pilot which addresses the interoperability issue between the platforms. An important milestone was reached in January 2015. Phase I in work package 5.1 was processed successfully, allowing for the first time, to interchange a publication and an application for participation between the Netherlands (Tendernet), Denmark (ETHICS) and Germany (XVergabe) Gateway to e-Vergabe from BeschA) with PEPPOL infrastructure, consisting of access points from IBM Denmark and the University of Priaeus Greece. Part of the work is based on specifications from CEN WS/BII3.
http://www.esens.eu/home/

EXEP

See end of section Ongoing standards development

MSP MEMBERS' AND STAKEHOLDERS' REMARKS

OpenPEPPOL has provided a set of existing specifications and methods sufficient for production implementation of e-Procurement and e-Invoicing business functions. These will be added to by e-SENS. An appropriate long-term community feedback, updating and maintenance structure for these assets is preferred, as any network of transacting parties will evolve and discover new needs over time. t is envisaged that the timeline for CEN/PC440 will be adopted to allow for feedback from OpenPEPPOL and e-SENS as well as other implementation initiatives. This is because the deliverables of OpenPEPPOL and e-SENS are based to a large extent on the workshop agreements provided by CEN WS/BII. These agreements will be further enhanced by CEN/PC440. The long-term governance and maintenance of these agreements will be ensured by the CEN.

The next-generation e-Procurement platforms are expected to enforce a model in which the platform used by the contracting authority to run a tendering process that collaborates with independent "tender response preparation" platforms used by the EO, by sharing a unique view of the process and document structures being exchanged as part of the e-Tendering transactions, potentially including these features:

- product/services catalogues and classifications;
- code lists, identification schemes;
- accessibility standards for user interfaces (see the separate section on web accessibility above);
- registration / authentication standards for e-Procurement platforms (standards in this area would enable to set up federations of e-Tendering platforms to share company information or even single sign-on services, making things easier for businesses which currently have to go through complex procedures on each of the platforms that they work on);
- digital signature and use of public key infrastructure, which may leverage current ETSI work on trusted lists and signature formats;
- data models and processes for e-Tendering performance measurement.

The different CEN Technical committees should liaise with Recommendations developed in European Multi-Stakeholder Forum on e-Invoicing, the work carried out under ISA^2 Action: the European public procurement initiative (which includes the ontology, ePrior, the once only principle, ESPD and eCertis) and the EXEP.

E-INVOICING

POLICY OBJECTIVES

Electronic invoicing (e-Invoicing), i.e. an invoice that has been issued, sent and received in a structured electronic format which allows for its automatic and electronic processing, brings numerous benefits to all users (senders and recipients). By automating the relevant business processes, e-Invoicing leads to cost savings, increased efficiency, faster payments, and a reduced environmental impact. Its deployment is a strong tool in support of enterprise and financial policies as it makes enterprises more efficient and generates potentially significant savings for Member States' governments. Therefore, e-Invoicing is highlighted in the EU's digital agenda as one of the key actions of its first pillar ("A vibrant digital single market"). Additionally, it contributes significantly to the EU's digital agenda by promoting the development of eGovernment, and ready accessibility to users with disabilities (see the separate section on accessibility of ICT products and services and web accessibility).

LEGISLATION AND POLICY DOCUMENTS

AT EUROPEAN LEVEL

- **Directive 2014/55/EU** of the European Parliament and of the Council on electronic invoicing in public procurement. This Directive obliges central government bodies of the Member States of the European Union to accept electronic invoices in public procurement from 27 November 2018 onwards; and local authorities from 27 November 2019 onwards. These electronic invoices must comply with a European standard on electronic invoicing and with one of the syntaxes on a limited list of syntaxes.
- **Council Directive 2010/45/E**U amending Directive 2006/112/EC on the common system of value added tax as regards the rules on invoicing.
- **SWD(2013) 222** — Impact Assessment accompanying the document `Proposal for a Directive of the European Parliament and of the Council on electronic invoicing in public procurement´
- **COM(2013) 453 final o**n end-to-end e-Procurement to modernise public administration
- **Communication COM(2012)573** "Single Market Act II: Together for new growth"
- **Explanatory Notes on VAT-invoicing rules** (Council Directive 2010/45/EU)[45].
- **Council Directive 2006/112/EC** on the common system of value added tax.
- **COM(2010) 245:** "A Digital Agenda for Europe", which gives a prominent role to achieving a single digital market and calls for removing the regulatory and technical barriers which prevent mass adoption of e-invoicing.
- **COM(2010)712** "Reaping the benefits of electronic invoicing for Europe" describes a number of actions in different areas, including standardisation, needed to facilitate the deployment of e-invoicing in Europe.
- Member States called for measures to promote e-invoicing at the Informal competitiveness **Council of February 2012** and in the European Council Conclusions of June 2012.
- The European Parliament called for making e-invoicing compulsory in public procurement by 2016 in a resolution adopted in April 2012.
- **COM(2012)179** "A strategy for e-procurement" states that the ultimate goal is "straight through e-procurement" with all phases of the procedure from notification (e-notification) to payment (e-payment) being conducted electronically.
- European Multi-stakeholder forum on Electronic Invoices, Final Report Phase 1, 1013

OTHERS

- German ZUGFeRD 1.0 structured e-Invoice format www.zugferd.de
- Danish legal e-Invoice mandate: Executive Order No. 354 of 26 March 2010: http://www.oioubl.info/documents/en/OIOUBLStatute.pdf
- Several European countries already introduced rules whereby public authorities could only accept electronic invoices from suppliers and all these initiatives will need to align with the ongoing standardisation activities carried out by CEN/TC 434 according to the Annex of the standardisation request C(2014) 7912 final.
- Italian FatturaPA is based on a centralized hub that accepts eInvoices from a defined number of channels in a XML format[46].
  The usage of FatturaPA is mandatory in all the transactions towards the Italian public administration since 31 March 2015.
- 4 corner e-invoicing network in the Netherlands[47]

45 http://ec.europa.eu/taxation_customs/resources/documents/taxation/vat/traders/invoicing_rules/explanatory_notes_en.pdf

46 http://www.fatturapa.gov.it

47 http://www.simplerinvoicing.org

PROPOSED NEW ACTIONS ON STANDARDISATION

STANDARDS DEVELOPMENT

The most pressing standardisation activity at this moment is to fulfil the standardisation request addressed to the European Standardisation Organisations and accepted by CEN and allocated to its TC434 in support of the implementation of the Directive 2014/55/EU of the European Parliament and of the Council of 16 April 2014 on electronic invoicing in public procurement.

ACTION 1 Continue the work in CEN TC/434 which includes the following aspects and standardisation deliverables, currently under development. The Commission Implementing Decision on Standardisation Request on e-Invoicing in public procurement requests the following deliverables:

- developing a European standard (EN) for the semantic data model of the core elements of an electronic invoice;
- identifying a limited number of invoice syntaxes (formats) that fully comply with the European standard, to be given in a technical specification;
- developing syntax bindings, i.e. information specifying how the semantic data model could be represented in the listed syntaxes (formats), and their automatic validation artefacts, to be given in a technical specification;
- developing guidelines on the interoperability of electronic invoices at the transmission level, taking into account the need to ensure the authenticity of the origin and the integrity of the electronic invoices' content, to be given in a technical report;
- developing guidelines on the optional use of sector or country extensions (as described in the Recommendation of the European multi-stakeholder forum on e- Invoicing) ink conjunction with the European standard, including a methodology to be applied in the real environment, to be given in a technical report;
- carrying out the test of the European standard with respect to its practical application for an end-user, and to provide the result in a Technical Report (TR).

ACTION 2 SDOs to standardise the generic container [body] of data for all types of invoices (possibly investigating how to include tax requirements on a European level); for industry specific purposes specific containers of data standardised sector specific extensions in addition to the generic container might be devised and standardised at a European level: i.e. for energy and human resources management purposes in line with the guidelines on the optional use of sector or country extensions developed by CEN/TC 434. There needs to be a registry for such standardised extensions whose development should be in line with centrally defined rules.

OTHER ACTIVITIES AROUND STANDARDISATION

General remark: Overall, the actions should be part of an agreed standardisation strategy shared by the Commission, the ESOs, MSP, consortia and standards bodies supplying specifications in use, and Member States which actively implement them. The Commission may launch further broad, neutral fact-finding inquiries (perhaps via the MSP and EMSFEI) to identify appropriate shared needs and goals.

STANDARDISATION NEEDS, ONGOING ACTIVITIES AND PROGRESS REPORT

COMMISSION PERSPECTIVE AND PROGRESS REPORT

Currently, a vast number of e-invoicing standards, data formats, and usage requirements exist across the EU and globally. The existing formats have been established and are used in different sectors and businesses. The diversity of data and usage requirements, and very different approaches to their implementation, increase complexity and cost, and create a risk of market fragmentation. What is important is to promote interoperability while respecting different sector needs and practices. The Commission policy initially supported the parallel development and planning of multiple suitable systems, by various Member States, but has emphasised this should not come at the cost of interoperability and broad access across markets.

The Commission has addressed the issues around e-Invoicing on the legal level:

- Communication COM(2012)573 identified 12 key actions, one of which is to "adopt legislation to make e-invoicing standard billing mode in public procurement".
- Directive 2014/55/EU obliges central government bodies of the Member States to accept electronic invoices in public procurement.

In the last decade or so, many e-invoicing standards/formats have been developed, based mostly on different versions of XML. Many of these are proprietary formats, and are only used by one multinational company and its suppliers, or embed proprietary unique identifiers that may require licensing from a single source. As Member States developed their own national standards, some of these also differed from anything already on the market, resulting in further divergence and a lack of interoperability. As a consequence, market players, such as companies or financial and IT service providers need to support multiple formats, requiring substantial mapping and conversion exercises to cope with data expressed in different syntaxes.

Further standardisation may be generated by the requirement of contracting authorities to turn primarily to e-Certis to ask for certificates and other documents: e-Certis will become a sort of clearing house for these documents. Member States have to keep e-Certis up-to-date starting from 2016. As soon as Member States implement the new public procurement Directives, the European single procurement document (ESPD) will become the standard document used to ask businesses about the exclusion and selection criteria. Together with national registers and national prequalification services e-Certis and ESPD will support the once only principle.

A European Multi-stakeholder Forum on e-Invoicing (EMSFEI) has been set up by the Commission with Commission Decision C(2010)8467. C(2014) 4142 confirmed it would advise the Commission on e-Invoicing matters. On 1 October 2013, EMSFEI unanimously adopted and endorsed the Recommendation on the use of a Semantic Data Model to support Interoperability for Electronic Invoicing that has been taken up by the European Commission and is a central focal point for Directive 2014/55/2014.

ONGOING STANDARDS DEVELOPMENTSTANDARDS DEVELOPMENT

CENTC 434

CENTC 434 was established provide standardisation for e-Invoicing and undertakes the standardisation activities required by the Directive 2014/55/EU

CEN/PC 440

CEN/PC 440 — "Electronic public procurement" — established in order to provide standardisation in the field of e-procurement including Post-award processes.

CEN WS/BII 3.

CEN WS/BII 3. Currently developing its third evolution which has been aligned to the draft version of the "core invoice model" from CEN/TC 434.

UN/CEFACT

Cross-Industry Invoice (CII) v.2 adopted as ISO standard; no initiatives for convergence with UN/CEFACT foreseen

OASIS

Adoption of UBL 2.1 as ISO/IEC 19845:2015 'Information technology -- Universal Business Language Version 2.1 (UBL v2.1)'

OTHERS (INCLUDING STAKEHOLDER GROUPS, TECHNOLOGY PLATFORMS, AND RESEARCH PROJECTS)

ESENS

Pilot project. Follow-on project to PEPPOL which was the previous pilot project. It includes a pilot for e-Invoicing.
http://www.esens.eu/

OPENPEPPOL

E-Invoice developer community to implement the PEPPOL (and e-SENS) programmes. The PEPPOL transport infrastructure is today implemented by hundreds of service providers throughout Europe, servicing thousands of public and private entities, specifically in the post-award processes of e-procurement, where e-Invoicing is predominantly used.
http://www.peppol.eu/about_peppol/about-openpeppol-1

MSP MEMBERS' AND STAKEHOLDERS' REMARKS

The French government devised rules for e-Invoicing. This action is part of a simplification programme for businesses. The goal is to dematerialise invoicing between public bodies and suppliers. E-invoicing will be introduced progressively from 1 January 2017 it will apply to big firms and from 2020 to small and medium businesses. Public bodies must be ready to use e-Invoicing by 2017.

For SMEs to also benefit from e-invoicing, the German Forum on electronic Invoicing (FeRD) has developed a uniform data format called ZUGFeRD, the "Central User Guide of the Forum for Electronic Invoicing in Germany" (Zentraler User Guide des Forums elektronische Rechnung Deutschland). Structured invoices can be exchanged electronically between different companies and between companies and the public administration http://www.zugferd.de

In Italy 100% of the suppliers for central and local authorities have been obliged to issue e-Iinvoices in FatturaPA format since March 31, 2015 semantically aligned with CEN/BII WS core invoice. This broad-scale project has led to between 2 and 2.5 million suppliers to send invoices electronically and has enabled the Italian government to reap the benefits of digital invoicing to the full extent.

In the Netherlands, the central government received 53% of its invoices from companies through digital channels in the first two quarters of 2014. An increasing number of departments are able to process digital invoices automatically. Full digital processing either on the basis of scanning/OCR, PDF, XML and/or HRXML messages will be in place in the coming years in all departments. The government has developed a semantic e-invoice standard (SMEF) which has a comply or explain status. Choosing a semantic e-invoice standard gives more freedom in selecting e-invoice syntax standards. A Dutch profile on HRXML (SETU) follows comply or explain rules, whereas UBL 2.1 is chosen as the preferred standard if there is no dominant sector standard available. The Dutch government is very glad that the European Commission is using a similar approach with one semantic and several syntax standards. This will enable the central government to reap the benefits of digital invoicing to the full extent and Billing Service Providers to link up their invoicing networks, thus facilitating for pan-European digital invoice interchanges, be it based on Simplerinvoicing or similar solutions. http://www.simplerinvoicing.org/

The emergence of an abundance of internet and mobile based payment services for both online and over-the-counter purchases makes it increasingly important to also standardize formats and delivery methods for business-to-consumer (B2C) e-Invoicing. Business-to-government (B2G) and B2C e-Invoicing formats are not directly applicable to invoices and receipts issued to consumers. Most importantly there are privacy issues to be considered with respect to content and delivery. Standardised e-Invoicing for B2C commerce could have a number of benefits including faster and simpler payments and reduced environmental impact for mobile over-the-counter purchases; more readily accessible to users with disabilities; consumers can collect invoices in a single location, easily accessible for warranty and ODR purposes; easily accessible and portable e-invoices may be used to increase trust in relation to second-hand C2C trading. However, e-Invoicing in multiple formats, where the consumer would have to register in many different ways with various vendors and/or data mining third-party services to receive invoices in various formats or become embedded in proprietary apps, would be detrimental to the objectives of the digital single market.

CARD, INTERNET AND MOBILE PAYMENTS

POLICY OBJECTIVES

While there is no globally accepted definition of a mobile payments (m-payment), payments made using a mobile phone seem to be gaining importance. Mobile payments can be based on card payments, credit transfers, direct debits, or through pre-funded cards and accounts.

In general, the Commission strives to promote an interoperable European market for card, internet and mobile payments for the benefit of consumers and merchants.

LEGISLATION AND POLICY DOCUMENTS

AT EUROPEAN LEVEL

- **Revised Directive on Payment Services**. In 2015, the European Parliament and the Council agreed on the European Commission proposal to create safer and more innovative European payments (Payments Service Directive 2). The new rules aim to better protect consumers when they pay online, promote the development and use of innovative online and mobile payments, and make cross-border European payment services safer. Member states will have two years to incorporate the directive into their national laws and regulations.
- **Regulation (EU) 2015/751** of the European Parliament and of the Council of 29 April 2015 on interchange fees for card-based payment transactions

OTHERS

French strategy :
http://proxy-pubminefi.diffusion.finances.gouv.fr/pub/document/18/17780.pdf#page=7

PROPOSED NEW ACTIONS ON STANDARDISATION

STANDARDS DEVELOPMENT

ACTION 1 SDOs are to develop standards, including use-cases and a clear definition of mobile payment, on different ways of payment covering the whole purchase process (from checking the price to receiving the confirmation of payment), reflecting requirements for accessibility, interoperability, security, personal data protection and privacy. These are needed for a clearer definition and scope of what m-payments are.

ACTION 2 CEN/TC224 will work on accessibility, guideline for users, European profiles of standards and specification for describing/featuring European solutions

OTHER ACTIVITIES AROUND STANDARDISATION

ACTION 3 Assess landscape of existing standards. The Commission, in cooperation with the European Central Bank, intends to facilitate the merging of ongoing standardisation activities in the area of card payments and spur the emergence of pan-European standards for m-payments and internet payments. As a first step the Commission will invite the ESOs and other relevant bodies such as the single euro payments area (SEPA) council to map out business and user requirements and assess existing standardisation gaps. The CEN has already confirmed its interest for this mapping exercise. Taking as a starting point the requirements of businesses and consumers, there is a need to assess the existing standards, to identify interoperability gaps, and to develop a work programme that will help develop missing standards and to fix the existing problems.

In particular the following issues (especially in the m-payment domain) should be addressed: security for apps, access and accessibility, management and portability of customer data, and transparency. Certification of equipment and solutions should be addressed as well by the competent bodies.

ACTION 4 Investigate work for W3C. After a successful workshop, W3C expects there will be a need to charter a new working group on the API payment request and a complementary business group with a broader remit. The proposed DRAFT charter was published recently: https://www.w3.org/2015/10/payments-wg-charter.html

STANDARDISATION NEEDS, ONGOING ACTIVITIES AND PROGRESS REPORT

COMMISSION PERSPECTIVE AND PROGRESS REPORT

There will be 947 million mobile-connected devices by 2020. Whether it is for shopping, moving, buying concert tickets, paying bills or accessing banking services, the mobile is device is becoming the preferred access path to online services. The market for mobile payments at European level is fragmented. The current landscape is characterised by applications for niche users and by numerous pilot projects, mostly at domestic or local level. The advent of an integrated system of mobile payments in the EU is hampered by the lack of cross-border standardised and interoperable technical solutions.

The absence of shared standards, standardisation gaps and the lack of interoperability between the various market players is delaying the mass market adoption of this innovative payment method. While certain solutions, such as near field communication (NFC), seem to emerge as possible lead technologies for proximity mobile payments, common standards for mobile payments at the point of sale (POS) do not exist or are in a very early stage of development.

Provided that the market factors are duly taken into account, resolving the issue of missing standards will make it easier for payment services providers and merchants alike to reach critical mass by making use of the digital single market and committing to make the necessary investments.

It requires a coordinated and pragmatic approach by the public authorities and the various players in order to favour the deployment of the service. The cooperation among the players is key, and should be supported by a real willingness and commitment to achieve concrete results.

The European Commission does not plan yet to proceed with specific legislation since it requires a more mature market. However, it will continue the cooperation and discussion with the institutional players and the ESOs. It will launch/support appropriate standardisation initiatives as soon as gaps and needs are identified. The CEN has confirmed its interest in supporting the European Commission initiatives regarding payment standards. It will use its multiple experts from both demand and supply sides already involved in the many organisations addressing standards covering the entire chain of payments in the card, internet and mobile environment. DG GROW will pursue its work on the mapping of the market for mobile payments.

The Euro retail payments board (ERPB) working group should work in cooperation with relevant players that are not represented in the ERPB (e.g. telecom operators). It is expected to enhance the consumers' confidence in m-payments.

Future standardisation work in the m-payments field should pay particular attention to security for apps, access and accessibility, management and portability of customer data, and transparency. Certification of equipment and solutions should also be addressed as well by the competent bodies.

In order to foster and accelerate innovation and to create a level playing field, a certain degree of standardisation is vital to secure compatibility in the mobile payments value chain. Changing handset (version), OS, card, wallet, provider, or any other service or product in the chain, must be a seamless and secure experience for the consumer.

Standardisation could include making a distinction between mobile platforms (e.g. secure element, mobile handset) and their functions/security which are generic in nature and provide support to all mobile services / applications and mobile payment applications (running on these platforms).

ONGOING STANDARDS DEVELOPMENT

CEN

CEN/TC224 covers the development of standards for strengthening the interoperability and security of personal identification and its related personal devices, systems, operations and privacy in a multi-sectoral environment.

ISO

Mobile payments WG — ISO TC68/SC7/WG10 and ISO/IEC JTC1 SC 17- Cards and personal identification. ISO 12812 will be ready for publication soon. It includes five parts:

- ISO 12812-1: General Framework
- ISO 12812-2: Security and data protection for Mobile Financial Services
- ISO 12812-3: Financial Application Management
- ISO 12812-4: Mobile Payments to Persons
- ISO 12812-5: Mobile Payments to Businesses

ETSI

Following the Commission-ETSI jointly organised workshop on m-Payments held in July 2014, ETSI will set up an open and inclusive "Smart Secure Platform" (SSP) that will bring together all relevant players and experts (industry, standards-making, public authorities) and will aim at identifying existing standardisation gaps and needs, bearing in mind the requirements to be set by ERPB. The objective is to define a generic (i.e., technology agnostic) standardised security platform to enable secure and interoperable service delivery of mobile devices for a series of industry sectors. The results of the analysis and the proposed standardisation work will lead to the launch of specific and coordinated standardisation activities at European and international level.

ITU-T

ITU-T SG13 approved two Recommendations on secure mobile payments and mobile banking solutions.

Recommendation ITU-T Y.2740 elaborates on approaches to develop system security for mobile commerce and mobile banking . It describes the security requirements for the mobile commerce and the mobile banking systems, based on four specified security levels.

Recommendation ITU-T Y.2741 specifies the general architecture of a security solution for mobile commerce and mobile banking in modern telecommunication networks.

Focus Group Digital Financial Services (FG DFS) is working towards analysing the barriers to mobile payments and mobile financial services in developing countries. The deliverables in this case will define the DFS system and provide best practices for consumer protection regulators, key performance indicators for quality of service for DFS and merchant acceptance for DFS. There will be additional deliverables related to:

- the interoperability of DFS payment systems,
- architecture for DFS payments,
- security for DFS,
- best practices for regulators for competition issues with regard to fair access to telecommunication infrastructure for DFS providers,
- data privacy issues in DFS,
- role of postal networks in DFS
- enhancing digital credit to avoid cashing out.

http://itu.int/en/ITU-T/focusgroups/dfs

W3C

The open web platform offers tremendous potential as the driver behind the transformation of the web Payments industry. The platform forms the foundation of how online and in-store payments can be made easy on the web in the future.
See https://www.w3.org/Payments/

The web payments working group , chartered to make payments easier and more secure on the web, through the development of new web standard protocols and APIs related to the initiation, confirmation, and completion of a payment. This serves to increase interoperability between payer and payee systems. The group is chartered to standardise programming interfaces, not user interfaces and not a new digital payment scheme.
See https://www.w3.org/Payments/WG/

The web payments interest group, chartered to provide a forum for web payments technical discussions to identify use-cases and requirements for existing and/or new specifications to ease payments on the web for users (payers) and merchants (payees). It is also chartered to establish a common ground for payment service providers on the web platform.
See https://www.w3.org/Payments/IG/

Other chartered groups (doing standards) are of course coordinated closely with web payments, such as security, crypto, privacy or authentication (also accessibility and internationalisation) and a number of other community-driven groups at W3C are doing work related to payments, or that will improve the web overall including payments. These include:

the Interledger payments community group, which seeks to connect the many payment networks (ledgers) around the world via the web,

the financial industry business ontology (FIBO) community group, which is developing extensions to schema.org related to financial industries,

the Blockchain Community Group, which is studying and evaluating technologies related to blockchain, and use-cases such as interbank communications.

NEXO and EPCNEXO and the European Payment Council (EPC) currently focus on the protocols for card payment protocols in the Eurozone and aim to replace the current mess of proprietary protocols. The EPC is also involved in SEPA and sees iteself as the decision-making and coordination body for the European banking industry in relation to payments.

MSP MEMBERS' AND STAKEHOLDER'S REMARKS

In general regarding card, internet and mobile payments, some stakeholders believe that the following issues should in particular be addressed: security, access and accessibility, management and portability of customer data, and transparency.

Card, internet and mobile payments are already standardised by a large number of organisations. This creates a diversity which may prevent the use of common infrastructures and common security standards. A common series of standards would be beneficial to all players in the market. A global view on standards in these areas is important as the payment market is global as are most existing standards.

EXTENSIBLE BUSINESS REPORTING LANGUAGE (XBRL)

POLICY OBJECTIVES

E-Business, defined as doing business over the internet, needs unified definitions, identification and codification of business-related information, processes, actors and their roles, and relationships. That includes names, legal form and status, financial information and reports, transactional information, deeds and claims in legal and administrative proceedings used in a variety of commercial, societal and administrative contexts in commerce, taxation, statistics, public procurement, supervision of regulated activities, judicial etc. Once the information is unified it can then be automatically processed by ICT means, published, searched and retrieved from the internet, automatically analysed and used by governments, businesses, consumers and civil society.

XBRL allows governments, regulators, institutions, private sector, etc. to build vocabularies and rules (called taxonomies) to report on the financial position, performance and economic viability of businesses. XBRL permits the publication of financial reports supplemented by markup according to XBRL taxonomies. These may then may be processed and retrieved by market participants, including analysts, supervisors, enterprise regulators, tax offices, clients, suppliers, creditors and investors.

LEGISLATION AND POLICY DOCUMENTS

AT EUROPEAN LEVEL

Directive 2013/50/EU (revision of the Transparency Directive 2004/109/EC) aims to ensure transparency of information for investors through a regular flow of disclosure of periodic and ongoing regulated information and the dissemination of such information to the public. Regulated information consists of financial reports, information on major holdings of voting rights and information disclosed pursuant to the Market Abuse Directive (2003/6/EC).

OTHERS

The Netherlands standard business reporting (SBR) program, using XBRL taxonomies for government-to-business interactions: see http://www.sbr-nl.nl/english/ .

More than half of the European Member States are using XBRL for tax, financial, statistics reporting or other information exchange. Please check https://www.xbrl.org/the-standard/why/who-else-uses-xbrl/

PROPOSED NEW ACTIONS ON STANDARDISATION

OTHER ACTIVITIES AROUND STANDARDISATION

Action 1. Launch a survey to determine EU Member States' initiatives, resources and position on XBRL and its fit to European regulatory accounting practices has been suggested. Coordinated EU input to the global XBRL standardisation processes, notably in XBRL and in international financial reporting standards (IFRS) taxonomy, could leverage multilateral efforts leading to transparent financial industries and sound governance in the post-crisis global economy.

STANDARDISATION NEEDS, ONGOING ACTIVITIES AND PROGRESS REPORT

COMMISSION'S PERSPECTIVE

Since 2012, the European securities and market authority (ESMA) defines, on a yearly basis, European common enforcement priorities (ECEP) in order to promote the consistent application of European securities and markets legislation and the IFRS, and especially the provisions of the Transparency Directive. Those priorities are a key focus of the examination of issuers' financial statements. They are made public so that listed companies and their auditors take due account of these areas when preparing and auditing IFRS financial statements.

In terms of regulatory technical standards (RTS), ESMA prepared draft RTS with respect to the operation of a European electronic access point (EEAP) at EU level. The EEAP will be a web-portal for the provision of easy and fast access to regulated information stored by all officially appointed mechanisms (OAM).

ESMA is also pursuing the development of draft RTS to specify the European single electronic reporting format (ESEF) for the preparation of annual financial reports in a single electronic reporting format that will take effect from 1 January 2020.

ONGOING STANDARDS DEVELOPMENT

XBRL
Base specifications and related resources: http://www.xbrl.org/

XBRL
International Financial Reporting Standards taxonomies and related resources: http://www.ifrs.org/XBRL/Resources/Pages/Resources.aspx

XBRL EUROPE

XBRL Europe is a non-profit organisation and has been set up to foster European XBRL efforts and to implement and share common XBRL projects between its members and to liaise with European authorities and organisations http://xbrleurope.org/

XBRL INTERNATIONAL

XBRL International is currently developing a syntax-independent version of XBRL: the open information model. This will facilitate the exchange of information between different systems, without loss of the agreed semantics

EUROFILING

XBRL resources for EU banking and insurance supervision: http://www.eurofiling.info.

CEN

CEN/WS XBRL: workshops on improving transparency in financial and business reporting, including CWA 16744-3:2014 (European XBRL taxonomy architecture), CWA 16746-1:2014 (standard regulatory roll-out package for better adoption: XBRL supervisory roll-out guide) and CWA 16746-2:2014 (standard regulatory roll-out package for better adoption: XBRL handbook for declarers).

OASIS

The Open Charge Alliance launched a project at OASIS for standardising their open charge point protocol (OCPP) for certain data transfers used in electric-vehicle-to-grid-to-payment transactions, in open source EV charging station networks: see https://www.oasis-open.org/committees/OCPP

PRESERVATION OF DIGITAL CINEMA

POLICY OBJECTIVES

The 2005 European Parliament and Council Recommendation on film heritage recommended Member States to ensure preservation of cinematographic works. The fourth application report on this recommendation, published on 3 October 2014, shows that very few Member States are implementing digital workflows to preserve digital or digitised cinema. Those that have done it have used diverging standards.

LEGISLATION AND POLICY DOCUMENTS

AT EUROPEAN LEVEL

- **Recommendation of the European Parliament and of the Council of 16 November 2005** on film heritage and the competitiveness of related industrial activities, OJ L 323 of 9.12.2005, p.57. http://eurlex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32005H0865:EN:NOT
- **Council Conclusions on "European film heritage**, including the challenges of the digital era", adopted in November 2010 http://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/en/educ/117799.pdf
- **Council conclusions on "European Audio-visual Policy** in the Digital Era" adopted on 25 November 2014 http://www.consilium.europa.eu/homepage/highlights/council-addresses-european-audiovisual-policy-in-the-digital-era?lang=en
- **4th Application report of the Film Heritage Recommendation, from 2.10.2014** https://ec.europa.eu/digital-agenda/en/news/european-commissions-report-film-heritage

OTHER

- Archival Policy of the Swedish Film Institute http://www.sfi.se/Global/Filmarkivet/Policy%20of%20the%20Archival%20Film%20Collections%20of%20the%20Swedish%20Film%20Institute%20(2012).pdf
- British Film Institute Strategy "2012-2017" Film forever http://www.bfi.org.uk/about-bfi/policy-strategy/film-forever
- Results of the EU-funded research project EDCine ftp://ftp.cordis.europa.eu/pub/ist/docs/ka4/au_concertation_1006_edcine_en.pdf http://ec.europa.eu/avpolicy/docs/reg/cinema/june09/edcine.pdf
- Recommendations from the International Federation of Film Archives (FIAF):
  - FIAF Technical Commission Recommendation on the deposit and acquisition of D-Cinema elements for long-term preservation and access http://www.fiafnet.org/commissions/TC%20docs/D-Cinema%20deposit%20specifications%20v1%200%202010-09-02%20final%201.pdf
  - FIAF Technical Commission Recommendation on the Principles of Digital Archiving http://www.fiafnet.org/commissions/TC%20docs/Digital%20Preservation%20Principles%20v1%201.pdf

PROPOSED NEW ACTIONS ON STANDARDISATION

STANDARDS DEVELOPMENT

ACTION 1 SDOs to develop and adopt a European standard and the related guidelines on preservation of digital films, based on existing standardisation activities at national and international level.

OTHER ACTIVITIES AROUND STANDARDISATION

ACTION 2 SDOS to promote awareness and implementation of the European standard among relevant stakeholders (e.g. European film heritage institutions)

STANDARDISATION NEEDS AND ONGOING ACTIVITIES AND PROGRESS REPORT

COMMISSION PERSPECTIVE AND PROGRESS REPORT

The film heritage sector would benefit from European standards that describe the most efficient digital workflows and data formats for preservation of digital films. The resulting standards for digital preservation of films could also be of interest for digital preservation of other type of documents in public administrations. Some Member States, as Germany and France, are planning to adopt national standards.

ONGOING STANDARDS DEVELOPMENT

OAIS

OAIS (Open Archive Information System) — ISO 14721:2012 http://www.iso.org/iso/iso_catalogue/catalogue_ics/catalogue_detail_ics.htm?csnumber=57284

GERMANY

Germany is starting standardisation activities at national level to produce one standard at national level on preservation of digital films

CST/FRAUNHOFER

CST/Fraunhofer started a new "Society of Motion Picture and Television Engineers" (SMPTE) activity for a mezzanine file format of digitised movies based on the interoperable master format (IMF) which can be extended to a preservation format of digital films

FINANCIAL TECHNOLOGIES (FINTECH)

POLICY OBJECTIVES

In order to help FinTech innovation reach its full potential with Europe playing a leading role, while ensuring financial stability and consumer confidence, the European Commission has set up a financial technology task force (FTTF)[48]. Co-chaired by DG FISMA and DG CONNECT, the task force brings together services responsible for financial regulation and for the digital single market, along with other colleagues dealing with competition and consumer protection policy. It will further engage outside experts and stakeholders with the aim to formulate policy-oriented recommendations and propose measures in the course of 2017

One of the work streams of the task force will focus on interoperability and standards.

POLICY DOCUMENTS

AT EUROPEAN LEVEL

- The Commission sets up an internal task force on FinTech https://ec.europa.eu/digital-single-market/en/blog/european-commission-sets-internal-task-force-financial-technology
- The Parliament is writing an own initiative report on the influence of technology on the future of the financial sector http://www.europarl.europa.eu/oeil/popups/ficheprocedure.do?lang=&reference=2016/2243(INI)#technicalInformation

PROPOSED NEW ACTIONS ON STANDARDISATION

STANDARDS DEVELOPMENT

ACTION 1 Build close relations with ongoing standardisation and open source activities in the field and work towards a comprehensive overview of the technology developments.

ACTION 2 Map the current standardisation landscape, identify standardisation gaps, and build a roadmap.

OTHER ACTIVITIES AROUND STANDARDISATION

ACTION 3 Organise a workshop on blockchain and related technologies for identifying possible further actions on policy level.

STANDARDISATION NEEDS, ONGOING ACTIVITIES AND PROGRESS REPORT

COMMISSION PERSPECTIVE AND PROGRESS REPORT

The interoperability and standards work stream of the FinTech task force has kicked off in January 2017. There is a need to map the current standardisation landscape in the area of FinTech.

Blockchain[49] is a specific implementation of distributed ledger[50] technologies. In essence blockchain is a shared, trusted, public ledger that everyone can inspect, but which no single user controls[51] and an independent, transparent, permanent database coexisting in multiple locations and shared by a community, building a trustful data infrastructure. Blockchain has led to the development of virtual currencies (one of them being the bitcoin) and is developed and tested by the FinTech industry to develop new business models and services, or simply as the technical infrastructure to host and exchange financial data. So standardisation in blockchain and distributed ledger should be analysed and assessed, but not only: financial services, including at the semantic and organisational level, should be part of the analysis as well.

ONGOING STANDARDS RELATED DEVELOPMENTS

The following technical committees are carrying out activities that may be related to FinTech standardisation.

ISO

http://www.iso.org/iso/home/standards_development/list_of_iso_technical_committees/iso_technical_committee.htm?commid=6266604

http://www.iso.org/iso/home/standards_development/list_of_iso_technical_committees/iso_technical_committee.htm?commid=49650

TC68 is maintaining ISO 20022 standards and developing new ones.

ITU/T

ITU-T Study Group 17 (Security) has started to work on blockchains.

48 https://ec.europa.eu/digital-single-market/en/blog/european-commission-sets-internal-task-force-financial-technology

49 https://en.wikipedia.org/wiki/Blockchain_(database)

50 https://en.wikipedia.org/wiki/Distributed_ledger

51 *The Economist, The Trust Machine, October 2015*


CO_2
SUSTAINABLE
GROWTH
ECO

SMART GRIDS AND SMART METERING, SMART AND EFFICIENT ENERGY USE

POLICY OBJECTIVES

One of the EU's key ambitions is to develop a low-carbon economy. In the 2020 and 2030 frameworks for climate and energy, the EU committed to lowering greenhouse gas emissions by 20% by 2020 with respect to 1990 and by 40% by 2030, to reach a share of renewable energy consumption of at least 20% by 2020 and 27% by 2030, and 27% energy savings by 2030 (compared with the business-as-usual scenario).

In this context, the electricity networks have a central role to play. In 2012, electricity represented 22% of the EU's energy consumption with renewables making up a share of 24% of gross production i.e. almost a 3% increase on 2011. Owing to the increasing number of appliances and the expected penetration of heat pumps and electric vehicles, this share is expected to rise and the share of renewables could reach 50% by 2030 with a major contribution from variable sources.

There is therefore a tremendous need to accelerate the roll-out of the smart grids. Smart grids will be the backbone of the future decarbonised power system. They will enable improved energy efficiency and the integration of vast amounts of renewable energy sources (RES), decentralised generation and new loads such as electric vehicles; provide an opportunity to boost EU technology providers' retail market competitiveness and worldwide technological leadership, and serve as a platform for traditional energy companies or new market entrants such as ICT companies, including SMEs, to develop new, innovative energy services. That dynamic should boost competition in the retail market, incentivise reductions in greenhouse gas emissions and provide an opportunity for economic growth.

The use of smart grids for future high-tech infrastructures in Europe, such as the integration of renewables and energy infrastructure for electric cars, needs to be addressed at European level from the start to create synergies, ensure interoperability and establish a true internal market.

Standards are needed to cover the communication needs of grid management, to balance the energy supply and demand, and interface with the millions of new sources of renewable energy. Standards are also needed for the complex interactions in the new distributed energy market. Lastly, a transparent demand response scheme that is accessible to all consumers is also required.

LEGISLATION AND POLICY DOCUMENTS

AT EUROPEAN LEVEL

- **Directive 2014/94/EU** on the deployment of alternative fuels infrastructure
- **Recommendation 2014/724/EU** on the data protection impact assessment template for smart grid and smart metering systems
- **COM(2014) 356** Benchmarking smart metering deployment in the EU-27 with a focus on electricity; and accompanying SWD(2014) 188 and SWD(2014) 189
- **C (2013) 7243** Delivering the internal electricity market and making the most of public intervention; and accompanying SWD (2013) 442 Incorporating demand side flexibility, in particular demand response, in electricity markets
- **Recommendation COM 2012/148/EU** on preparations for the roll-out of smart metering systems
- **COM(2012) 663** Making the internal energy market work
- **COM(2011) 202 Smart Grids**: from innovation to deployment
- **COM(2010) 245** "A Digital Agenda for Europe": actions 71 & 73 address respectively minimum functionalities to promote smart grid interoperability and a common set of functionalities for smart meters and are directly related to the standardisation activities at CEN/CENELEC/ETSI.
- **Directives 2009/72/EC and 2009/73/EC**: Internal market in electricity and natural gas; Directive 2009/29/EC amending Directive 2003/87/EC so as to improve and extend the greenhouse gas emission allowance trading scheme of the Community; Directive 2009/28/EC of the European Parliament and of the Council on the Use of Energy from renewable sources.

- **Consolidated version of Directive 2003/87/EC** of the European Parliament and of the Council establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC[52]
- **Mandate M/490[53] and Mandate M/441[54]** from EU/EFTA to the ESOs

PROPOSED NEW ACTIONS ON STANDARDISATION

STANDARDS DEVELOPMENT

ACTION 1 The Expert Group (EG1) of the smart grids task force works on assessing the interoperability and standards used in a smart grid environment for delivering the required functionality, connectivity and seamless interaction of data repositories and services, including for the benefit of consumers. The new focus will be on:

- delivering demand-response ready interfaces;
- standardising, in close consultation with the ESOs and their respective groups, the smart meters coordination group (SM-CG) and smart energy grid coordination group (SeG-CG), of the information type and format required for seamless data flow;
- preparing to launch measures that enable service providers and other entities to consume the data of their choice and making this data accessible to all consumers.

ACTION 2 The smart grids task force should, in collaboration with the cybersecurity coordination group (CSCG), assess major security and privacy standards and regulations that apply to smart grids and smart metering. It should identify gaps and propose measures, while taking personal data protection into account.

STANDARDISATION NEEDS, ONGOING ACTIVITIES AND PROGRESS REPORT

COMMISSION PERSPECTIVE AND PROGRESS REPORT

Systems need to be integrated to ensure consistent operation in response to user needs, so interoperability is a fundamental requirement. This can be ensured only through appropriate standardisation, achieved by reviewing existing standards or, if needed, developing new ones. The majority of the standards (around 70%) needed for smart grids are ICT-related. It is essential to reach agreement on the issues of data protection, privacy, and data security-related standards.

Communication standards will also be crucial for the deployment of electric cars and the creation of smart cities. Harmonised communication protocols would provide standard components and interfaces enabling 'plug-and-play' capability for any new entrant to the network, such as renewables or electric cars, or the use of open architectures based on global communication standards.

A major difficulty is choosing the right stakeholders for standardisation. It is important to establish a seamless environment between smart grid management (relating to utility producers and utility network operators) and smart consumption (relating to the end consumer) where interests do not overlap or conflict.

The smart grids task force is the main coordination reference in European, with the mission to advice the Commission on policy and regulatory directions at EU level and to coordinate the first steps towards the implementation of smart grids under the provision of the third energy package. Nine DGs are participating: ENER and CNECT (co-chairs), CLIMA, GROW, ENV, JUSTICE, JRC, RTD and SANTE, along with more than 30 associations representing all relevant stakeholders, from both the energy and telecommunications sectors, and over 350 experts from national regulatory agencies and industrial market actors.

Policy aspects related to the smart grid mandate M/490 were handled by the EG1 of the smart grids task force, a group chaired by ENER, with CNECT actively participating.

52 http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX-:02003L0087-20140430

53 https://ec.europa.eu/energy/sites/ener/files/documents/2011_03_01_mandate_m490_en.pdf

54 Standardisation mandate in the field of measuring instruments for the development of an open architecture for utility meters involving communication protocols enabling interoperability.

At present, the standardisation request M/490 of the Commission to CEN, CENELEC, and ETSI, of March 2011, can be considered completed as confirmed by the conclusions of the validation conference the Commission services organised on 26 February 2015 in Brussels, during which industry representatives confirmed their will to take over and implement the EG1's findings. Consequently, EG1 was re-launched to assess the interoperability, standards and functionalities applied in the large scale rollout of smart metering in Member States and in particular the status of implementation of the required standardised interfaces and of the Commission-recommended 55 functionalities relating to providing information to consumers. EG1 carried out this work and a report summarising the main findings was published in October 201556.

The SM-CG coordinates standardisation efforts related to smart meters. It was created when the Commission issued standardisation request M/441. This multi-stakeholder group oversees standardisation relating to smart metering infrastructure. It has produced a reference architecture (TR 50572), a glossary of terms, an overview of available standards, smart metering use-cases and an overview of technical requirements including those for privacy and security.

See also the work of the International Agency on Energy, particularly its recommendations in terms of interoperability[57].

ONGOING STANDARDS DEVELOPMENT

On the level of technical standardisation and coordination of work, IEEE, OASIS and the ESO Smart Energy Grid Coordination Group are continuing their collaboration including identifying whether there are serious conflicts between their respective standardisation deliverables which may have a negative impact on interoperability and the market adoption of smart grid solutions.

55 Commission Recommendation 2012/148/EU
56 https://ec.europa.eu/energy/en/topics/markets-and-consumers/smart-grids-and-meters/smart-grids-task-force
57 https://www.iea.org/publications/freepublications/publication/smartgrids_roadmap.pdf

STANDARDS DEVELOPMENT

CEN, CENELEC, ETSI

At present mandate M/490 given to CEN-CENELEC-ETSI by the Commission in March 2011 can be considered as completed. The main outcomes are available at: http://www.cencenelec.eu/standards/Sectors/SustainableEnergy/SmartGrids/Pages/default.aspx

The three ESOs have agreed to continue their collaboration in relation to smart grids following the completion of the work under the standardisation request, under the eG-CG. This group will focus on security and interoperability, follow up new developments in the field of smart grids, and actively promote the results of its work at European and international levels.

For smart metering, the SM-CG consisting of the three ESOs will continue to manage the standards work programme that is still contributing to the development of new and maintenance of existing standards for advanced metering infrastructures.

Regarding electromobility, a work programme and a list of relevant standards for the charging of electric vehicles was last updated in November 2014. Regarding charging points for electric vehicles of interest to the eMobility coordination group, and in support of the implementation of the alternative fuels infrastructure Directive 2014/94/EU, a new standardisation request was issued to the ESOs in March 2015. ETSI and the oneM2M Partnership project are active in the area of machine-to-machine (M2M) with some relation to smart grids. ETSI is also developing radio technologies for wireless interconnection in home automation networks with applications such as smart metering and energy control in the scope of the technology.

CENELEC

Ongoing work includes EN 50523:2009 'Household appliances interworking

IEC

IEC has a number of technical committees dealing with smart grids and smart metering:

- TC 8: Systems Aspects for Electrical Energy Supply
- SC 8A: Grid Integration of Large-capacity Renewable Energy (RE) Generation
- TC 13: Electrical Energy Measurement and Control (including Smart Metering)
- TC 57: Power Systems Management and Associated Information Exchange
- PC 118: Smart Grid User Interface

Strategic group 3 on smart grid has been disbanded but the drafted smart grids system roadmap is still available from: http://www.iec.ch/smartgrid/downloads/sg3_roadmap.pdf

Systems committee on smart energy (SyC Smart Energy) provides systems level standardisation and coordination in the areas of smart grids and smart energy, including interactions in the fields of heat and gas. http://www.iec.ch/dyn/www/f?p=103:186:0::::FSP_ORG_ID,FSP_LANG_ID:11825

The IEC smart grid mapping tool provides a graphical and interactive overview of all smart grid related standards: http://smartgridstandardsmap.com/

IEEE

IEEE has many standards and standards projects in development from the diverse fields of digital information and controls technology, networking, security, reliability, assessment, interconnection of distributed resources including renewable energy sources to the grid, sensors, electric metering, and broadband over power line, and systems engineering. IEEE has developed a guide for smart grid interoperability standardisation, IEEE 2030-2011 IEEE Guide for Smart Grid Interoperability of Energy Technology and Information Technology Operation with the Electric Power System (EPS), End-Use Applications, and Loads. IEEE 2030(r) spans the three distinct perspectives of power and energy, communications and information technology.
http://standards.ieee.org/develop/msp/smartgrid.pdf.

ITU-T

The ITU smart grid focus group completed its work in December 2011 and adopted deliverables at http://itu.int/en/ITU-T/focusgroups/smart. The work was taken over by ITU-T SG15, which leads and coordinates this issue within ITU and with other organisations. ITU-T SG15 developed standards on power line communication (PLC, Recommendation ITU-T G.990x-series), which is one of the most important technologies for smart grid.

ITU-T SG13 Recommendation ITU-T Y.2070 "Requirements and architecture of the home energy management system and home network services", and consented Y.2071 "Framework of micro energy grid".

Detailed information is described in the document "smart grid standardisation overview and work plan" developed by ITU-T SG15 and available at http://www.itu.int/en/ITU-T/studygroups/2013-2016/15/Pages/exec-sum.aspx.

OASIS

OASIS developed a series of transactive energy standards for smart grid information, energy supply transactions and monitoring which have been adopted by some regulators as model specifications for open energy markets.

See OASIS Energy Interoperation: https://www.oasis-open.org/committees/energyinterop OASIS Energy Market Information Exchange (eMIX): https://www.oasis-open.org/committees/emix OASIS Web Services Calendar (WS-Calendar): https://www.oasis-open.org/committees/ws-calendar OASIS Open Building Information Exchange (oBIX): https://www.oasis-open.org/committees/obix.

The Open Charge Alliance launched a project at OASIS for standardising their OCPP protocol for certain data transfers used in electric-vehicle-to-grid-to-payment transactions, in open source EV charging station networks: https://www.oasis-open.org/committees/OCPP

IETF

RFC6272 identifies the key infrastructure protocols of the internet protocol suite for use in the smart grid. The target audience is those people seeking guidance on how to construct an appropriate Internet Protocol Suite profile for the smart grid. In practice, such a profile would consist of selecting what is needed for smart grid deployment from the picture presented here. The EMAN WG https://datatracker.ietf.org/wg/eman/charter/ has produced several specifications for an energy management framework, for power/energy monitoring and configuration. See http://datatracker.ietf.org/wg/eman/documents/. The framework focuses on energy management for IP-based network equipment (e.g. routers, switches, PCs, IP cameras, phones and the like).
Many of the IETF working groups listed under section internet of things are developing standards for embedded devices that may also be applicable to smart grids.

OTHERS (INCLUDING STAKEHOLDER GROUPS, TECHNOLOGY PLATFORMS, AND RESEARCH PROJECTS)

NIST

The US government sponsored a Smart Grid Interoperability Panel from 2009-2012 to spur cooperative industry and public agency development of open data standards for smart grid functionality: http://www.nist.gov/smartgrid/priority-actions.cfm. In 2013, the management of this project was turned over to industry stakeholders as a continuing standards cooperation project: http://sgip.org/

JISC

Japanese Industrial Standards Committee (JISC) roadmap for international standardisation for smart grid.

SGCC

The State Grid Corporation of China (SGCC) Framework. A lot of further national activities and roadmaps could be mentioned as well, such as those of Austria, Spain, the United Kingdom, the Netherlands, France, Korea and others.

MSP MEMBERS' AND STAKEHOLDERS' REMARKS

Security, privacy and management of control of the access to and ownership of data are essential for the development of smart grids. Without wide acceptance by commercial users and consumers, the role of smart grids would be limited to specific vertical markets only.

Mechanisms that allow users and providers to negotiate optimised usage, including planning and scheduling of availability and use of energy resources are missing in smart grid applications.

- The part of the grid inside the home domain is also an element that has a significant impact on energy efficiency. Several elements are needed: local protocols for home automation networks; a multidisciplinary standardised approach covering all aspects of the problem, from application semantics to indoor interconnection wired or wireless technologies;

applications such as lighting and energy control, appliances control, power monitoring, smart metering and buildings energy management; provision of elements for a global solution on smart appliances and home energy control, such as suitable radio protocols for indoor coverage.

SMART CITIES AND COMMUNITIES, AGGREGATING SMART SERVICES AND TECHNOLOGIES IN URBAN AREAS

POLICY OBJECTIVES

Smart urban technologies can make a significant contribution to the sustainable development of European cities. 68% of the EU population lives in urban areas, a proportion that is growing as the urbanisation trend continues, both in Europe and worldwide.

A smart city is an entity that uses ICT effectively, to integrate the requirements of its urban community, in terms of energy and other utilities (production, distribution and use), environmental protection, mobility and transport, services for citizens (healthcare, education, emergency services etc.) and with proper regard for security, both of individuals and their personal data, and use it as a driver for economic and social improvements. This would also increase the deployment of smart technologies and solutions in rural communities, contributing to the development of businesses and creating conditions for making smart communities attractive to the population.

In standards terms, there are some over-arching requirements, concerning standards for the way cities are managed, for common terminologies, for citizens' interface with their local authority, etc. But mainly, smart city standards topics relate to the need to ensure commonalities —as far as these are appropriate and cost-effective— between the approaches taken by the different application areas, to enable the city to derive the best horizontal advantage from its overall approach and above all benefit from interoperability. The standards requirements as such for these application areas are specified in the Rolling Plan elsewhere at the appropriate points.

At the level of smart cities, the need for interoperability is stronger than at the level of buildings and it requires interaction between technologies, public authorities and the built environment. This is especially true when it comes to public services. Open data is inextricably linked with standardised open data.

From a physical point of view, we can think of the urban environment as a hierarchical system in which, for example, buildings are grouped in neighbourhoods, neighbourhoods in cities, cities in regions, and so on. Urban areas are therefore inherently complex systems, the subsystems of which work together to create the whole.

The core components in such a complex system are the frameworks that assist companies, cities and other actors to provide appropriate solutions that prioritise economic, social and environmental outcomes. Solutions should address the whole lifecycle, optimising environmental, social and economic outcomes through the seamless transfer of information, the availability of energy management appliances (sensors, switches) designed as 'plug and play' devices and compatibility with home automation networks.

LEGISLATION AND POLICY DOCUMENTS

AT EUROPEAN LEVEL

- Strategic Implementation Plan, http://ec.europa.eu/eip/smartcities/files/sip_final_en.pdf
- COM(2012) 4701: Smart Cities and Communities — European Innovation Partnership

OTHERS

IITU and UNECE "United for smart sustainable cities" (U4SSC) initiative to advocate for public policy to emphasize the importance of ICT in enabling the transition to smart sustainable cities.

Spanish national plan on smart cities, with a governance model including an innovative advisory board on smart cities http://www.agendadigital.gob.es/planes-actuaciones/Paginas/plan-nacional-ciudades-inteligentes.aspx

PROPOSED NEW ACTIONS ON STANDARDISATION

STANDARDS DEVELOPMENT

ACTION 1 Multidisciplinary standardised approach for home automation networks (HAN). This should cover all aspects of the problem, from application semantics to radio technologies. Applications such as lighting and energy control, appliances control, power monitoring and buildings energy management are part of the HAN and have significant impact on energy efficiency. http://ec.europa.eu/digital-agenda/en/smart-cities.

ACTION 2 Provision of elements for a global solution on smart appliances and home energy control, such as suitable radio protocols for indoor coverage.

OTHER ACTIVITIES AROUND STANDARDISATION

ACTION 3 CEN-CENELEC-ETSI smart cities and communities coordination group (SSCC-CG), working on five main objectives:

- promoting an enabling framework for smart cities
- growing partnerships with key stakeholders;
- developing a reference point for the coordination of consistent smart city standardisation by ESOs
- communicating and promoting standards on smart cities
- assessing smart citizen-related standards

The initial phase of the SSCC-CG work had been completed towards end 2016, and an overview white paper from January 2015 is available[58].

It is proposed that he SSCC-CG activities will be taken over by the CEN-CENELEC-ETSI Sector Forum on Smart and Sustainable Cities and Communities (SFSSCC)

ACTION 4 The H2020 coordination and support action on ICT/Energy vocabularies and ontologies (Ready4SmartCities): CNECT Objective ICT-2013.6.4 will contribute to the standardisation organisations.

ACTION 5 The H2020 coordination and support action on smart cities and communities standards (Espresso): CNECT Objective SCC-03-2015 will contribute to standardisation activities, with the objective of building consensus that would lead to the development of the standards needed in this area.

ACTION 6 Smart city standardisation initiative (European innovation partnership (EIC) on smart cities and communities (SCC) memorandum of understanding (MoU) on urban platforms, EIP demand-side group on urban platforms, open & agile smart cities (OASC)): A concrete proposal is the OneM2M (global partnership project, with the participation of ETSI and other regional SDOs) standardisation process on smart city interoperability. It includes open APIs providing a lightweight and simple means to gather, publish, query and subscribe to reliable real-time urban context information, an interoperability framework/platform for the publication, management, discovery and consumption of urban data, and common data models/ontologies. This action will ensure the necessary standards specifications needed for a global market of open urban service platforms and applications, integrating other standards and complementing protocols and communication standards on lower levels. The work will cooperate with similar initiatives such as the EIP on SCC MoU on urban platforms; it will use the EU funded project Espresso, get high-level requirements from city-led initiatives such as the EIP SCC demand-side group on urban platforms and the global OASC initiative; and it will use these latter two city-led groups as control, advisory, promotion and scale mechanisms.

ACTION 7 An ETSI technical report is needed to clarify whether further standardisation is needed on citizen issues related to smart cities (e.g. on what, where, when etc.), and to take full account is taken of other standards activities under way. The TR would also support the other recommendations at policy level. The EIP SSC recommends to fully respect consumer privacy (EIP on SCC operational implementation plan, page 6) in support of the strategic smart city goals. The Commission and SETIS consider it essential for innovation to build trust, especially concerning energy data security and privacy (SET plan, December 2014, page 7.)

ACTION 8 Standards for the delivery of parcels and packages. SDOs to investigate on the possible optimisation of available ICT standards regarding the delivery of parcels and packages on the last mile. Due to the dramatically increasing e-commerce European cities are overwhelmed with parcel delivery trucks. The number of packages arriving at peoples' homes has increased exponentially over the last couple of years.

ACTION 9 Privacy issues: SDOs to check existing standards for account to the protection of individuals with regard to personal data processing and the free movement of such data. To ensure commitment to the public-interest nature of privacy and data protection, the ESOs should develop specific privacy by design compliant standards.

STANDARDISATION NEEDS, ONGOING ACTIVITIES AND PROGRESS REPORT

COMMISSION PERSPECTIVE AND PROGRESS REPORT

The European Commission has created the SCC EIP which as established a smart cities stakeholder platform, with ESO participation, and a high-level group advising the Commission. The high-level group released in early 2014 a strategic implementation plan (SIP) setting out a joint vision, a common target and proposals for implementation, which contain standardisation aspects.

58 ftp://ftp.cencenelec.eu/EN/EuropeanStandardisation/Fields/SmartLiving/City/SSCC-CG_Short_Version_Report_Jan_2015.pdf

ONGOING STANDARDS DEVELOPMENT

STANDARDS DEVELOPMENT

CEN, CENELEC, ETSI

The SSCC-CG has published a report at http://www.cencenelec.eu/standards/Sectors/SmartLiving/smartcities/Pages/SSCC-CG.aspx and is now following up the recommendations, through a series of five specific activities. It proposes to lead in relation to the EIP action cluster on standards. It is proposed that he SSCC-CG activities will be taken over by the new CEN-CENELEC-ETSI Sector Forum on Smart and Sustainable Cities and Communities (SFSSCC)

Coordination efforts by the SDOs, shown at the World Smart City Forum (July 2016 Singapore). Agreed event to take place again in 2017 http://www.worldsmartcity.org/programme/

ETSI

ETSI has created a new Industry Specification Group on cross-sector Context Information Management (ISG CIM) for smart cities applications and beyond.

ISO, IEC

ISO Technical Committee 268 "'Sustainable development in communities" is directly working on smart city-relevant issues, including terminology, management systems and indicators.

ISO-IEC/JTC1 WG11 "Smart cities"

IEC Systems Committee (SyC) on Electrotechnical Aspects of Smart Cities has been created to foster the development of standards in the field of electrotechnology to help with the integration, interoperability and effectiveness of city systems (http://www.iec.ch/dyn/www/f?p=103:186:0::::FSP_ORG_ID:13073).

IEEE

There are a number of available standards and active standards projects related to Smart Cities through its Smart Grids, IoT, eHealth, and other related topics. These standards and projects cover a broad spectrum of fields, including but not limited to digital information and controls technology, reliability, interconnection of distributed resources including renewable energy sources to the grid, sensors, electric metering, broadband over power line, and systems engineering.
http://standards.ieee.org/develop/msp/smartcities.pdf.

ITU-T

ITU-T FG-SSC developed 21 Technical Specifications and reports including a Technical Report on "Intelligent sustainable buildings for smart sustainable cities" and Technical Specifications on Setting the framework for an ICT architecture of a smart sustainable city". New ITU-T Study Group 20, which superseded FG-SSC, aims to guide cities in upgrading their traditional infrastructures and reimagining processes and models by integrating new digital technologies.

ITU-T SG20 has approved three Recommendations- ITU-T L.Y.4900: Overview of key performance indicators in smart sustainable cities, ITU-T Y.4901: Key performance indicators related to the use of information and communication technology in smart sustainable cities and ITU-T Y.4902: Key performance indicators related to the sustainability impacts of information and communication technology in smart sustainable cities. http://itu.int/go/tsg20

ITU-T SG20 has determined new Recommendation ITU-T Y.4454 "Platform interoperability for smart cities"

ITU-T Study Group 5 approved (2015/10)ITU-T L.1440, a methodology to assess the environmental impact of ICT in cities, together with many stakeholders including the European Commission

OASIS

Transformational Government Framework (TGF) Description: Models and practices for using IT to improve delivery of public services. https://www.oasis-open.org/committees/tgf, https://www.oasis-open.org/news/pr/new-british-smart-cities-specification-uses-oasis-transformational-government-framework

AENOR

Over 20 Spanish standards at AENOR's CTN 178 on e.g. platforms interoperability, open data in smart cities, smart ports, rural communities and smart tourist destinations, basis for ITU-T SG20 recommendations on these topics
http://www.aenor.es/descargasweb/normas/aenor-Spanish-standardisation-on-Smart-Cities-CTN-178.pdf

BSI

BSI's PAS 181:2014 Description: British Smart City Framework. A good practices framework for city leaders to develop, agree and deliver smart city strategies. Uses OASIS TGF (below).
http://www.bsigroup.com/en-GB/smart-cities/Smart-Cities-Standards-and-Publication/PAS-181-smart-cities-framework/

BSI, FUTURE CITIES

Cities Standards Institute (CSI) is a joint activity to develop a strong network of cities, companies and SMEs to develop the next stage of the BSI's Smart City Catapult Framework

DIN/DKE/VDE

The German Standardisation Roadmap Smart City
http://www.vde.com/en/dke/std/documents/nr_smart%20city_en_version%201.0.pdf

OTHERS (INCLUDING STAKEHOLDER GROUPS, TECHNOLOGY PLATFORMS, AND RESEARCH PROJECTS

SEMANCO

For the first time developing a semantic energy information framework (SEIF) to model the energy-related knowledge planners and decision makers need

EESEMANTICS

Stakeholder group on energy efficient buildings data models. Building on the standards promoted by building smart alliance.

ADAPT4EE/ READY4SMARTCITIES

Activity related to eeSemantics: group is running a series of vocabulary camps addressing specific sub-areas.

HORIZON 2020 CALL SCC-03-2015 ESPRESSO

Development of system standards for smart cities and communities solutions.

The process for developing smart cities and communities standards should ensure the interoperability of solutions, i.e. the adaptability of solutions to new user requirements and technological change and the avoidance of entry barriers or vendor lock-in through promoting common metadata structures and interoperable/

open interfaces as opposed to proprietary ones, together with open and consistent data. It should making relevant data as widely available as possible —including to third parties for the purpose of applications development— while using common, transparent measurement and data collection standards to ensure meaningfulness and comparability of performance/outcome measurements.

INDUSTRY MEMORANDUM OF UNDERSTANDING ON URBAN PLATFORMS

Over 40 organisations from industry and research have signed a Memorandum of Understanding on interoperable urban platforms. The group is led by SAP and has already given detailed feedback on the requirements document from cities (demand-side group of the EIP SCC urban platform cluster) and is currently producing related technical specifications. They are working to develop a set of principles and a joint reference architecture framework to enable interoperability, scalability and open interfaces to integrate different solutions and to develop a joint data and service ontology to be used by individual Smart cities. And finally they are working to accelerate the adoption of the developed framework by standardisation bodies and other stakeholders.
https://ec.europa.eu/digital-single-market/en/news/memorandum-understanding-towards-open-urban-platforms-smart-cities-and-communities

DEMAND-SIDE GROUP (CITY-LED) ON URBAN PLATFORMS (WITHIN THE EUROPEAN INNOVATION PARTNERSHIP ON SMART CITIES AND COMMUNITIES)

A total of 95 cities — individual cities and two city networks — have already agreed to cooperate more strongly in the area of urban platform by signing a Letter of Intent. The group is working within the urban platforms cluster of the EIP on SCC. This group is led by London and has already produced a requirements document for smart city interoperability (urban platform), which is currently being tested. The requirements document is being used by the industry group of the MoU on urban platforms with EIP SCC to create a reference architecture framework and standards landscape. The members of the group are committed to implement commonly agreed open standard urban platforms and foster the deployment of smart city solutions.
https://eu-smartcities.eu/content/urban-platforms

OPEN & AGILE SMART CITIES (OASC)

City-led initiative to create a smart city market which addresses the complex needs of cities in the digital transition, especially interoperability, portability and comparability, in order to avoid vendor lock-in and to support local digital entrepreneurship. OASC consists of three technical mechanisms which are open and free. Launched in March 2015, a current total of 75 cities in 15 countries, mainly in Europe, have already committed on adopting the OASC principles, The OASC mechanisms are directly linked to the existing standardisation processes on national, European and international level, including the SSCC-CG.
www.oascities.org

FUTURE INTERNET PUBLIC PRIVATE PARTNERSHIP

Specifications and technologies developed under the Future Internet Public Private Partnership programme (FP7) that can be used within the context of smart cities:

FIWARE NGSI is an API that provides a lightweight and simple means to gather, publish, query and subscribe to context information. This is an API for context information management. This information can be indeed open data and consumed through the queries and subscriptions APIs (NGSI10). This way, it is possible to publish real-time or dynamic data, typically well structured, and offer it as open data for the reuse by developers. For instance, it is possible to offer in real-time data from sensors or systems to leverage the creation of new applications.

FIWARE CKAN: Open data publication generic enabler. FIWARE CKAN is an open source solution for the publication, management and consumption of open data, usually, but not only, through static datasets. FIWARE CKAN allows to catalogue, upload and manage open datasets and data sources, while supports searching, browsing, visualising or accessing open data. FIWARE CKAN is an Open Data publication platform that is used by many cities, public authorities and organisations.
www.fiware.org/

EUROCITIES AND GREEN DIGITAL CHARTER (GDC)

A strategic, city-led initiative aiming to improve cities and citizens' quality of life through the use of open and inclusive digital solutions. GDC is a EUROCITIES initiative launched in 2009 and signed by 50 major European cities at the highest level stakeholders like CEN/CENELEC and OASC. Apart from GDC, EUROCITIES works with its member cities for "Data" and "Standards & Interoperability" through the two respective working groups of its Knowledge Society Forum.

MSP MEMBERS' AND STAKEHOLDERS'S REMARKS

There are already many activities going on around smart cities in various standards development organisations around the globe. Industry, therefore, welcomes that the Commission does not see a need to trigger further standards development at this point in time but relies on the industry initiatives which have started in organisations around the globe.

Broad coordination, including stakeholders, Member States, and the Commission, is important for making consistent progress in this area which covers a large field of sub-domains.

The Spanish Secretary of State has identified the need to establish certain requirements for city platforms to allow interoperability. This is an opportunity for specific European standardisation work which could be developed by CEN-CENELEC and ETSI.

ICT ENVIRONMENTAL IMPACT

POLICY OBJECTIVES

ICT is currently one of the fastest growing greenhouse gas-emitting and energy management sectors.

At the level of ICT multiple methodologies are available to assess the environmental impact of ICT itself but they do not provide a consistent methodological framework for this assessment. A solution to this is the work developed in various European and International standardisation bodies such as ETSI, ITU-T, IEC, ISO and others, around methodologies to assess this environmental impact, currently focused on energy management including energy consumption and greenhouse gas (GHG) emissions, with the achievement of good consensus. This work is performed in collaboration with industry, standardisations bodies and public authorities. The criteria for measuring the impact of ICT on the environment will be extended to other environmental sectors, like water and raw materials.

A key challenge is achieving transparency around claims relating to the environmental performance of ICT products and services, and setting an effective basis to drive competition.

The Commission is looking at the environmental impact of ICT from various fronts:

- To analyse further the current situation of the ICT-sector and to consider possible options for future action, the Commission, DG CNECT, commissioned a study on the practical application of the new framework methodology for measuring the environmental impact of ICT (including a cost/benefit analysis for companies) and has organised, among other things, a workshop on policy measures, metrics, and methodologies in the context of environmentally-sound data centres.
- Full report: http://bookshop.europa.eu/en/study-on-the-practical-application-of-the-new-framework-methodology-for-measuring-the-environmental-impact-of-ict-cost-benefit-analysis-pbKK0114640/
- Executive summary: http://bookshop.europa.eu/en/study-on-the-practical-application-of-the-new-framework-methodology-for-measuring-the-environmental-impact-of-ict-cost-benefit-analysis-pbKK0114642/ https://ec.europa.eu/digital-agenda/news-redirect/17261
- With CNECT playing the chief editor role under ITU-T the "ICT in Cities methodology to assess the environmental impact of ICT at city level is now finished (http://www.itu.int/rec/T-REC-L.1440-201510-P)
- With a life cycle approach (or cradle to grave), it provides:
    - 1. a basis to help cities take the right decisions as regards their ICT infrastructure and the relevant energy costs/environmental effects;
    - 2. a level playing field for industry to compete and innovate in providing the most sustainable solutions to cities.
- DG ENV launched an ongoing pilot on product environmental footprint on category rules. It is looking at various ICT products such as IT equipment, uninterruptible power sources (UPS) and batteries.
- DG GROW is looking at an ecodesign measure for enterprise servers that are found among others in data centers at potential ecodesign measures for enterprise servers and data storage devices, products that can be normally found in data centres or in server rooms. The definition of global key performance indicators (KPIs) is essential to this objective.

LEGISLATION AND POLICY DOCUMENTS

AT EUROPEAN LEVEL

- **COM(2010) 245**: A Digital Agenda for Europe, Key Action 12:
    - Assess whether the ICT sector has developed common measurement methodologies
    - Propose legal measures if appropriate
- **Directives 2005/32/EC and 2009/125/E**C on ecodesign of products
- **Regulation 2013/105/EC:** Mobilising Information and Communications Technologies to facilitate the transition to an energy-efficient, low-carbon economy
- **Directive 2012/27/EU** on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC
- **Directive 2010/31/EU** of the European Parliament and of the Council on Energy Performance of Buildings
- **Directives 1992/75/EC and 2010/30/E**U on Labelling and Information
- **Regulation (EU) No. 347/2013** on guide-

lines for trans-European energy infrastructure

- **COM(2009) 7604** Recommendation (9.10.2009) on mobilising Information and Communication Technologies to facilitate the transition to an energy-efficient, low-carbon economy
- **COM(2009) 519 final:** Investing in the Development of Low Carbon Technologies (SET Plan)
- **COM(2008) 30 final:** 20 20 by 2020, Europe's climate change opportunity
- **COM(2008) 241:** Addressing the challenge of energy efficiency through Information and Communication Technologies
- **Directive 2003/96/EC** of the Council on Energy Taxation

PROPOSED NEW ACTIONS ON STANDARDISATION

STANDARDS DEVELOPMENT

ACTION 1 Guidelines for the environmental footprinting of ICT networks, products or services.

ACTION 2 Guidelines for organisations' ICT footprint reporting.

OTHER ACTIVITIES AROUND STANDARDISATION

ACTION 3 Definition of Global KPIs for Energy Management of Fixed and Mobile access, and Core networks

ACTION 4 Guidelines for the use of Global KPIs for Data Centres.

ACTION 5 Guidelines for the definition of Green Data Centres.

ACTION 6 Definition of Global KPIs for Data Services.

ACTION 7 Guidelines for the definition of Green Data Services.

ACTION 8 Definition and guidelines of KPIs for ICT networks

ACTION 9 Ontologies and vocabularies to foster interoperability of Energy Systems / white goods / brown goods / inside the buildings.

STANDARDISATION NEEDS, ONGOING ACTIVITIES AND PROGRESS REPORT

ONGOING STANDARDS DEVELOPMENT

EFFICIENT ENERGY USE

ESOS

Standardisation request M/462 on efficient energy use within broadband deployment was accepted by the ESOs to provide standards for measurement and monitoring, including definition of energy-efficient KPIs. This standardisation request is not only limited to networks but extends as well to data centres and other ICT nodes associated with broadband deployment. It is entering phase 2.

Energy and more general resource management in data centres is addressed by a cross-ESO coordination group (Coordination Group Green Data Centres – CG-GDC). This group monitors European and international standardisation for data centre resource management (including energy) and maintains a live executive summary of that activity.

ftp://ftp.cencenelec.eu/EN/EuropeanStandardisation/HotTopics/ICT/GreenDataCentres/GDC_report_summary.pdf

CG-GDC encourages standardisation activity to support Commission objectives and has recently asked the CENELEC to undertake the conversion of DG JRC best practices into a standards-based format. This represents a more general, and frequently updated, formulation of L.1300 mentioned below. In addition, CENELEC TC 215 is transcribing resource management KPI standards produced by ISO/IEC into European format.

CENELEC

TC 215 is responsible for a holistic series of ENs for the design, operation and energy efficiency of data centres (including KPIs) from a system point of view. Its technical committees are responsible for energy efficient products deployed in data centres.

ITU AND ETSI

Starting at the level of `good, networks and services´, they have approved methodologies for environmental impact assessment. These will make it possible to assess in a transparent, qualitative, accurate and consistent way the footprint and other aspects of various products and services that are part of everyday digital life, such as email, telephone services, laptops, broadband access. In addition, companies, public bodies and other organisations will be able to assess and report their own ICT footprint based on ITU's "ICT in Organisation".

ITU and ETSI have also agreed a new standard to measure the energy efficiency of mobile radio access networks (RANs), the wireless networks that connect end-user equipment to the core network.

The standard (Recommendation ITU-T L.1330) is the first to define energy-efficiency metrics and measurement methods for live RANs, providing a common reference to evaluate their performance. Its application will build uniformity in the methodologies employed by such evaluations, in parallel establishing a common basis for the interpretation of the results

ITU

"L.Cities methodology" (Recommendation ITU-T L.1440): in which the footprint of ICT in cities and the city dimension of ICT projects and services are being considered. The Commission through CNECT H5 acted as chief editor.

ITU-T SG 5 has developed a series of standards aimed at reducing greenhouse gas emissions and energy consumption, including:

- ITU-T L.1300: Best practices for green data centres;
- L.1310: Energy efficiency metrics and measurement methods for telecommunication equipment;
- ITU-T L.1320: Energy efficiency metrics and measurement for power and cooling equipment for telecommunications and data centres;
- L.1340: Informative values on the energy efficiency of telecommunication equipment;
- L.1350: Energy efficiency metrics of base station site (consented);
- L.1430 : Methodology for assessment of the environmental impact of information and communication technology greenhouse gas and energy projects;
- L.1500: Framework for ICT and adaptation to the effects of climate change;
- ITU-T L.1501: Best practices on how countries can utilize ICTs to adapt to the effects of climate change:
- L.1502: Adapting ICT infrastructure to the effects of climate change;
- L.1503: ICT for climate change adaptation in cities

IEC

IEC TC 100/TA 13 deals with environmental aspects of audiovisual and multimedia equipment (in particular with the quantification methodology for greenhouse gas emissions of computers and monitors). http://www.iec.ch/dyn/www/f?p=103:7:0::::FSP_ORG_ID,FSP_LANG_ID:7810,25

ISO/IEC JTC 1

ISO / IEC JTC 1 SC 39 (Sustainability for and by Information Technology) working group 2 prepares guidance for the development of energy efficient ICT (excluding data centres). http://www.iso.org/iso/standards_development/technical_committees/list_of_iso_technical_committees/iso_technical_committee.htm?commid=654019

IEEE

IEEE has standardisation activities that contribute to assessing and reducing the environmental impact of ICT such as the electronic product environmental assessment and energy efficient Ethernet. http://standards.ieee.org/develop/msp/envr.pdf.

ENERGY SAVING MEASURES

CENELEC

Other ongoing work includes EN50523:2009 Household appliances interworking

ISO

Energy model terminology is specified in

- ISO/IEC CD 13273 (Energy efficiency and renewable energy sources)
- ISO/DTR 16344 (Common terms, definitions and symbols for the overall energy performance rating and certification of buildings)
- ISO/CD 16346 (Assessment of overall energy performance of buildings)
- ISO/DIS 12655 (Presentation of real energy use of buildings)
- ISO/CD 16343 (Methods for expressing energy performance and for energy certification of buildings)
- ISO 50001:2011 (Energy management systems — Requirements with guidance for use).
- ISO/TC 257 General technical rules for determination of energy savings in renovation projects, industrial enterprises and regions` is currently working on a standard on "energy efficiency and savings calculation for countries, regions and cities" (ISO/CD 17742)

ITU-T

Report "Intelligent sustainable buildings for smart sustainable cities", which provides technical guidance on environmentally-conscious design, maintenance, repair and operating principles and best practices from construction through to lifetime use and decommissioning http://www.itu.int/en/ITU-T/focusgroups/ssc/Documents/website/web-fg-ssc-0136-r6-smart-buildings.docx and other reports from the FG-SSC:http://www.itu.int/en/ITU-T/focusgroups/ssc/Pages/default.aspx

DATA CENTERS

CEN/CENELEC/ETSI

Coordination Group Green Data Centres

CENELEC

TC215 WG3, and a number of other TCs dealing with specific appliances

ETSI

TC ATTM and former STF 439 working on the definition of Global KPIs for Energy Management of Data Centres

ETSI

ETSI's industrial specification group (ISG) operational energy efficiency for users (OEU) gathers ICT users from the whole industry (all sectors, e.g. aircraft factories, banks, insurances, energy providers) and issues position papers and referential specifications on global KPIs and implementation sustainable standardisation. These position papers are issued to support the development of needed standards by standardisation technical committees.

ISO / IEC JTC 1

ISO / IEC JTC 1 SC 39 (Sustainability for and by Information Technology) working group 1 deals with resource-efficient data centres, including the following tasks:

- Development of a data centre resource efficiency taxonomy, vocabulary and maturity model
- Development of a holistic suite of metrics and key performance indicators (KPI) for data centres
- Development of guidance for resource efficient data centres
- Development of an energy management system standard specifically tailored for data centres

http://www.iso.org/iso/standards_development/technical committees/other_bodies/iso_technical_committee.htm?commid=654019

The ongoing standardisation activities by CEN/CENELEC/ETSI on data centres and other ICT nodes may be referenced in possible future legislation.

OTHERS ACTIVITIES AROUND STANDARDS

EUROPEAN COMMISSION

With the support of ICT companies, concluding the piloting of various methodologies for goods, networks, services & organisations. Elements such as compatibility and the workability of different standards have been assessed with a positive outcome regarding these two elements. The results can serve as an example, for ITU & ETSI in their common work to further align their methodologies for "goods, networks and services".

CLUSTER COLLABORATION FP7-SMARTCITIES-2013 OBJECTIVE ICT-2013.6.2. DATA CENTRES IN AN ENERGY-EFFICIENT AND ENVIRONMENTALLY FRIENDLY INTERNET

Define common KPIs and ratios (metrics) and methodology for measuring them, to characterize the energy & environmental & economic behaviour of data centres. Disseminate the results. Create a proper bidirectional communication channel between the Commission, the standardisation bodies and the cluster, in order to facilitate information sharing and to push a relevant shortlist of KPIs.

H2020 CITYKEYS

H2020 support action which coordinates projects in several cities piloting the L.Cities methodology (Recommendation ITU-T L.1440). Results of these pilots may provide feedback to improve the standard. http://www.citykeys-project.eu/

SEMANCO

For the first time developing a Semantic Energy Information Framework (SEIF) to model the energy-related knowledge planners and decision makers need

EESEMANTICS

Stakeholder group on Energy Efficient Buildings Data Models. Building on the standards promoted by Building Smart Alliance.

WORKING GROUP ON ENERGY CONSUMPTION

In the area of smart appliances (white goods, HVAC systems, lighting, etc.) a working group has been established bringing together energy consuming and producing products (EupP) manufacturers and stakeholders with the objective of creating a roadmap towards agreed solutions for interoperability. Focus is communication with smart appliances at information level in smart homes. Long term perspective is M2M solutions in the context of IoT

EUROPEAN COMMISSION (GROW)

The guidebook *"Stimulating industrial innovation in the construction sector through the smart use of ICT: connecting SMEs in digital value chains"* (2012)

- provides a market analysis of the construction industry in terms of the current and foresight integration of ICT and eBusiness solutions and systems;
- develops a framework for digital value networks in the construction sector.

https://ec.europa.eu/growth/sectors/digital-economy/ebsn_en

The impact will strongly depend on the uptake of these methodologies and associated regulation if defined. Once this point is clarified the progress could be measured in for instance number of companies reporting their footprint calculated using these methodologies.

EUROPEAN ELECTRONIC TOLL SERVICE (EETS)

POLICY OBJECTIVES

The European electronic toll service (EETS), as required by Directive 2004/52/EC, will achieve interoperability of the electronic road toll systems in the EU. EETS involves two main stakeholders:

- Toll chargers, which operate either on behalf of the Member State or in the framework of a concession contract with the Member State, manage the infrastructure or levy the tolls for the circulation of vehicles on the network they manage.
- EETS providers, supplying drivers or road hauliers with the necessary equipment and services to access all EU tolled infrastructures and ensuring the payment to the toll chargers of the fees due for use of their network.
- Directive 2004/52/EC provides that Member States having electronic road toll systems are to ensure that operators offer the EETS to heavy goods vehicles at the latest three years after the entry into force of the decision defining EETS and to all other categories of vehicle at the latest five years after.
- The Commission has launched an open public consultation on the EETS legislative acts, which closed in October 2016.

LEGISLATION AND POLICY DOCUMENTS

AT EUROPEAN LEVEL

- **Directive 2004/52/EC** of the European Parliament and of the Council on the interoperability of electronic road toll systems in the Community;
- **Commission Decision 2009/750/EC** on the definition of the EETS and its technical elements;
- **COM(2012)474:** Implementation of the EETS.
- **M/338**[59] Standardisation request to CEN, CENELEC and ETSI in support of interoperability of electronic road toll systems in the EU

PROPOSED NEW ACTIONS ON STANDARDISATION

STANDARDS DEVELOPMENT

ACTION 1 CEN and ISO to jointly revise the electronic fee collection (EFC) architecture standard, i.e. ISO 17573. [This action is currently under pre-evaluation in CEN and may be removed if the corresponding grant agreement is not completed.]

ACTION 2 ESOs to develop a specification for security profile(s) for EFC for use in the EETS

ACTION 3 ESOs to develop a key performance Indicator (KPI) specification for use in the EETS based on CEN/ISO/TS 17444-1/2.

STANDARDISATION SUPPORT ACTIVITIES

ACTION 4 Targeted technical standards support for EETS-related activities, e.g. notified bodies EETS Coordination Group participation, ITS-CG, liaison with the Electronic Toll Committee.

STANDARDISATION NEEDS, ONGOING ACTIVITIES AND PROGRESS REPORT

COMMISSION PERSPECTIVE AND PROGRESS REPORT

It is necessary to further develop standards allowing the effective assessment of key performance indicators, conformity to specifications, certification and suitability for use of EETS-related standards (by developing test standards).

ONGOING STANDARDS DEVELOPMENT

CEN
CEN/TC278 — standardisation of Intelligent Transport Systems in Europe. CEN/TC278/WG1 standardises EFC. An overview of EFC standards and links to the standardised data structures and test suites may be consulted under http://tc278.eu/index.php/efc#EFCstandards

59 http://ec.europa.eu/growth/tools-databases/mandates/index.cfm?fuseaction=search.detail&id=216

ETSI

ETSI TC ITS is the relevant committee in charge of EETS http://www.etsi.org/technologies-clusters/technologies/intelligent-transport

ISO

ISO/TC 204 covers standardisation of information, communication and control systems in the field of urban and rural surface transportation, including intermodal and multimodal aspects thereof, traveller information, traffic management, public transport, commercial transport, emergency services and commercial services in the intelligent transport systems (ITS) field. http://www.iso.org/iso/iso_technical_committee%3Fcommid%3D54706

Projects include:

ISO/CD 17573: Electronic fee collection — Systems architecture for vehicle-related tolling

ISO 12855:2015 (Ed. 2): Electronic fee collection — Information exchange between service provision and toll charging

MSP MEMBERS' AND STAKEHOLDERS' REMARKS

It is required to further develop standards to support assessment and monitoring of key performance indicators for EETS conformity assessment of implementations to standards, EETS suitability for use and product certification (through provision of test standards). It is also necessary to provide support for EFC standardisation activities in form of targeted technical standards as support for EETS-related activities.

INTELLIGENT TRANSPORT SYSTEMS (ITS)

POLICY OBJECTIVES

Intelligent transport systems apply ICT to the transport sector. ITS services and applications can create clear benefits in terms of transport efficiency, sustainability, accessibility, safety and security, whilst contributing to the EU's single market and competitiveness objectives.

LEGISLATION AND POLICY DOCUMENTS

AT EUROPEAN LEVEL

- **Directive 2010/40/EU** of the European Parliament and of the Council on the framework for the deployment of Intelligent Transport Systems in the field of road transport and for interfaces with other modes of transport
- **Commission Delegated Regulation (EU) No 305/2013** supplementing Directive 2010/40/EU of the European Parliament and of the Council with regard to the harmonised provision for an interoperable EU-wide eCall
- **Commission Delegated Regulation (EU) N° 885/2013** supplementing ITS Directive 2010/40/EU of the European Parliament and of the Council with regard to the provision of information services for safe and secure parking places for trucks and commercial vehicles
- **Commission Delegated Regulation (EU) No 886/2013** supplementing Directive 2010/40/EU of the European Parliament and of the Council with regard to data and procedures for the provision, where possible, of road safety-related minimum universal traffic information free of charge to users
- **Commission Delegated Regulation (EU) No 962/2015** supplementing Directive 2010/40/EU of the European Parliament and of the Council with regard to the provision of EU-wide real-time traffic information services
- **Commission Decision 2008/8455/EC** final on the conclusion of an Implementing Arrangement between the European Commission and the Department of Transportation of the United States of America in the field of research on Intelligent Transport Systems and Information and Communication Technologies applications to road transport

- **COM(2008)886 final:** Commission Communication *Action Plan for the deployment of intelligent transport systems in Europe*
- **Commission Decision 2008/671/EC** on the harmonised use of radio spectrum in the 5875-5905 MHz frequency band for safety-related applications of Intelligent Transport Systems (ITS)
- **Recommendation C/2006/7125:** Safe and efficient in-vehicle information and communication systems: update of the European statement of principles on human machine interface (EsoP).

OTHERS

Extract from 'ICT Strategy of the German Federal Government: Digital Germany 2015'[60]. Measure listed on page 35 '*Implementation of Directive 2010/40/EU of the European Parliament and of the Council of 7 July 2010 on the framework for the deployment of Intelligent Transport Systems in the field of road transport and for interfaces with other modes of transport'.*

Extract from 'ICT for Everyone — A Digital Agenda for Sweden' (TFRP037_SV_ICT_for_Everyone-ADigitalAgendaForSweden.pdf). '*The Government established a Council for Intelligent Transport Systems (ITS Council) in June 2010. The aim is to make better use of the opportunities to use information and communication technology in the transport system to attain transport and business policy objectives. The Council is to develop forms of cooperation between authorities and the business community, provide advice to and speed up the work of the Swedish Transport Administration and other parties on implementing the action plan for intelligent transport systems and promote greater Swedish action in the EU. A final report is due to be presented by 31 December 2012*'.

Pursuant to Directive 2010/40/EU, Member States have submitted to the Commission information on their national activities and projects on national ITS actions. In addition, several Member States gave their agreement to the publication of their initial contributions: http://ec.europa.eu/transport/themes/its/road/action_plan/its_national_reports_en.htm

60 http://www.bmwi.de/English/Redaktion/Pdf/ict-strategy-digital-germany-2015,property=pdf,bereich=bmwi2012,sprache=en,rwb=true.pdf

PROPOSED NEW ACTIONS ON STANDARDISATION

STANDARDS DEVELOPMENT

CO-OPERATIVE SYSTEMS.

Co-operative systems for Intelligent Transport in the field of information and communication technologies to support interoperability of co-operative systems for intelligent transport in the European Community (C-ITS): Mandate M/453

ACTION 1 To complete the minimum set of standards required to deploy C-ITS systems and applications, completing the activities foreseen in the M/453, and achieving the Release 2 for C-ITS (including V2V, V2I/I2V and I2I communications).

ACTION 2 Plugtest activities for conformity and interoperability testing, including guidelines with methods for assessing the conformity of the identified minimum set of standards.

ACTION 3 Taking into account the C-ITS architecture, ICT related standards for applications to support vulnerable road users (VRU, e.g. projects like VRUITS www.vruits.eu). In particular, SDOs should agree on common requirements and relevant communication standards should be identified by ETSI TC ITS.

ACTION 4 SDOs to develop a standard to allow flawless spectrum sharing between RLAN (Wi-Fi) and C-ITS systems at the 5.9 GHz bands and also between C-ITS and LTE, based on current developed spectrum sharing report by CEPT working group FM and SE24 (ETSI ERM). Enabling Spectrum sharing with RLAN (Wi-Fi) and LTE without interference of the Cooperative functionalities in the 5.8 and 5.9 GHz bands

OPEN IN-VEHICLE PLATFORM ARCHITECTURE

Working group 6 ("Access to in-vehicle data and resources") of the C-ITS Platform has identified 3 possible technical solutions (on-board application platform, in-vehicle interface, data server platform) for accessing in-vehicle data. The following related standardisation needs have been identified:

ACTION 5 SDOs to develop the missing standards for an advanced physical/electrical/logical interface (e.g. evolution of OBD2), including the necessary minimum level of security (i.e. integrity, authentication and availability) and the minimum data sets and standardised data protocols which enable ITS services.

ELECTRIC VEHICLES (EVS):

ACTION 6 Taking into account the C-ITS architecture, vehicle-to-grid (V2G) communication protocols, message datasets, interfaces, and back-office platforms.

ACTION 7 Regarding in-vehicle systems, integration of EVs communication with car architectures; sub-system partitioning and their interfaces; X-by-wire controls; testing and management of energy storage systems with on-board battery management system, metering and certification.

Location precision: It is essential to most safety applications to realize a high precision location reference beyond current global navigation satellite systems enabling more effective and advanced safety applications. To achieve this, all functional and technical methods need to be used (e.g. crowd sourcing, high precision objects and radio communications).

ACTION 8 SDOs to standardise of data and communication aspects to ensure interoperable implementation and data sharing system for increased location accuracy (ETSI TC ITS but also ESOs and other standard setting organisations).

DIGITAL MAPS:

ACTION 9 SDOs to develop standards / specifications to steer and manage the exchange of accurate (public) road data in navigation-oriented maps, and of the timely integration of such updates inITS digital maps for navigation and more advanced in-vehicle applications, including cooperative ITS and automated driving, and for non-vehicle ITS applications, and addressing a possible alignment with the technical framework for infrastructure for spatial information in the European community (Inspire).

DIGITAL LOCAL DYNAMIC MAPS (SPECIFICALLY FOR THE SAFETY RELATED APPLICATIONS SUCH AS C-ACC AND VRU)

ACTION 10 SDOs to extend the local dynamic map standards to integrate mechanisms supporting the use of high precision positioning and related objects. This may require additional specific object definition standardisation.

INTEROPERABLE FARE MANAGEMENT (IFM) SYSTEMS

ACTION 11 SDOs to develop standards supporting the emerging IFM, taking into account the findings from the smart ticketing alliance. This should, include the development of

- technical specifications and test procedures for the quality assurance of the interoperable fare medium
- technical specifications and standards for profiles of information exchange between the operational entities in IFM
- a technical report for a security architecture framework.

TRAFFIC CENTRE AND I2I COMMUNICATION

ACTION 12 Further development of the DATEX II standard taking into account input from road operators. The Commission published on 4 June 2015 a call for proposals for a Programme Support Action (PSA) for Intelligent Transport Services for Road (ITS) in the framework of the connecting Europe facility (CEF). In particular the focus of this call for proposals is on the maintenance and further development of DATEX II for the provision of interoperable intelligent transport systems and services for road transport.

URBAN ITS

Standardisation request on urban ITS M/546 (Commission Implementing Decision of 12/2/2016)

ACTION 13 ESOs to develop standard s in support of the implementation of Article 8 of the ITS Directive for multi-modal information, traffic management and urban logistics in the urban ITS domain. The objective is to better connect existing networks, foster strong cooperation and creation of interoperable urban-inter-urban interfaces and foster more extensive use of all transport modes. Urban stakeholders should actively participate in this regard. There will be a need to address the full range of user needs, the ranges of environments and the different types of vehicles, modes of transport or mobility services, the diversity of cities, while ensuring the implementation remains simple. The standards should account for the following aspects as far as possible:

- legacy systems and existing protocols, costeffective management paths, business models and guidelines for procurers
- special needs of consumers, businesses and operators, including SMEs
- executable and freely available guidance, code lists, datasets, tools and processes to facilitate operational implementation and conformance tests
- data availability, access, quality, reliability and accuracy

The requested European standards and European standard deliverables should reuse, harmonise or interface as far as possible with existing standards, specifications (incl. priority actions A and B within the ITS Directive) and projects (CIVITAS, POSSE and smart cities projects etc.). In the domain of public transport, and particularly with respect to multimodal information and smart ticketing, the need for consistency will affect a broad set of standards and technical specifications, namely:

- Transmodel, the European Reference Data Model for Public Transport, CENTC278 ENV12896;
- IFOPT, (CEN/TS 00278207) a CEN Technical Standard defining a data model for the Identification of Fixed Objects in Public Transport (e.g. stop points, stop areas, stations, connection links, entrances, etc.);
- SIRI, (CEN/TS 002781811 to 5), a European CEN technical standard defining Service Interface for RealTime Information relating to public transport operations;
- NeTEx, a prCEN/ Technical Standard currently in development. It is based on Transmodel, extended with additional concepts from IFOPT and SIRI. NeTEX is divided into three parts: Part 1 Transport Network and Part 2 — Schedules Part 3 — Fares and data for AVL
- Standards supporting the emerging interoperable fare management (IFM) systems: Public Transport interoperability (IOPTA) standard ISO EN 15320 defining the functional system architecture and the application scenarios; the EN 1545 standard describing the data elements and the ISO EN 240141 standard, defining functional system architecture and the application scenarios.

LAND TRANSPORT:

ACTION 14 In order to implement new legislation on Digital Tachographs and on Weights and Dimensions, ESOs should develop an additional standard on dedicated short-range communications (DSRC) is needed to allow the transmission of data from a moving vehicle to an enforcement police officer on the roadside, through the DSRC interface.

ACTION 15 Another issue is related to on board weighing systems for trucks, where different providers may equip the tractor and the trailers that it will tow. ESOs should develop an interface standard between the different suppliers to ensure that the on board weighing computer in the tractor will be able to receive the weights per axle of any trailer, store them, and then calculate the total weight of the vehicle. This standard could be based on ISO 11992.

OTHER ACTIVITIES AROUND STANDARDISATION

CO-OPERATIVE SYSTEMS

ACTION 16 To ensure commitment to the public-interest nature of privacy and data protection, the SDOs should account for EU-wide data privacy policies to set legal requirements for cooperative ITS systems and applications in general. To define a uniform pan-European usable trust policy and processes to support multi-stakeholder business cases, including revocation of trust. Following conclusions made by the ITS platform working group on security, SDOs should take into account crypto-agility in a safe way that permits the introduction of new algorithms in a backward compatible manner. Work on revocation should also be started, including lower-level requirements like the format of the CRL and the transmission details. Standards for protocols and profiles for enrolment credential requests or authorisation ticket requests are also a priority. The working group also defined other needs, including privacy aware message handling and certificates.

ACTION 17 Gap analysis on standards and technology complementarity for connectivity for vehicles. This gap analysis should address the relative compatibility of the different technologies that are foreseen to be used to connect vehicles in the C-ITS framework (i.e., IEEE 802.11p ITS G5, 3GPP LTE, LTE-V2X in sidelink and cellular mode, C-V2X in 5G framework). It should include the point of view of each actor in the value chain, mainly vehicle manufacturers, road infrastructure managers and public transport authorities, and telecom network operators. The goal is to further qualify, from a technical viewpoint, the notion of hybrid systems outlined in the C-ITS master plan. The technological compatibility and complementarity of the different standards should be elaborated against the planned set of road transport services duly complemented by ICT services i.e. as a function of the various anticipated service requirements. A reference framework could be the five categories of services issued by the CAR2CAR consortium.

DATA

ACTION 18 European standardisation deliverables on reference data models, common data dictionaries and metadata structure across the three domains and specific European standards:

- Multimodal information services: new mobility services, alternative fuels infrastructure;
- Traffic management: static/dynamic road data, traffic and traffic control data, weather data and traffic prioritisation and access regulations;
- Urban logistics: intelligent parking for light vehicles/commercial vehicles/trucks and loading bays information and reservation services for special freight vehicles and logistic sectors.

Open in-vehicle platform architecture: the development, operation and user acceptance of vehicle-based intelligent transport systems and services will benefit from an agreed open in-vehicle platform architecture enabling a 'single platform —multiple services' approach and ensuring interoperability/interconnection with legacy in-vehicle communication networks (CAN-bus) and (generic) infrastructure systems and facilities.

The issue so far has been addressed in fragmented way, providing building blocks (e.g. the research projects CVIS, GST, OVERSEE, the eSafety working group on SOA and the recommendations of the EeIP Task Force OPEN, and the ITS study) but an overall logical and cost-effective synthesis seems to be lacking. C-ITS standards should also be taken into account. A study launched under the ITS Action plan (action 4.1) focused on synergies among legal provisions and obligations for heavy good vehicles (HGV).

'Human-Machine-Interaction' (HMI): The development and use of novel ITS services and applications need safe integration and use to avoid increasing distraction of the driver. Results of the research project AIDE ("Adaptive Integrated Driver vehicle InterfacE"), the conclusions of the nomadic device forum and the European statement of principles (ESoP) on safe HMI must be taken into consideration.

ACTION 19 Guidelines and potentially technical specifications to ensure the correct and safe on-board use of ITS systems and applications, enabling safe integration and operation of nomadic devices.

International cooperation aiming at achieving the necessary global harmonisation of standards is paramount in the field of ITS.

ACTION 20 To continue international cooperation in the field of ITS standardisation, in particular with the USA and Japan, but also with other regions, including participation of the relevant SSOs.

Automated driving: The developments in C-ITS and in various European / national / private pilots with autonomously driving cars are generally seen as two converging paths towards so-called "connected automated driving": vehicles being connected to the mobility ecosystem in their immediate vicinity (other vehicles, infrastructure) and to the wider mobility ecosystem (central traffic management systems, other modes of transport, etc..) and to the internet. The aim is to make this convergence as smooth and efficient as possible.

ACTION 21 SDOs to assess the standardisation needs of connected automated driving and develop a work programme, based on the expected convergence of developments in C-ITS and in autonomously driving vehicles.

STANDARDISATION NEEDS, ONGOING ACTIVITIES AND PROGRESS REPORT

COMMISSION PERSPECTIVE AND PROGRESS REPORT

To take full advantage of the benefits that ICT-based systems and applications can bring to the transport sector it is necessary to ensure interoperability and continuity of the services among the different systems throughout Europe. The existence of common European standards and technical specifications is paramount to ensure the interoperability of ITS services and applications and to accelerate their introduction and impact. International cooperation aiming at global harmonisation should be pursued.

ONGOING STANDARDS DEVELOPMENT

C-ITS

STANDARDS DEVELOPMENT

CEN (ISO), ETSI

CEN (TC 278 WG16) with ISO TC 204 and ETSI (TC ITS) www.etsi.org/m453; www.itsstandards.eu. Cooperation is also ensured through the ITS Standardisation Coordination Group (ITS-CG)

http://www.etsi.org/images/files/technologies/Final_Joint_Mandate_M453_Report_2013-07-15.pdf

Release 1 has been finalised — see ETSI TC ITS technical report TR 101 067 with the Release 1 standards and the development of ISO TR 17465-3 with the CEN/ISO Release 1 list. A joint document listing Release 1 standards also includes relevant standards from other SDOs such as SAE and IEEE.

The progress of 3GPP and LTE V2X is also relevant, noting the impending completion of Release 14, given that this access technology can also serve many C-ITS purposes.

ISO TC22 & ISO TC204 (CEN/TC278 WG16 & TC 301), SAE.

In-vehicle Platform.

HLC & JWG between TC204 and TC22 discussing how to continue activities.

SAE looks at electrical connections related activities.

ETSI, CEN, ISO, SAE, IEEE

Evaluation of the application of existing standards is an ongoing activity.

Harmonisation task groups (HTGs) are looking into harmonisation needs between the standards developed by the different organisations.

CEN, ETSI

CEN and ETSI are working, in consultation with main stakeholders (such as ASECAP and C2C CC) to find an appropriate solution to ensure non-detrimental interference from ITS-G5 to systems using CEN DSRC technology at 5.8 GHz.

See also CEN/TR 16690 on Electronic fee collection — Guidelines for EFC applications based on in-vehicle ITS stations

3GPP and LTE V2X are progressing. Impending completion of Release 14 given that this access technology can also serve many C-ITS purposes.

ISO/IEC JTC1/SC37

SC 37 is responsible for the standardisation of generic biometric technologies pertaining to human beings to support interoperability and data interchange among applications and systems. Generic human biometric standards include: common file frameworks, biometric application programming interfaces, biometric data interchange formats, related biometric profiles and other standards in support of technical implementation of biometric systems, evaluation criteria to biometric technologies, methodologies for performance testing and reporting, cross jurisdictional and societal aspects of biometric implementation. SC 37 Biometrics home page: http://www.iso.org/iso/home/standards_development/list_of_iso_technical_committees/jtc1_home/jtc1_sc37_home.htm . The complete list of standards published or under development can be found in ISO Standards Catalogue of ISO/IEC JTC 1/SC 37 — Biometrics.

Published standards and ongoing projects related to the topics include the series of biometric data interchange standards for different biometric modalities, biometric technical interfaces, related biometric profiles and other standards in support of technical implementation of biometric systems, and cross jurisdictional and societal aspects of biometric implementation. Representative projects: amendments of ISO/IEC 19794-x: 2011/Amd. 2:2015 data format standards specifying XML encoding, extensible biometric data interchange formats ISO/IEC 39794-x (e.g. generic extensible data interchange formats for the representation of data: a tagged binary data format based on an extensible specification in ASN.1 and a textual data format based on an XML schema definition (both capable of holding the same information), ISO/IEC 30107-x Biometric presentation attack detection multi-part standard and ISO/IEC 24779-x — Cross-Jurisdictional and societal aspects of implementation of biometric technologies — Pictograms, Icons and Symbols for use with Biometric Systems multi-part standard.

ITU

ITU has various standardisation activities in the area of ITS communications. In ITU-R

- Radio interface standards of V2V and V2I communications for ITS applications. ITU-was put forward for simultaneous adoption and approval by consultation. Draft revision of Report ITU-R M.2228

- Advanced ITS Radiocommunications was approved. Work is progressing toward a preliminary new Report ITU-R M.[ITS USAGE] — ITS usage in ITU Member States

ITU-T Study Group 16 is working on a family a family of vehicular gateway protocols that can be used for inter-vehicle communications. Studies have started concerning taxonomy of automated driving and for secure software updates for ITS communications devices and security mechanisms for over the air vehicle software updates (together with ITU-T SG17).

SG13 has approved Recommendation ITU-T Y.2281 on networked vehicle gateway specifications and on harmonizing taxonomy for automated driving.

IEEE

IEEE has standards activities in many aspects of ITS, such as vehicle communications and networking (IEEE 802 series). In addition, the IEEE 1609 Family of Standards for Wireless Access in Vehicular Environments (WAVE) define an architecture and a complementary, standardised set of services and interfaces that collectively enable secure vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) wireless communications. These standards are designed to provide the foundation for a broad range of applications in the transportation environment, including vehicle safety, automated tolling, enhanced navigation, traffic management and many others. http://standards.ieee.org/develop/msp/its.pdf.

IETF

The ECRIT working group in the IETF has developed a general architecture for enabling IP applications to discover and connect to emergency services. The GEOPRIV working group has developed protocols that allow IP networks to in- form end devices about their geolocation, a critical pre-requisite for emergency calling. The application-specific working groups in the IETF (for example, the SIPCORE working group) have developed extensions to support emergency calling as required.A new WG IPWAVE has just been formed on matters fo IP wireless access in vehicular environments. This group will work on V2V and V2I use-cases where IP is well-suited as a networking technology and will develop an IPv6 based solution to establish direct and secure connectivity between a vehicle and other vehicles or stationary systems. These vehicular networks are characterized by dynamically changing network topologies and connectivity.

International cooperation for the development of harmonised global standards is particularly important in these areas. The Commission has concluded agreements with the US Department of Transport and with the Japanese Ministry for Land Transport and Industry. Cross-regional harmonisation task groups (HTGs) have been established in this area. Currently the CAMP/WIIC and the C2C-CC and Japanese OEM are working to solve coordination requirements for Day 1 deployment expected in 2015 in Europe.

ETSI has cooperation and liaison agreements with relevant standards organisations such as IEEE, SAE, ISO, IETF, and standardisation supporting industry groups like TISA. Additionally ETSI have liaisons and contacts with regional and national standards organisations such as ARIB (Japan), CCSA (China) and TTA (Korea) and the Asian Pacific Telecommunication organisation (APT).

ITU has launched the Collaboration on ITS Communication Standards (CITS) aims at providing a globally recognized forum for the creation of an internationally accepted, globally harmonised set of ITS communication standards of the highest quality in the most expeditious manner possible to enable the rapid deployment of fully interoperable ITS communication-related products and services in the global marketplace. See http://itu.int/en/ITU-T/extcoop/cits

OTHER ACTIVITIES RELATED TO STANDARDISATION

C-ITS PLATFORM

Established by the Commission, it brings together representatives of all C-ITS stakeholders to cooperate on legal, organisational, administrative and governing aspects, but also on more technical issues such as standardisation, or security and certification of the system, in view to ensure the interoperability of systems across the Member States.

CAR-2-CAR COMMUNICATION CONSORTIUM (C2C-CC)

The industry organisation represents car manufacturers and actively participates and chairs ETSI TC ITS. It also contributes to CEN working groups.

ERTICO — ITS EUROPE, GSM-A AND THE IMOBILITY FORUM

Stakeholder organisations providing input to ETSI and CEN

"AMSTERDAM GROUP" (AG)

This is an umbrella organisation bringing together the C2C-CC, ASECAP, CEDR and POLIS for smooth alignment of deployment of Cooperative-ITS functionalities and technologies European wide. A strong support for standardisation activities, regulation and harmonisation is provided to the European community directly by the individual AG members as agreed within the AG. Membersalso participate in the spectrum regulation at CEPT and work on harmonisation with IEEE 802.11 TigerTeam to ensure spectrum-sharing with Wi-Fi devices.

UN/ECE WP29

The UNECE transport division provides secretariat services to the world forum for harmonization of vehicle regulations (WP.29). The world forum has incorporated into its regulatory framework technological innovations of vehicles to make them safer and more environmentally sound.
http://www.unece.org/trans/main/welcwp29.html

GENIVI

GENIVI® is a non-profit industry alliance committed to driving the broad adoption of specified, open source, in-vehicle infotainment (IVI) software.

The alliance develops an open standard for aligning automotive and consumer infotainment cycles. http://www.genivi.org/

MIRRORLINK INITIATIVE

The MirrorLink initiative turns the car into a terminal, it has little computing power itself and relies instead on the phone as its processor. http://www.mirrorlink.com/

COMESAFETY2, IMOBILITYSUPPORT

EU funded projects supporting C-ITS standardisation, in particular international cooperation. www.comesafety.org, www.imobilitysupport.eu/

EU AND NATIONAL FUNDED RTD PROJECTS AND PILOTS

The standardisation activities are supported by RTD projects, pilots and field operational tests in the area of C-ITS, in particular contributing to fine-tuning the standards, such as DriveC2X, FOTSIS, PRESERVE, ITSSv6, ComeSafety2, COMPASS4D, iMobilitySupport, SIM-TD, SCORE@F, eCoMove, EasyWay, SPITS

WCO DATAMODEL

The WCO datamodel (world customs organisation data model) is an important standard for providing alignment for announcements to and from government about transport and trade. It makes communication throughout Europe between governmental parties and between government and commercial parties easier and cheaper.

ICT FOR ELECTRIC VEHICLES/ELECTROMOBILITY

EU FUNDED RTD PROJECTS AND PILOTS

Projects such as Mobinet, Mobincity, eCo-FEV; E-DASH, eDAS, SmartV2G, ODIN, COSIVU, SafeAdapt, Smart-LIC, VRUITS and the pilots ICT4EVEU, MOBI.Europe, MOLECULES, SmartCEM and green e-motion and the support action smart EV-VC will have outcomes possibly relevant for standardisation.

IEEE

IEEE P2030.1 (vehicle to grid (V2G) interconnectivity), addressing applications for electric-sourced vehicles and related support infrastructure and also communication for charging (IEEE 1901).

ICT FOR TRAFFIC MANAGEMENT AND INFRASTRUCTURE TO INFRASTRUCTURE (I2I) *RELATED INFORMATION EXCHANGE AND ARCHITECTURES BEYOND SHORT RANGE COMMUNICATIONS.*

CEN/TC278/WG8

DATEX data exchange standards. DATEX II is a standardised e-language for traffic and travel data exchange between traffic control centres, traffic information centres and service providers. In 2020 DATEX II is expected to be the information model for road traffic and travel information in Europe. The aim is to get the real mature parts of DATEX II standardised as European standards.

ISO

Standardisation activities are taken up in this area by ISO TC 204, with strong cooperation with CEN/TC 278, but also by ISO TC 22. ISO/TS 15638-19:2013 ITS — Framework for collaborative telematics applications for regulated commercial freight vehicles (TARV Part 19). It is at an early stage of development but not mature enough to serve as standard for reservation at that stage.

OTHER ITS TOPICS

ITU

Study groups 12 and 16 both have work items to transform the deliverables of ITU-T focus group on driver distraction (2011-13) into proper ITU-T Recommendations. The mandate of ITU-T study group 17 includes the study of security aspects of ITS communications.

W3C

W3C has several ongoing activities related to automotive/ITS.

The mission of the automotive working group (https://www.w3.org/auto/wg/) is to develop open web platform specifications for HTML5/JavaScript application developers enabling web connectivity through in-vehicle infotainment systems and vehicle data access protocols. The API is agnostic with regard to the connection used.

The mission of the automotive and web platform business group (http://www.w3.org/community/autowebplatform/) is to influence the open web platform on the unique needs of the automotive industry, and to help stakeholders within the automotive industry to build a good and practical understanding on the standardisation processes within the W3C. The initial scope of this business group will be to determine what vehicle data should be exposed through a web API(s).

Several community groups (pre-standardisation open fora) were also started to look at specific ITS issues, e.g. the traffic event ontology community group https://www.w3.org/community/traffic/ and automotive ontology https://www.w3.org/community/gao/

TN-ITS (TRANSPORT NETWORK ITS SPATIAL DATA DEPLOYMENT PLATFORM)

Based on the outcome of ROSATTE project (FP7), the working group promotes the integration of accurate (public) road data in navigation-oriented maps, and their timely updating, including possible alignment with the technical framework for the INSPIRE project, including the identification of standardisation needs.
http://www.imobilitysupport.eu/library/imobility-forum/working-groups/concluded/digital-maps/

EU FUNDED PROJECTS (HORIZON 2020 WG 3.5 CALL)

Projects supporting local dynamic maps standardisation (e.g. HIGHTS)

ADVANCED MANUFACTURING

POLICY OBJECTIVES

Advanced manufacturing addresses the transformation of the manufacturing and automation industry (digitalisation of industry) to a new level of intelligent production and of intelligent process handling and integration. It is driven by the convergence of manufacturing with ICTs and includes all optimisation solutions that may improve productivity, quality, and flexibility in the entire manufacturing lifecycle. It may also lower levels of costs, waste and pollution.

Work pieces and semi-finished products involved in the manufacturing process are to possess information on themselves and suitable means of communication. They therefore comprise of cyberphysical systems. These "smart products" are to be embedded in the process as a whole. They will control not only their own logistical path through production, but rather the entire production workflow concerning them. Decentralisation of the digitally stored information will consequently be followed by a decentralisation of control systems.

Advanced manufacturing as a policy focuses on fostering the development and speeding up of the uptake of advanced manufacturing technologies by European industry. This ambition unfolds in three objectives: accelerate the dissemination and commercialisation of advanced manufacturing technologies, boost the demand for advanced manufacturing technologies, and reduce skills shortages and competence deficits.

European manufacturers would benefit from more automated flexibility and data intelligence in supply chains. Agile manufacturing (e.g. reacting to changes in demand, in labour or in material resources available) would enable smarter logistics and lower production costs. Simulations or rapid prototyping methods like 3D printing would enhance the design process. Big data analytics, turning the data stored in clouds to intelligence, would provide insights on achieving cost and carbon emission reductions. Eventually, an internet of manufacturing things would provide for smooth communication between the various machines of an intelligent supply chain, building on the increased presence of sensors and actuators.

There are a number of initiatives around advanced manufacturing in Europe, in the Member States and also outside Europe (see B.2). It is the objective on the European level to coordinate between the different initiatives and to drive the strategic topic of advanced manufacturing at a pan-European level, thus improving the competitiveness of the European manufacturing and automation industry both regarding the Common European market but also on a global scale.

Advanced manufacturing is one of the key enabling technologies (KETs) identified but the Commission as key to competitiveness. By 2015, the global market for KETs is estimated to be more than EUR 1 trillion. KETs have huge potential for growth and employment. According the European Competitiveness Report 2013, depending on the KET, growth potentials of 10 — 20% per year can be expected over the coming years. For particular submarkets, the growth potential is even larger. Countries and regions that fully exploit KETs will be at the forefront of advanced and sustainable economies. KETs deployment will contribute to achieving reindustrialisation, energy, and climate change targets simultaneously, making them compatible and reinforcing their impact on growth and job creation.

LEGISLATION AND POLICY DOCUMENTS

AT EUROPEAN LEVEL

- **COM(2016) 180 final.** Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Digitising European Industry Reaping the full benefits of a Digital Single Market
- **COM(2016)176** "ICT Standardisation priorities for the digital single market"
- **COM(2012)341** A European strategy for key enabling technologies — A bridge to growth and jobs
- **COM(2012)** A stronger European Industry for Growth and Economic Recovery
- **SWD(2014) 120** Advancing Manufacturing — Advancing Europe, Report of the Task Force on Advanced manufacturing for Clean Production
- **COM(2009)512** Preparing for our future: Developing a common strategy for key enabling technologies in the EU
  http://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:52009DC0512

OTHERS

The following list is a non-exhaustive overview of initiatives on national level:

- French strategy for factories of the future http://proxy-pubminefi.diffusion.finances.gouv.fr/pub/document/18/17721.pdf#page=47
- The German initiative Industrie 4.0, including the industry association initiative "Plattform Industrie 4.0" in cooperation with with acatech / Forschungsunion http://www.acatech.de/fileadmin/user_upload/Baumstruktur_nach_Website/Acatech/root/de/Material_fuer_Sonderseiten/Industrie_4.0/Final_report__Industrie_4.0_accessible.pdf http://www.plattform-i40.de/finalreport2013
- R&D initiatives like "Autonomik für Industrie 4.0" http://www.autonomik40.de/#&panel1-1, "it's OWL" http://www.its-owl.com/home/news/2-forum-produktion-im-mittelstaendischen-maschinenbau/ or SmartFactory KL http://smartfactory.dfki.uni-kl.de/en
- UK Initiative "High Value Manufacturing Catapult" https://hvm.catapult.org.uk/
- UK Foresight Studie "Future of manufacturing: a new era of opportunity and challenge for the UK" https://www.gov.uk/government/publications/future-of-manufacturing
- US Advanced Manufacturing National Program Office (AMNPO) http://manufacturing.gov/amnpo.html
- Diginova's "Roadmap to Digital Fabrication" http://www.diginova-eu.org/content/dam/diginova/en/documents/Digital_Fabrication_eBook.pdf
- The strategic research and innovation agenda of Sweden "Made in Sweden 2030" http://www.vinnova.se/PageFiles/750915348/Made in Sweden 2030-eng.pdf
- "Smart Industry " NL initiative strategy for the future http://www.smartindustry.nl/

PROPOSED NEW ACTIONS ON STANDARDISATION

STANDARDS DEVELOPMENT

ACTION 1 Common communications standards and a reference interoperable 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 would 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.

OTHER ACTIVITIES AROUND STANDARDISATION

ACTION 3 Review the recommendations for actions in the "German Standardisation Roadmap Industrie 4.0" (http://www.dke.de/de/std/documents/rz_roadmap industrie 4-0_engl_web.pdf), chapter 6. The Roadmap also presents a description of the current status in standardisation for Industrie 4.0 (chapter 4) and an analysis of the identified need for standardisation (chapter 5).

ACTION 4 A study is needed to identify and analyse opportunities for revisions of existing standards (communications, M2M) or new standards. In particular, the following topics should be analysed:

NEW PRODUCTION TECHNOLOGY

- Additive manufacturing (incl. 3D printing)
- Robotics: Human-machine-interface for "autonomous co-laborative robots"

MANUFACTURING PROCESS

- Future manufacturing systems (M2M and usage of IoT, agile manufacturing): self-organisation of parts of the supply chain; smart logistics including the management of unexpected changes in products: labour or raw materials; massive customisation along the whole production process; shared infrastruc-

tures between sites of production;

- Virtualisation and common semantics (smart factory / digital factory), engineering tools, different life-cycle approaches (technology, product development, manufacturing of the product, the manufacturing equipment / plant) and their integration;
- Manufacturing lifecycle, including advanced maintenance, rapid prototyping, clean manufacturing, availability/resilience of production systems and facilities.
- Wireless network in the plant, e.g. based on EN 300 328 and EN 62657
- Compared or predictive analyses via big data and cloud, increased optimisation possibilities by more accurate management information on the operational manufacturing process
- Interoperability: providing improved interoperability using existing models for further developments, including special requirement analysis from process and manufacturing industries (e.g. real-time/tactile internet, robustness, etc.)

FUNCTIONAL SAFETY ISSUES

- Safety, e.g. functional safety of machinery based on IEC 61508, IEC 61511, ISO 13849, …
- Security, privacy and management of dta ownership in the manufacturing environment and for manufactured products. The new systems must protect (i) data in production systems and facilities and (ii) access to production systems and facilities, e.g. system security based on the ISO/IEC 27000 series and IEC 62443 series.

SKILLS DEFICIT REDUCTION

- Manufacturing skills for future manufactures;
- Work organisation;
- Training and continuing professional development.

ACTION 5 Considering standardisation in research projects is strongly recommended to identify existing standards and standardisation potential at an early stage. R&D phase standardisation covers any activity that aims to identify the potential of standardisation and assists with public availability of the results of these processes. In addition, the continuous and close cooperation with stakeholders to integrate their views and requirements and to foster community acceptance is essential to build the ground for securing effective impact. Based on this, such standardisation activities assist the transformation of research findings into product ideas transferred to the market afterwards, as they support the dissemination and implementation of innovative knowledge. Therefore in innovative fields the sustainable transfer of knowledge and technology is enhanced and accelerated.

- In order for research and standardisation to be effectively linked, it must be remembered that standardisation activities can in many cases only be started at a relatively late stage of the project. To close the gap until industry is prepared to continue funding in a more mature stage, the support of standardisation-related research projects beyond the end of the projects themselves should be considered.

STANDARDISATION NEEDS, ONGOING ACTIVITIES AND PROGRESS REPORT

COMMISSION PERSPECTIVE AND PROGRESS REPORT

Standards can play a key role in accelerating the effectiveness of supply chains in manufacturing systems. In some cases, standardisation can also play a stabilising role of research activities on which real market opportunities may then be built on. The opportunity is to ensure Europe's technological leadership through the massive integration of ICT into advanced manufacturing technologies, systems and processes.

The amount of communication between machines, sensors and actors is increasing and will continue so. The machines will become increasingly organised as well as their supply chains, from design to warehousing until delivery of a product. IoT technologies will play a major role to support this. Securing high-speed communications infrastructures (e.g. broadband infrastructures) is vital. The specific industrial needs and requirements concerning, for example, availability, security and functional safety have to be taken into account in order to make these technologies suitable for advanced manufacturing. Moreover, the supply chains increasingly need flexibility in design to answer to individual customer requirements (mass customisation). Easier and cost-effective product differentiation is a key for growth. Additive manufacturing (3D printing) may push differentiation to a further stage of individualisation, generating a market of crowd-based production and retailing.

There is a need to promote the development of interoperability standards and European reference architectures, as well as open cross-sectorial platforms for the digitisation of European industry, including experimentation, validation, interoperability testing facilities and trusted labels and certification schemes;

Standardisation is of central importance, yet at the same time provides the biggest challenge for the success of advanced manufacturing, which demands an unprecedented degree of system integration across domain borders, hierarchy borders and life-cycle phases. To achieve this, consensus-based standards and specifications form an indispensable basis. Close cooperation between researchers, industry and the standardisation bodies is required to create the necessary conditions for sweeping innovation, methodical soundness and functionality, stability and security of investments, practicability and market relevance.

Existing, but also future consensus-based standards will create a firm basis for technical procurement, support communication through standardised terminology and concepts and ensuring interoperability, fitness for use and market relevance. The drawing up of concepts at an early stage by a consensus-based standardisation process and the close cooperation between researchers, industry and the standardisation bodies are central requirements for the success of innovative manufacturing approaches and for a rapid implementation in industrial practice. These concepts and any related standards should be coherent with existing standards e.g. on machinery, tools, automation, etc., as the take-up of advanced manufacturing concepts would be dramatically speed up if they are compatible with the installed manufacturing base.

Several research oriented activities are currently under way under H2020:

- I4MS (Innovation for Manufacturing SMEs) is a Commission initiative dedicated to the manufacturing sector and in particular to its high-tech SMEs. I4MS is part of the public-private partnership "Factories of the Future" (PPP H2020 FoF). Funded projects currently focus on flexibility and adaptability in the production chain (CloudFlow, INTEFIX, APPOLO), simulation (Fortissimo, CloudSME), robotics (EUROC) and data intelligence (LASHARE).
- The EFFRA (European factories of the future research association) developed a roadmap for the development of Factories of the Future by 2020 in the framework of H2020.
- SPIRE (sustainable process industry through resource and energy efficiency) is a public-private partnership that represents more than 90 industrial and research process industry stakeholders from over a dozen countries across Europe.

In addition lighthouse pilot projects in the framework of the Joint Undertaking on Electronic Components and Systems for European Leadership will provide for validation of standards for future markets, including large scale experimental test-beds

ONGOING STANDARDS DEVELOPMENT

DIN/DKE

The "German Standardisation Roadmap Industrie 4.0" http://www.dke.de/de/std/documents/rz_roadmap industrie 4-0_engl_web.pdfhttp://www.dke.de/de/std/documents/rz_roadmap industrie 4-0_engl_web.pdf provides an overview of the relevant existing standards in the ambit of Industrie 4.0 and the need for standardisation which is already discernible today. It presents the requirements for standards and specifications for Industrie 4.0, identifies areas where action is necessary and issues corresponding recommendations.
http://www.dke.de/de/std/documents/rz_roadmap%20industrie%204-0_engl_web.pdf

CEN

CEN/TC 438 'Additive Manufacturing' has been working since 2015 to standardize the process of AM, their process chains (hard and software), test procedures, environmental issues, quality parameters, supply agreements, fundamentals and vocabularies.

CENELEC

CENELEC/TC 65X "Industrial-process measurement, control and automation" works out methods for safe and secure communication protocols for wired and wireless industrial automation applications some of which are included in the 2,4 GHz industrial, scientific and medical radio band (ISM).

ETSI

ETSI ERM TG 11 is currently working on methods to improve the politeness of existing adaptive and non-adaptive mechanisms and to consider the inclusion of alternative mechanisms taking into account the needs of the wireless industrial applications operating in the 2,4 GHz ISM band.

ETSI ERM TG 41 is currently working on harmonised standards for wireless industrial applications in the frequency range 5725 MHz to 5875 MHz

ISO/IEC

Interoperability standards from IEC/TC 65 "Industrial process measurement, control and automation", with its sub-committees, e.g. standard on internet security IEC 62443 series, functional safety standards IEC 61508, IEC 61511 or interoperability standards, e.g. IEC 62541 (OPC), and others

IEC/TC 65 and its subcommittees, like foundational/structuring groups SC 65E/AhG 1 "Smart manufacturing information models", AhG 3 "Smart manufacturing framework and system architecture", SC 65E/JWG 5 "Enterprise control", SC 65E/WG 9 "AutomationML — Engineering Data Exchange Format", operational groups WG 16 "Digital Factory" and WG 19 "Life-cycle management for systems and products"; and communication groups, including real-time communications work, SC 65C/MT 9 "Industrial networks — Fieldbusses", SC 65C/WG 16 "Wireless" and SC 65C/WG 17 "Wireless coexistence".

IEC systems evaluation group (SEG) 7 on smart manufacturing has been created to organise the transition from SG 8 to a systems committee (SyC). Among its tasks, SEG 7 will focus on:

providing an inventory of existing standards and current standardisation projects under the management of IEC, ISO and other SDOs.

expanding on the definition of common value chains within a smart manufacturing enterprise, as identified in SG 8, and identifying associated use-cases which will assist in determining the state of the art in the industry, and the identification of potential gaps where IEC standardisation is needed with respect to smart manufacturing.

establishing an initial roadmap of smart manufacturing standardisation, architecture and prospective standardisation and conformity assessment projects to be conducted by the SyC member TCs and partners.

delivering a dashboard to cross reference the project work items to documented use-cases within particular value chains to assist standards developers and industry stakeholders to navigate the domain

ISO/TC 184 deals with industrial automation technologies, including automated manufacturing equipment, control systems and the supporting information systems, communications and physical interfaces required to integrate them in the world of e-business http://www.iso.org/iso/iso_technical committee%3Fcommid%3D54110

Projects include:

ISO 6983-1:2009 — Automation systems and integration — Numerical control of machines — Program format and definitions of address words — Part 1: Data format for positioning, line motion and contouring control systems

ISO 14649 (series of standards): Industrial automation systems and integration — Physical device control — Data model for computerized numerical controllers

ISO 22093:2011 — Industrial automation systems and integration — Physical device control — Dimensional Measuring Interface Standard (DMIS)

ISO 23570 (series of standards): Industrial automation systems and integration — Distributed installation in industrial applications

ISO 13584 (series of standards): Industrial automation systems and integration — Parts library

ISO 30303 (series of standards): Industrial automation systems and integration — Product data representation and exchange

ISO 16100 (series of standards): Industrial automation systems and integration — Manufacturing software capability profiling for interoperability

IEC/TC 3/SC3D Product properties and classes and their identification"

ISO/IEC JTC 1 "Information Technology" with its sub-committees, e.g. SC 31 on RFID

ISO Strategic Advisory Group Industry 4.0/Smart manufacturing (ISO /SAG)

ISO/TC 261 works on standardisation in the field of additive manufacturing concerning their processes, terms and definitions, process chains (hard- and software), test procedures, quality parameters, supply agreements and all kind of fundamentals.

IEEE

IEEE has standards activities relevant to advanced manufacturing, including in the networking, sensors, and IoT domains. http://standards.ieee.org/develop/msp/advanced-manufacturing.pdf

ITU

The new ITU-T Study Group 20 on "IoT and its applications, including smart cities and communities" was created in June 2015. It provides a specialized IoT standardisation platform for the development of a cohe-sive set of international standards on IoT and smart manufacturing. http://itu.int/go/tsg20

ITU-T SG13 approved Recommendation Y.2238 on Overview of Smart Farming based on networks.

OASIS

Production Planning & Scheduling (PPS): Description: XML documents for production floor planning and scheduling in manufacturing industries, and transactional exchange patterns for operations management contexts. https://www.oasis-open.org/committees/pps

W3C

Web of Things http://www.w3.org/WoT/

IIC

Developing test beds and contributing to reference architecture and use-case development http://www.iiconsortium.org/test-beds.htm

MSP MEMBERS' AND STAKEHOLDERS' REMARKS

There are three basic principles behind standardisation of advanced manufacturing technologies:

- accelerate the dissemination and commercialisation of advanced manufacturing technologies,
- boost the demand for advanced manufacturing technologies, and
- reduce skills shortages and competence deficits.

In industrial automation, it is essential for the vast variety of systems from various manufacturers to interact in a reliable and efficient manner. The users, operating globally, expect to be able to source their usual products and systems everywhere in the world. In order to ensure this global usability and consistency across different systems, international standardisation in industrial automation has always been regarded as especially important and pursued as a matter of a priority. Nowadays, standards are available or are at least being drafted to cover important issues in industrial automation. But again and again new technologies and new requirements create a new demand for standardisation. This requires the development of a host of new concepts and technologies. However it will only be possible to implement these new concepts and technologies in industrial practice if they are backed by standards based on consensus. Only such standards are able to create the necessary security for investments and confidence among manufacturers and users.

Development of new technologies and intensifying the relationships between more and different actors in the value chain require not only new standards but also updating, maintenance and even re-design and integration of existing standards.

Additional communication capabilities and a (partial) autonomy to react to external influences and internally stored specifications are transforming mechatronic systems into cyber-physical systems. The objectives derived from that transformation are developments and adjustments in ICT for manufacturing applications: robustness, resilience, information security and real-time capability. In addition, increasing improvement is aimed for energy and resource efficiency, and in the adjustment of industry to accommodate the social demands arising from demographic change.

With regard to machine to machine communication, consideration should be given to the framework of metadata. There may be a role for standards in developing an accepted architecture building on existing agreed terminology.

ROBOTICS AND AUTONOMOUS SYSTEMS

POLICY OBJECTIVES

The importance of robotics and autonomous systems (RAS) lies in its strong economic contribution as an industrial and commercial activity in its own right and in its broad and disruptive socioeconomic impact across diverse market sectors worldwide. Advanced robotics and autonomous (or near-autonomous) vehicles will have a potential annual economic impact by 2025 on a par with e.g. mobile internet, advanced materials or energy markets.

Already now, industrial robotics has become a cornerstone in several of Europe's high value manufacturing industries, such as the automotive industry, keeping these industries in Europe. This trend must be maintained, strengthened and extended to all main industries in Europe. Robotics technology also has an impact on a broad range of end-user markets and applications. The robotics professional and consumer service sectors are expected to achieve double-digit growth in the next decade and SMEs will play a key role e.g. in opening new markets. In addition to manufacturing, important future application domains for robots, with a high impact on everyday life, will include healthcare, agriculture, civil, commercial or consumer sectors, logistics and transport.

The EU's strategic vision is to build Europe's global position in the robotics market to account for one third of industrial robotics, two thirds of professional services and one fifth of the domestic services market by 2020.

LEGISLATION AND POLICY DOCUMENTS

AT EUROPEAN LEVEL

- **Robotics PPP** — EU Robotics: Strategic Research Agenda
  http://www.eu-robotics.net/cms/upload/PPP/SRA2020_SPARC.pdf
- **Robotics PPP** — EU Robotics: Multiannual Roadmap (rolling document)
  https://eu-robotics.net/sparc/about/roadmap/index.html
- **European Machinery Directive 2006/42/EC**
  http://ec.europa.eu/growth/single-market/european-standards/harmonised-standards/machinery/index_en.htm

OTHERS

- International Federation of Robotics: Standardisation
  http://www.ifr.org/standardisation/
- US Occupational Safety and Health Administration: Robotics
  https://www.osha.gov/SLTC/robotics/index.html

PROPOSED NEW STANDARDS ACTIONS

OTHER ACTIVITIES AROUND STANDARDISATION

ACTION 1 Foster coordination of standardisation efforts on robotics and autonomous systems in Europe, promoting interaction of all stakeholders taking into account their vision and real needs (i.e. through SPARC public-private partnership).

STANDARDISATION NEEDS, ONGOING ACTIVITIES AND PROGRESS REPORT

COMMISSION PERSPECTIVE AND PROGRESS REPORT

Robotics and autonomous systems is a multidisciplinary scientific and technological domain for implementing complex systems with cognitive capabilities. These include mechatronics devices, power systems and drives, actuators, sensors, data communication systems, computer software, multi-agent technologies, signal processing techniques, artificial intelligence, semantic technologies and much more. Robots can be very small or very large and have many physical aspects; for instance, they can be similar to a crane, an arm, a snake or a human body, they can have wheels or legs, and they can be vehicles able to move on the ground, in the air or under the water. Robots can also be used for an extraordinary variety of applications including industrial manufacturing, logistics, maintenance, precision farming, autonomous driving, space exploration, surveillance, emergency and rescue services, commercial services, health care, rehabilitation, assistive living, entertainment, education and social interaction.

Therefore the number of standards that may affect robotic engineering is huge compared to the relatively small size of the robotic sector. Luckily, standardisation efforts can be shared with more general technological domains such as electromechanical engineering, electronics, information technologies, telecommunications, production management, geographical information and so forth, where robotics plays a technology user role and inherit their standards. Nonetheless, there are also many standards addressing the specific needs of the robotic sector. The following links list some of them:

http://www.iso.org/iso/iso_catalogue/catalogue_tc/catalogue_tc_browse.htm?commid=54138

Since robotics is a fast-moving technological field, its standardisation needs are growing and changing. We can identify at least three main broad areas where new standardisation efforts are required:

- Robotic safety. Traditionally the robotic sector has adopted general personal and functional safety standards and regulations for machinery such as EN/ISO 13849-1, IEC/EN 62061. However, the particularities of robotics and its applicability to industrial and non-industrial environments has made it necessary to develop specific standards such as ISO/TS 15066 (Safety of collaborative robots) which builds further on EN/ISO 10218-1 and EN/ISO 10218-2 (Robots and robotic devices -- Safety requirements for industrial robots) or EN/ISO 13482 (Robots and robotic devices — Safety requirements for personal care robots), ISO/TS 15066 (Safety of collaborative robots), ISO TC184/SC2/WG7 (Personal care robot safety), IEC TC62/SC62A and ISO TC184/SC2 JWG9 (Medical electrical equipment and systems using robotic technology). The huge expansion that robotics is experiencing in non-industrial environments including health care, autonomous driving and private homes, must be accompanied by the development of new safety standards addressing their specific issues.
- Robotics system integration and interoperability. Current robots can be made up of very different functional subsystems (dynamic control, perception, navigation, task planning, trajectory planning, human interaction, etc.) that must be integrated through complex interfaces. Also robotic systems can cooperate with other systems by means of other interfaces. Many of the standards that define

these interfaces are inherited from more general domains such as electromechanical engineering and ICT. But there is a number of standards that are designed to fit robotics-specific requirements, for instance ISO 9409 (mechanical interfaces) and ongoing work in ISO/TC 299/WG6, ISO TC184/SC2/WG10 (Modularity for service robots). At least two areas need further development:

- Robot programming languages and communication protocols for robot controllers. There are several widespread robot programming languages such as Rapid (ABB), PDL2 (Comau), KRL (Kuka), etc. that have been developed by robot manufacturers following a proprietary philosophy, but they act as de-facto standards as they must be used by system integrators and other third parties of the robotic value chain. The increasing level of integration of robots in complex systems is creating a need to standardise programming languages and protocols so that they can play a role similar to that of G-Code (ISO 6983/RS274D) in the world of CNC machine tools.
- Robot operating systems. Robot operating systems are software platforms that help connect various robotic subsystems (perception, control, reasoning, planning, etc) to perform complex tasks. Strictly speaking they are not actual operating systems as they must be run on conventional computers. However they are much more than a middleware layer. They determine and manage the environment for the interoperability of all the software components of the robotic system, irrespective of where they run (on standard computers, robot controllers or embedded systems). In the last 10 years, a number of robot operating systems have come out: ROS, Player, YARP, Orocos, CARMEN, Orca, MOOS, to name a few. Most have been developed and maintained as open source software by universities and non-profit research centres and have not achieved yet enough stability and maturity to become full standards. However, the most successful ones have the potential to set the interoperability standards of the future of robotics.

• Knowledge modelling. There are other factors attracting attention in the robotics community: acquisition of knowledge about the robot's physical environment, reasoning and learning. These involve a great variety of techniques such as signal processing, sensor data fusion, mapping, machine learning, artificial intelligence, constraint solving, and optimisation. All these techniques have something in common: they manage enormous amounts of data that must be contextualised and processed semantically. Much of this information is captured through complex sensor systems (e.g. image processing or speech recognition) but also from the web. The way how this information can be generated, processed and distributed depends heavily on the availability of appropriate standards. There are already many standards on knowledge modelling, most of them inherited from the ICT field (e.g. SQL, JSON, XML, OWL, and RDF) and a few from other domains (e.g. ISO 10303 for product manufacturing information and ISO 11783 for precision farming), but knowledge modelling for robotics is still a research topic and lacks the stability needed to build a comprehensive set of accepted standards that covers the requirement of all potential applications.

ONGOING STANDARDS DEVELOPMENT

The most relevant standards on robotics are led by ISO. Robotic markets are global and it does not make much sense to develop standards at national or regional level. So far, most of the standardisation efforts have been primarily driven by manufacturers of industrial robots and robotic components. Their engineering teams are well integrated in the various ISO technical committees. European manufacturers, such as ABB, Kuka and Comau are very active in this field. Also many outstanding European manufacturers of robotic components are involved in standardisation groups in their areas of expertise.

However, new players such as start-ups and SMEs developing highly innovative solutions and products suited to the next generation of robotics have not been involved in standardisation so far. Engaging and supporting them in participating in standardisation efforts and activities will strengthen Europe's position in the robotics industry.

EU-funded R&D projects also contribute to standardisation activities but to a lesser extent because their activities tend not to last enough to match the usually long timetables of standardisation work. When European projects are involved in standardisation, it tends to be through recipients of funding that are robot or robot-component manufacturers. It is important to strengthen the ties between EU R&I projects and SDOs, bringing project results into standardisation activities.

STANDARDS DEVELOPMENT

ISO

ISO TC on Robotics: ISO/TC 299 — Robotics.

http://www.iso.org/iso/iso_technical_committee?commid=5915511

IEEE

IEEE has standardisation and pre-standardisation activities in the field of robotics and automation, including navigation, applications for transportation and ethical considerations for the design of autonomous systems.
http://standards.ieee.org/develop/msp/robotics.pdf

OTHER ACTIVITIES RELATED TO STANDARDISATION

SPARC

PPP for the collaboration between European robotic industry, academia and the European Commission to facilitate the growth and empowerment of the robotics industry and value chain. It includes a working group on standardisation.
http://www.sparc.eu/;

H2020

R&D&I projects funded within topics ICT 24, ICT 25, ICT 26 and ICT 27 from Work Programme 2016-17 that may produce relevant input for standardisation.

CONSTRUCTION — BUILDING INFORMATION MODELLING

POLICY OBJECTIVES

The construction industry is one of the largest European industries but is also seen as relatively inefficient in both process and service delivery. It suffers from a comparatively low level of digitalisation and studies indicate that its productivity, compared to other sectors, has fallen in recent decades. Current practices lead to duplication of activities and increases in costs and timescales for the delivery of construction projects.

Construction clients and users typically receive poor operating information at handover of the built assets are handed over, so management of the asset portfolio could be improved.

The introduction of building information modelling (BIM) is seen as a solution to the management of this information during the four phases of the asset lifecycle: procurement; design; assembly and operation. The development of BIM is advancing rapidly and requires the application of common standards to ensure future compatibility in data exchange and use.

The introduction of common standards and operating methods using BIM would:

- reduce barriers to operation and trade across the European market area and beyond
- reduce both the capital and operating cost of construction assets
- reduce the time wasted because of inefficient breaks between productive construction processes
- improve the reliability of construction output, with better quality and fewer defects
- improve the resource efficiency of construction products and materials, improving both operating and embodied carbon performance.
- support improvements in team working and collaboration

LEGISLATION AND POLICY DOCUMENTS

AT EUROPEAN LEVEL

- **Directive 2014/24/EU** of the European Parliament and of the Council of 26 February 2014 on public procurement and repealing Directive 2004/18/EC, especially Art. 22
- **COM(2012) 433** Communication from the Commission to the European Parliament and the Council on the Strategy for the sustainable competitiveness of the construction sector and its enterprises {SWD(2012) 236 final}
- **Regulation (EU) No 305/2011** of the European Parliament and of the Council of 9 March 2011 laying down harmonised conditions for the marketing of construction products and repealing Council Directive 89/106/EEC

PROPOSED NEW ACTIONS ON STANDARDISATION

STANDARDS DEVELOPMENT

ACTION 1 Adopt ISO standards as EN-ISO standards or technical specifications, including ISO12006-3, ISO16739, ISO29481-2, ISO 22263:2008, ISO 29481-1:2016, and ISO 29481-2:2012.

ACTION 2 SDOs to develop European standards when necessary (i.e. if functional gaps are found or international standards are not available)

ACTION 3 Exchange information — Enhance the industry foundation classes (IFC) standards

ACTION 4 Develop information delivery manual (IDM) standards

OTHER ACTIVITIES AROUND STANDARDISATION

ACTION 5 SUPPORT DATA DICTIONARIES

ACTION 6 SUPPORT THE BIM EXECUTION PLAN (BEP)

STANDARDISATION NEEDS, ONGOING ACTIVITIES AND PROGRESS REPORT

COMMISSION PERSPECTIVE AND PROGRESS REPORT

CEN Technical Committee 442 on Building Information Modelling was officially kicked off in 2015. The aim is to help the construction sector to be more (cost) efficient and sustainable by enabling smooth data exchange and sharing between partners in the value chain.

The objectives of CEN/TC 442 are:

- to deliver a structured set of standards, specifications and reports which specify methodologies to define, describe, exchange, monitor, record and securely handle asset data, semantics and processes with links to geospatial and other external data.
- to be the home for European BIM standardisation. CEN/TC 442 will be the central place to go for coordinating European BIM harmonisation.
- to coordinate the work with ISO under the Vienna Agreement, either adopting existing international standards at European level or developing new ones in parallel
- to receive and consider proposals for new deliverables and develop them within the TC structure of working groups for the different scopes

ONGOING STANDARDS DEVELOPMENT

CEN
CEN/TC 442 Business Plan which can be found at the link below https://standards.cen.eu/dyn/www/f?p=204:7:0::::FSP_ORG_ID:1991542&cs=16AAC0F2C377A541DCA571910561FC17F

COMMON INFORMATION SHARING ENVIRONMENT (CISE) FOR THE EU MARITIME DOMAIN

POLICY OBJECTIVES

The global action's objective is to establish a common information sharing environment (CISE) enabling enhanced awareness and knowledge of what is happening at sea as an important contribution to efficiency in maritime operations and performance in all sectors within the EU maritime domain. This in turn will ultimately ensure safer, cleaner and more secure seas.

In line with the EU digital single market, this translates into seamless, more structured and trusted cross-sector and cross-border information exchange between public administrations across seven distinct maritime domains (maritime safety and security, marine environmental protection, fisheries control, border control, law enforcement, customs and defence).

CISE seeks therefore to develop appropriate semantic, technical, organisational and legal solutions and recommendations to enhance the interoperability between existing systems of around 400 maritime public authorities throughout the EU/EEA. As a result the systems become compatible and the content, speed and reliability of information exchange optimal, enabling improved security and sustainable development of economic maritime activities.

Cross-sector and cross-border interoperability between maritime surveillance systems is the major innovative aspect of the CISE. The technical solution proposed is mainly based on the CISE data and service model. Currently being tested in the major FP7 pre-operational validation project EUCISE 2020, the ICT specifications for this solution are also proposed for standardisation. This development could also benefit the European industry.

LEGISLATION AND POLICY DOCUMENTS

AT EUROPEAN LEVEL

- Communication from the Commission to the European Parliament and the Council Better situational awareness by enhanced cooperation across maritime surveillance authorities: next steps within the Common Information Sharing Environment for the EU maritime domain (COM/2014/0451 final)
- Commission Staff Working Document: 'Impact Assessment accompanying the communication from the Commission to the European Parliament and the Council Better situational awareness by enhanced cooperation across maritime surveillance authorities: next steps within the Common Information Sharing Environment for the EU maritime domain' (SWD/2014/0225 final)
- Council conclusions *Towards the integration of maritime surveillance: A common information sharing environment for the EU maritime domain,* 3092nd General Affairs Council meeting, Brussels, 23 May 2011
- Communication from the Commission to the Council and the European Parliament *Draft roadmap towards establishing the Common Information Sharing Environment for the surveillance of the EU maritime domain* (COM/2010/0584 final)
- *Council conclusions on integration of maritime surveillance,* 2974th External Relations Council meeting, Brussels, 17 November 2009
- Communication from the Commission to the Council the European Parliament, the European Economic and Social Committee and the Committee of the Regions *Towards the integration of maritime surveillance: A common information sharing environment for the EU maritime domain* {SEC(2009) 1341} (COM/2009/0538 final)

PROPOSED NEW ACTIONS ON STANDARDISATION

STANDARDS DEVELOPMENT

ACTION 1 Based on the existing CISE data and service model, complete semantic and technical interoperability specifications to exchange surveillance information between competent authorities could be standardised.

OTHER ACTIVITIES AROUND STANDARDISATION

ACTION 2 **The complementary actions could be developed in addition to the standardisation action:**

- Maintenance of the collaborative platform for publishing technical and operational documentation ("the CISE eHandbook") from 2017. This platform will allow feedback to be collected from the future CISE participants (Member States and Authorities)

- Development of a reference implementation of the CISE software components to facilitate the adoption of CISE by interested authorities.
- Development of a testing platform to assess whether the CISE interface developed by the national authorities complies with the standardised specifications.
- Development of template service level agreement or memorandum of understanding for the future agreements on sharing information between Member States

STANDARDISATION NEEDS, ONGOING ACTIVITIES AND PROGRESS REPORT

COMMISSION PERSPECTIVE AND PROGRESS REPORT

The objective is to reach firm agreement on the CISE data and service model with all the stakeholders involved in maritime surveillance in Europe. This interoperability agreement should encourage Member States to invest more resources in the exchange of maritime surveillance information across Europe with CISE, thus ensuring the long-term sustainability of the programme.

The present version of the CISE data and service model was developed in 2014 by a pilot project (the CISE cooperation project) involving 28 partners from 12 European countries and covering different sea basins and different sectors.

The EUCISE 2020 FP7 project (CISE pre-operational validation) will develop the CISE components using the CISE data and service model and validate them in a pre-production environment. This project involves 37 authorities from 13 European countries.

ONGOING STANDARDS DEVELOPMENT

ISO

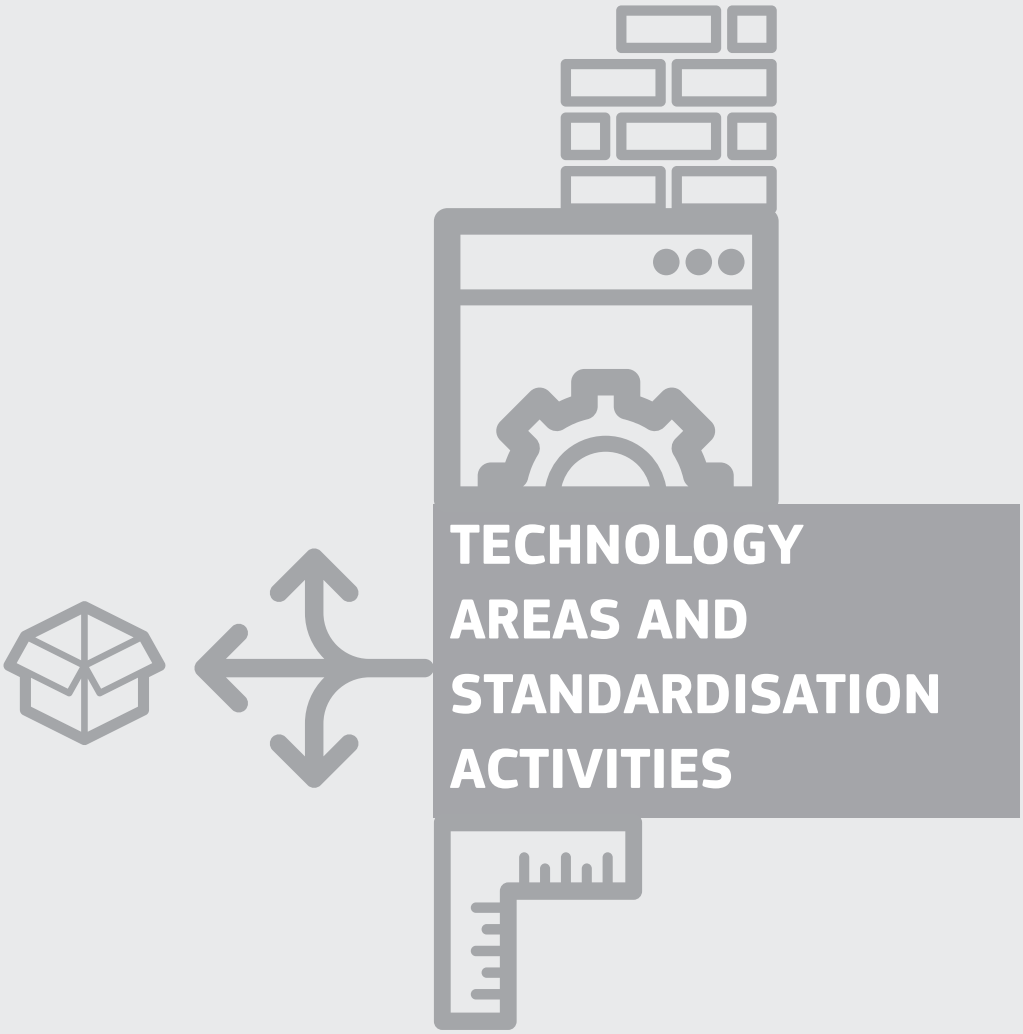
ISO/TC 8: Ships and marine technology
http://www.iso.org/iso/iso_technical_committee?commid=45776

ISO/TC8 new focus items include:

- Cyber safety
- Electronic certification for port entry; data harmonisation, e-Navigation, IHO
- Ships' Energy Efficiency, EEOI, reductions in emissions from ships in freight transport

Projects include:

- ISO 19847, Ships and marine technology -- Shipboard data servers to share field data on the sea
- ISO 19848, Ships and marine technology -- Standard data for shipboard machinery and equipment



TECHNOLOGY AREAS AND STANDARDISATION ACTIVITIES

HORIZONTAL CONCEPTS FOR ICT INFRASTRUCTURES

Standardisation organisations often address horizontal issues, that is, issues that may be applicable to various policy areas, issues linked to what we could call core concepts or an ICT infrastructure. This may refer to work done in global open standards organisations which develop standardised technology components that are widely deployed or work done in formally recognised standards organisations including the ESOs. Rather than mapping these standards developed one-to-one to specific policy areas, the standards should be considered as building blocks. Metaphorically, one could see these technologies such as Lego pieces that can be utilised to build complex architectures.

Moreover, there are certain basic background matters of a horizontal character and those thus apply to many of the policy areas and are not sector specific. A prime example is data privacy, where standardisation in general is asked to consider privacy aspects and include them generically into the design and development process. Others include security (see below) and — for some specific standards areas — accessibility.

These horizontal concepts and the respective standards are not always considered in the specific policy areas listed in in the specific policy areas listed in previous chapters which because of this may appear incomplete. are consequently incomplete. Therefore, the relevant aspects will be addressed below in order to draw the attention to these horizontal technologies.

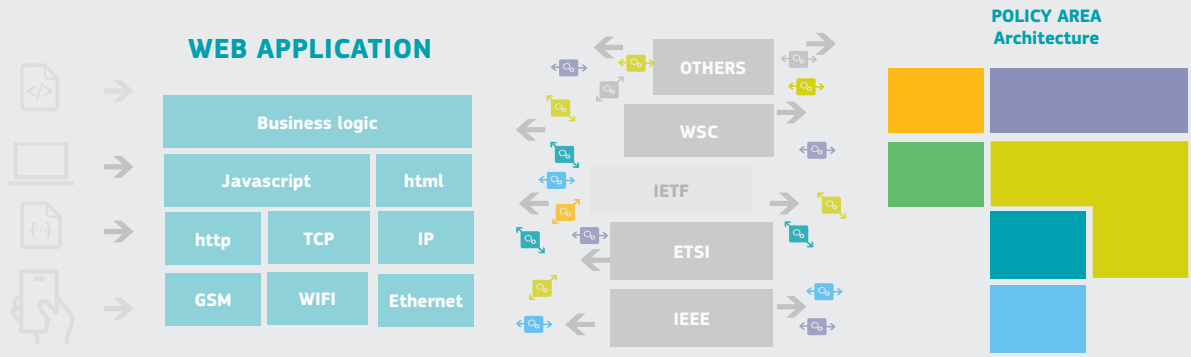
It is quite often the case that technologies standardised and maintained by one of the standards organisations depend on one another. Therefore, in order to specify a standardised solution for a specific policy requirement one might need to use, for example, a scripting standard (Ecma International) with specific object security (IETF) to be used within a web service (W3C) that runs on top of a transport layer using specific security architectures (both IETF) which in turn runs on Ethernet (IEEE) and communicates with other systems over wireless networks (IEEE and ETSI).

Utilising relevant specifications will lower the costs of the implementation and reduce specification overhead, thereby significantly lowering costs and risks in reaching results for the key policy goals. It is therefore recommended that while solutions in these policy areas are being standardised, elements are being considered for use; those who develop solutions should bring their requirements and/or solutions to those global open standards development organisations when appropriate.

Architects and implementers are encouraged to seek applicable building blocks and have them submitted for identification if they have not been identified yet.

Likewise, CAMSS (Common Assessment Method for Standards and Specifications) created by the ISA Programme, is a method to assess standards and specifications in the field of ICT based on the best practices of Member States and aligned with the Regulation on Standardisation (No 1025/2012). The CAMSS method is a sound and standardised instrument ensuring that the assessments and selections of standards and specifications are made in a way which ensures their consistency for increasing interoperability between EU Member States in the area of eGovernment and therefore creating synergies and economies of scale.

The following drawing illustrates those horizontal technology layers which provide building blocks for ICT infrastructures and systems:



Vertical areas will as much as possible use the same, or compatible, building block technologies when they have to work together. Given future standard development done by separate standards development organisations, particular attention should be given to ensure that, e.g. the digital identity format, the security/privacy framework, or the data ontology languages used in eHealth, e-Invoicing or eEmergency are interoperable, and interoperable with the relevant building blocks used by Web and the Internet platforms as well.

Even within a single SDO with a broad scope, there is a need to avoid the development of different solutions for the horizontal areas.

TECHNOLOGY AREAS, MAJOR BUILDING BLOCKS AND RELEVANT ORGANISATIONS

The part below provides a very high-level illustrative outline61 of the relevant horizontal technology areas. [2]

For each area examples of major technology building blocks that are covered are listed. Moreover those standards development organisations are listed which have major activities ongoing in the respective technology area and which can act as a source for further information and for providing relevant specifications.

This section serves to illustrate the wealth of commonly available and globally deployed building blocks without the intention of providing a detailed inventory or roadmap.

TECHNOLOGY AREA: PHYSICAL AND LINK

SCOPE: COVERS TECHNOLOGIES THAT ALLOW DEVICES TO CONNECT TO OTHER DEVICES, PHYSICAL AND TRANSMISSION SPECIFICATIONS

TECHNOLOGY BLOCKS COVERED

Cabling, USB, BUS specifications,, Ethernet, WIFI, GSM, LTE, Signalling and framing specifications

ORGANISATIONS ACTIVE IN THESE AREAS

CENELEC
ETSI
IEEE
ISO/IEC
ITU-T
JEDEC
TIA
USB-IF

TECHNOLOGY AREA: INTERNET-WORKING TECHNOLOGIES

SCOPE: COVERS TECHNOLOGIES THAT ALLOW HOSTS OR APPLICATIONS ON INDEPENDENT NETWORKS TO COMMUNICATE TO EACH OTHER.

TECHNOLOGY BLOCKS COVERED

IP level technologies. For example, Binding to lower layers, Mobility solutions, Rendezvous, Locator/Identifier splits, Home networks, Tunnelling, and DNS, intra and inter domain routing, virtual networking, multi-cast, congestion control mechanism, TCP maintenance, and various traffic optimisation mechanisms

ORGANISATIONS ACTIVE IN THESE AREAS

ETSI
IETF
ITU-T

TECHNOLOGY AREA: APPLICATIONS

The Applications area covers the session presentation and application layer in the OSI model. The ordering below is somewhat arbitrary.

APPLICATIONS: MESSAGING AND MEDIA

SCOPE: COVERS SESSION PROTOCOLS AND ARCHITECTURES, AND PLATFORM TECHNOLOGIES.

TECHNOLOGY BLOCKS COVERED

Application layer protocols. For example, various e-mail standards, HTTP, LDAP Internet based telephony (SIP and RTP), internet messaging (XMPP), emergency services, geolocation, and web platform (HTML, Cookies, XML, EcmaScript).

ORGANISATIONS ACTIVE IN THIS AREA

Ecma
ETSI
IETF
IEEE
W3C
XMS

61 In order to achieve better comprehension, the areas are somewhat aligned with the OSI or Internet Layer model, but the mapping is not necessarily exact nor is the positioning of technology blocks in the areas.

APPLICATIONS; PRESENTATION AND INTERFACING

SCOPE: COVERS INTERFACING AND HUMAN INTERACTION

TECHNOLOGY BLOCKS COVERED

Fonts, Internationalization, Audio and Video Codecs, Accessibility standards, File formats (jpeg, SVG), APIs, Cascading style sheets

ORGANISATIONS ACTIVE IN THIS AREA

Ecma
ETSI
IETF
ITU-T
MPEG
Unicode
W3C

APPLICATIONS: BUSINESS LOGIC

SCOPE: COVERS AREA SPECIFIC COMMUNICATION ASPECTS THAT ARE SPECIFIC TO APPLICATION AREAS

TECHNOLOGY BLOCKS COVERED

XML based document definitions, generic data models, business semantics, and Modelling Languages)

ORGANISATIONS ACTIVE IN THIS AREA

CEN
OASIS
OMG
UN/CEFACT
W3C

TECHNOLOGY AREA: SECURITY AND PRIVACY

SCOPE: SECURITY AND PRIVACY IS THE BROADEST OF THE TECHNOLOGY AREAS. IT IS PART OF HORIZONTAL BUT ALSO PART OF THE COMPLETE VERTICAL STACK AND, THEREFORE, MAY BE SEEN AS “CROSS-AREA”. THE BUILDING BLOCKS HEREIN CAN BE SOLUTIONS BY THEMSELVES OR BE APPLIED AS PART OF SOLUTIONS.

TECHNOLOGY BLOCKS COVERED

Internet Public Key

Internet infrastructure (x.509 based)

web authorisation

JavaScript signing and encryption

transport layer security mechanism (TLS)

Authentication information exchange mechanisms (SAML)

Privacy enhancement mechanisms

ORGANISATIONS ACTIVE IN THESE AREAS

CEN
ETSI
ISO/IEC
ITU-T
IEEE
IETF
OASIS
W3C

ANNEX I — LIST OF MEMBER STATES' WORK PLANS AND STRATEGIES

This Annex provides a list of links to strategy documents, policies and work plans on ICT standardisation that are available in the Member States, sometimes comprising several links depending on the respective document structuring in Member States. This list is for reference only. It does not claim completeness and only represents a current snap shot.

FRANCE

French digital strategy:
http://www.redressement-productif.gouv.fr/feuille-der-oute-pour-le-numerique;
Framework for interoperability and security:
http://references.modernisation.gouv.fr/rgi-interoperabilite

GERMANY

Digital Agenda for Germany:
http://www.bmwi.de/DE/Themen/Digitale-Welt/digi-tale-agenda.html
German ICT Strategy:
http://bmwi.de/EN/Topics/Technology/ict-strategy.html

ITALY

Agenda Digitale for Italy:
http://www.agid.gov.it/agenda-digitale

NETHERLANDS:

Dutch Digital Agenda, change, trust, accelerate (2016):
https://www.rijksoverheid.nl/onderwerpen/ict/documenten/rapporten/2016/07/05/digitale-agenda-vernieuwen-vertrouwen-versnellen
2017 Interact digitally with the public services :
https://www.digitaleoverheid.nl/digitaal-2017
Standardisation Forum and Board:
https://zoek.officielebekendmakingen.nl/st-crt-2011-23581.html
Documents related to Open Connection:
https://www.google.nl/url?sa=t&rct=j&q=&esrc=s&-frm=1&source=web&cd=1&cad=rja&ved=0C-C4QFjAA&url=https%3A%2F%2Fwww.ictu.nl%2Farchief%2Fnoiv.nl%2Ffiles%2F2009%2F12%-2FAction_plan_english.pdf&ei=h9VfUu2cNOaq7Q-b89YHgAw&usg=AFQjCNFUTf0oXCkDj5jv8RY88gq6m-H3UTQ&sig2=c4_dIip0VBnS2ReRDVI-yw
I-Nup:
http://www.rijksoverheid.nl/documenten-en-publicaties/kamerstukken/2011/05/30/aanbiedingsbrief-over-heidsbrede-implementatieagenda-voor-dienstverlen-ing-en-e-overheid-i-nup.html
Comply or explain policy for open standards:
https://zoek.officielebekendmakingen.nl/stcrt-2008-837.html
Open standards policy on the website of the Dutch Standardisation Forum:
https://www.forumstandaardisatie.nl
Check secure internet connection / website/ email:
https://www.internet.nl

SPAIN:

Digital Agenda for Spain:
http://www.agendadigital.gob.es/digital-agenda/Paginas/digital-agenda-spain.aspx
Spanish National Cybersecurity Strategy:
http://www.lamoncloa.gob.es/documents/20131332estrategiadeciberseguridadx.pdf
Spanish National Interoperability Framework, English version:
http://administracionelectronica.gob.es/pae_Home/dms/pae_Home/documentos/Estrategias/pae_Interoperabilidad_Inicio/pae_Esquema_Nacional_de_Interoperabilidad/ENI_INTEROPERABILITY_ENGLISH_3.pdf
Original Spanish version:
http://www.boe.es/boe/dias/2010/01/29/pdfs/BOE-A-2010-1331.pdf)
Strategy on Technical Interoperability Standards:
http://administracionelectronica.gob.es/pae_Home/pae_Estrategias/pae_Interoperabilidad_Inicio/pae_Normas_tecnicas_de_interoperabilidad.html#.UnI2QlPFnzs
Technical Interoperability Standard for the Catalogue of Standards, English version:
http://administracionelectronica.gob.es/pae_Home/dms/pae_Home/documentos/Estrategias/pae_Interoperabilidad_Inicio/LEGISLACION_2012_BOE-A-2012-13501_Catalogue_of_standards_ENI_publicacion_oficial_2012/Catalogue%20of%20Standards%20NIF%20Spain.pdf
Official Spanish version:
http://www.boe.es/diario_boe/txt php?id=BOE-A-2012-13501 plus
http://www.boe.es/diario_boe/txt. php?id=BOE-A-2013-455

SWEDEN:

Swedish Digital Agenda:
http://www.government.se/sb/d/2025/a/181914
Swedish strategy for eGovernment:
http://www.regeringen.se/sb/d/15700/a/206004

SWITZERLAND:

Strategy of the Federal Council for an Information Society in Switzerland 2016:
https://www.bakom.admin.ch/bakom/en/homepage/digital-switzerland-and-internet/strategie-digitale-schweiz.html
National strategy for the protection of Switzerland against cyber risks
https://www.isb.admin.ch/isb/en/home/themen/cyber_risiken_ncs.html
eGovernment Strategy Switzerland
https://www.egovernment.ch/en/umsetzung/e-government-strategie/

UNITED KINGDOM:

UK government policy on standardisation;
https://www.gov.uk/innovation-standardisation--4
Strategy on ICT:
https://www.gov.uk/government/publications/information-economy-strategy
Strategy on spectrum:
https://www.gov.uk/government/publications/spectrum-strategy
ICT infrastructure consultation:
https://www.gov.uk/government/consultations/digital-communications-infrastructure-strategy-consultation
Internet of Things development
https://www.gov.uk/government/collections/internet-of-things-review
Plans and progress on theNational Cybersecurity Strategy (NCSP)
https://www.gov.uk/government/publications/national-cyber-security-strategy-2-years-on
Government ICT procurement and the use of standards
https://www.gov.uk/government/publications/open-standards-principles/open-standards-principles
http://standards.data.gov.uk/

ANNEX II: LIST OF LINKS TO STANDARDS BODIES' WEB SITES WITH UP-TO-DATE INFORMATION ON ONGOING WORK

This Annex provides a list of links to repositories of standards development organisations where information on projects and ongoing work relevant to the EU policy priorities can be found. The list does not claim completeness and may incrementally be increased.

CEN

http://www.cen.eu/cen/Sectors/Sectors/ISSS/Pages/default.aspx

CENELEC

http://www.cenelec.eu/aboutcenelec/whatwedo/technologysectors/Informationandcommunicationtechnology.html

ETSI

ETSI work programme:
http://www.etsi.org/images/files/WorkProgramme/etsi-work-programme-2013-2014.pdf
http://webapp.etsi.org/workprogram/SimpleSearch/QueryForm.asp

ECMA:

https://www.ecma-international.org/

IEEE:

IEEE entry to standardisation activities relevant to the Rolling Plan:
http://standards.ieee.org/develop/msp/index.html

IETF:

IETF entry to standardisation activities relevant to the Rolling Plan:
http://trac.tools.ietf.org/group/iab/trac/wiki/Multi-Stake-Holder-Platform

OASIS

Current standards projects:
https://www.oasis-open.org/committees/
Standards projects by topical category:
https://www.oasis-open.org/committees/tc_cat.php

W3C:

Current list of W3C active Groups:
https://www.w3.org/Consortium/activities

ANNEX III: TERMS, DEFINITIONS AND ABBREVIATIONS

EUROPEAN STANDARDS ORGANISATIONS (ESO)

The three European standards organisations are listed in Annex I to Regulation 1025/2012/EU, i.e. CEN, Cenelec and ETSI. Among other activities, they adopt European standards.

EUROPEAN MULTI-STAKEHOLDER PLATFORM ON ICT STANDARDISATION (MSP)

The MSP is an advisory group to the Commission on matters relating to the implementation of standardisation policy for information and communications technology (ICT), including its work programme, priority-setting in support of legislation and policies, and identification of specifications developed by global ICT standard development organisations. It is composed of members of the national authorities of Member States and EFTA countries, industry associations, societal stakeholders and organisations representing ICT standardisation stakeholders.

http://ec.europa.eu/transparency/regexpert/index.cfm?do=groupDetail.groupDetail&groupID=2758

ANNUAL UNION WORK PROGRAMME ON EUROPEAN STANDARDISATION (AUWP)

The AUWP is a formal document adopted by the Commission identifying the strategic priorities for European standardisation, taking into account Union long-term strategies for growth.

http://ec.europa.eu/growth/single-market/european-standards/policy/index_en.htm

MAIN ABBREVIATIONS

AAL	Active assisted living
ADMS	Asset Description Metadata Schema
AG	Amsterdam Group
AIOTI	Alliance for Internet of Things Innovation
AM	Additive manufacturing
AMNPO	Advanced Manufacturing National Program Office
AMQP	Advanced message queuing protocol
APT	Asian Pacific Telecommunication
BIM	Building information modelling
BSI	British Standards Institution
CBOR	Concise Binary Object Representation
CCEV	Core Criteria/Evidence Vocabulary
CEF	Connecting Europe Facility
CERIF	Common European research information format
CII	Cross-Industry Invoice
CIP	Competitiveness and innovation framework programme
CIS	Consent & information sharing
CISE	Common Information Sharing Environment
CITS	Collaboration on ITS Communication Standards
CMS	Content management systems
COAP	Constrained Application Protocol
COC	Code of conduct
CORE	Constrained Restful Environments
CPS	Cyber-physical systems
CSA	Coordination and support action
CSC	Cloud Standards Coordination
CSCC	Cloud Standards Customer Council
CSCG	Cybersecurity Coordination Group
CSI	Cities Standards Institute
DECT	Digital enhanced cordless telecommunications
DOA	Digital object architecture
DSM	Digital single market
DSRC	Dedicated short-range communications
ECC	Electronic Communications Committee
ECEP	European common enforcement priorities
EEAP	European electronic access point
EETS	European Electronic Toll Service
EFC	Electronic fee collection
EFFRA	European Factories of the Future Research Association
EMSFEI	European Multi-Stakeholder Forum on e-Invoicing
EPC	European Payment Council
EPS	Electric Power System
ERN	European Reference Networks
ERPB	Euro retail payments board
ESEF	European single electronic reporting format
ESMA	European securities and market authority
ESO	European standards organisations
ESOP	European Statement of Principles
ESPD	European single procurement document
EUPP	Energy using and producing products
EV	Electric vehicles
EXEP	Expert group on e-Procurement
FIBO	Financial industry business ontology
GDC	GREEN DIGITAL CHARTER
GICTF	Global Inter-Cloud Technology Forum
HAN	Home automation networks
HMI	Human-Machine-Interaction
HON	Health On the Net
HRM	Human resources management
HTG	Harmonisation Task Groups
IAB	Internet architecture board
IBOPS	Identity-based attestation and open exchange protocol specification
ICT	Information and communication technologies
IDM	Information delivery manual
IDMP	Identification of medicinal products
IFC	Industry foundation classes
IFM	Interoperable fare management
IFRS	International financial reporting standards
IMF	Interoperable master format
INSPIRE	Infrastructure for Spatial Information in the European
IOT	Internet of Things
ISA	Interoperability solutions for public administrations
ISMS	Information security management systems
ITLET	Information Technology for Learning, Education and Training
ITS	Intelligent Transport Systems
JISC	Japanese Industrial Standards Committee
KET	Key enabling technologies
KMIP	Key management interoperability protocol
KPI	Key performance indicators
KTN	Knowledge Transfer Network
LOD	Linked open data
LSP	Large scale pilot
MOOC	Massive open online course
MOU	Memorandums of understanding
MQTT	Message Queuing Telemetry Transport
NFC	Near field communication
NSF	Network security function
OAM	Officially appointed mechanisms
OASC	Open & Agile Smart Cities
OCC	Open Cloud Consortium
OGC	Open Geospital Consortium

OGF Open Grid Forum
OMG Object Management Group
PACS Picture archive and communication systems
PCHA Personal Connected Health Alliance
PII Personally identifiable information
PLC Power line communication
PMRM Privacy management reference model
PO Publications Office
POS Point of sale
PPP Public-Private Partnership
PPS Production planning & scheduling
PSA Programme Support Action
PSAP Public safety answering point
PSI Public sector information
QKD Quantum key distribution
QOE Quality of experience
QOS Quality of service
QSC Quantum safe cryptography
R&TTE Radio Equipment and Telecommunications Terminal Equipment
RAN Radio access networks
RAS Robotics and autonomous systems
RDA Research Data Alliance
RE Renewable Energy
REEIF Refined eHealth European Interoperability Framework
RES Renewable energy sources
RTS Regulatory technical standards
SAGA Strategic Advisory Group on Accessibility
SAML Security assertion markup language
SBR Standard business reporting
SCIM System for Cross-domain Identity Management
SEIF Semantic energy information framework
SEPA Single euro payments area
SGCC State Grid Corporation of China
SIP Strategic Implementation Plan
SLA Service level agreement
SME Small and medium-sized enterprises
SMPTE Society of Motion Picture and Television Engineers
SNIA Storage Networking Industry Association
SSP Smart Secure Platform
STA Smart Ticketing Alliance
STIR Secure Telephone Identity Revisited
TARV Telematics applications for regulated commercial freight vehicles
TC Technical committee
TGF Transformational Government Framework
TOSCA Topology and Orchestration Specification for Cloud Applications
TR Technical Report
TS Technical specification
TSP Trust service providers
UAAG User Agent Accessibility Guidelines
ULE Ultra-low energy
UPS Uninterruptible power sources
VIN Vehicle Identification Number
VOT Vectors of Trust
VRU Vulnerable Road Users
WAVE Wireless Access in Vehicular Environments
WCAG Web Content Accessibility Guidelines
WCPS Web coverage processing service
XDI XRI data interchange