ILNAS

STANDARDS ANALYSIS
ICT SECTOR
LUXEMBOURG

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ANEC

Executive summary

In 2012 the "*Institut Luxembourgeois de la Normalisation, de l'Accréditation, de la Sécurité et qualité des produits et services*" (ILNAS) initiated an analysis of European and international standards in the Information and Communication Technology (ICT) sector. The aim of this analysis is to develop an information and exchange network for ICT standardization knowledge in the Grand Duchy of Luxembourg. Since 2013, this analysis has been carried out in the frame of the implementation of the "Luxembourg's policy on ICT technical standardization" (which was last updated in 2015)[1].

The ICT sector is already involved at the national standardization level with 69 national delegates currently registered by ILNAS[2]. These delegates participate in standardization technical committees and follow closely the work performed at international level. Moreover, the national delegates also ensure that the views and positions of Luxembourg are understood and known by the technical committees. ILNAS recognizes the effort and support provided by this network of experts. Nevertheless, ILNAS is convinced that this sector could be more represented in terms of delegates and experts in technical standardization, especially since some ICT areas do not yet benefit from a sufficient representation of national delegates (e.g.: Internet of Things, Cloud Computing, Big Data, Smart Cities). Thus, the purposes of this analysis are firstly, to provide useful information to national stakeholders regarding standardization activities in the field of ICT and secondly, to attract and involve them into an integrated and innovative approach of standardization.

Conducted in several steps, this survey follows a methodology built on a standards watch that allows the identification of standardization technical committees related to the ICT sector at the European and international level. Moreover, detailed information concerning the most interesting formal and non-formal standardization technical committees is provided in the present report. It also provides pathways for the national economic development by identifying niche opportunities and recent or emerging topics from a standardization point of view. Lastly, the connections between the ICT sector and other economic sectors active in the Grand Duchy of Luxembourg are specified through the definition of Smart ICT subsectors that could support development of other domains (e.g.: eHealth, Smart Manufacturing, Smart Energy, etc.).

This report is conceived as a practical tool to quickly identify issues and interests for the national stakeholders of the ICT sector. Published for the first time in November 2012, the present report constitutes the seventh version of this analysis, which will continue to evolve according to national market needs.

[1] https://portail-qualite.public.lu/content/dam/qualite/fr/publications/normes-normalisation/orientations-strategiques/politique-luxembourgeoise-pour-la-normalisation-technique-des-tic-2015-2020/policy-ict-technical-standardization-2015-2020.pdf

[2] National register of standardization delegates (February 2017)

Preface

The "*Institut Luxembourgeois de la Normalisation, de l'Accréditation, de la Sécurité et qualité des produits et services*" (ILNAS) is an administration under the supervision of the Minister of the Economy in Luxembourg. It was created on the basis of the law of May 20, 2008 (which has been repealed by the law of July 4, 2014, regarding the reorganization of ILNAS) and started its activities on June 1, 2008. For reasons of complementarity, effectiveness and transparency as well as for purposes of administrative simplification, ILNAS is in charge of several administrative and technical legal missions that were previously the responsibility of different public structures. These assignments have been strengthened and new tasks have since been assigned to ILNAS corresponding to a network of skills for competitiveness and consumer protection.

Through its Digital Trust department, ILNAS carries out different legal missions in the field of Information and Communication Technology (ICT). In addition, ILNAS commissioned the Economic Interest Grouping "*Agence pour la Normalisation et l'Économie de la Connaissance*" (ANEC GIE) to organize an information and exchange network dedicated to ICT standardization knowledge. Essentially, this particularly consists in following the relevant technical committees in the ICT field, including the joint standardization committee ISO/IEC JTC 1 of the International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC). This mission aims to achieve excellence in the ICT sector and additionally, to support the national (digital) economy in order to remain competitive and effective.

To promote standardization in Luxembourg, a national standardization strategy, approved by the Minister of the Economy, had been drawn up by ILNAS in June 2010 for the decade 2010-2020. This national strategy, directly related to the Horizon 2020 strategy of the European Union, has been updated in January 2014 with the "Luxembourg Standardization Strategy 2014-2020"[3], with a current position that can be summarized by the motto: "Technical standardization as a service".

To meet the new priorities, the strategy is based on the three following pillars in which the ICT sector is now one of the cornerstones:

1. Information and Communication Technologies (ICT)

Given the dynamism and the vital importance of the ICT sector for the national market:

- Continued support and development of the standardization field dedicated to ICT (also in terms of education and *ad hoc* promotion) according to the "Luxembourg's policy on ICT technical standardization", updated in 2015[4];
- Detection of niche opportunities for national economic developments.

[3] https://portail-qualite.public.lu/content/dam/qualite/fr/publications/normes-normalisation/orientations-strategiques/strategie-normative-2014-2020/luxembourg-standardization-strategy-2014-2020.pdf

[4] https://portail-qualite.public.lu/content/dam/qualite/fr/publications/normes-normalisation/orientations-strategiques/politique-luxembourgeoise-pour-la-normalisation-technique-des-tic-2015-2020/policy-ict-technical-standardization-2015-2020.pdf

2. National influence and compliance with legal attributions

In order to increase the influence of Luxembourg:

- Strengthen the representation of the Grand-Duchy of Luxembourg within European and international standards organizations;
- Active support in respecting legal attributions in terms of European standardization;
- Detection of opportunities for the national economic market.

3. Products and services

- Support through products and services [5] in the field of standardization (diagnostic, awareness/training sessions, targeted watch, sector-based analysis, etc.), mainly upon requests of the national market.

Moreover, as mentioned in the national standardization strategy, the "Luxembourg's policy on ICT technical standardization 2015-2020" aims to strengthen the national ICT sector in its involvement in standardization activities through three leading projects:

- Developing the interest and the involvement of the national market;
- Promoting and reinforcing the participation of the national market;
- Supporting and strengthening the Education about Standardization and research activities related to standardization.

Since October 2010, ILNAS has been supported by ANEC GIE in implementing the national standardization strategy. The role of ANEC GIE is to support the development of standardization and metrology activities at the national level and particularly to promote the benefits of participating in standardization.

Its mission is to raise awareness, deliver trainings and monitor the developments in the fields of standardization and metrology. ANEC GIE also has assignments in applied research in order to support the competitiveness of companies in Luxembourg. Thus, ILNAS, with the support of ANEC GIE, can effectively contribute to the economic diversification policy pursued by the Government in niches for economic developments.

In this context, ILNAS commissioned ANEC GIE, through the "Luxembourg's policy on ICT technical standardization", to carry out an analysis of European and international standards of the ICT sector, which is presented in this document. Indeed, in line with the priorities set by the Government of the Grand Duchy of Luxembourg, this sector has long been identified as a carrier for the national economy.

[5] https://portail-qualite.public.lu/fr/normes-normalisation/produits-et-services.html

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1. INTRODUCTION

The sector of Information and Communication Technologies (ICT) is a keystone of the worldwide economy. It provides pervasive support to all other sectors of activity. It helps organizations to reduce costs, boost innovation, improve processes and makes the public sector faster and more citizen-friendly. As systems become more and more intricate, the growth of the ICT sector is now driven by the ability of its component parts to interoperate ("to talk to each other"). Standards can allow this interoperability between different products from different manufacturers. Thus, economic growth of and through ICT is tied to the related standardization activities.

The ICT sector is an active sector at the national standardization level composed by 69 national delegates, which are national experts registered and involved in a standardization committee. Even if this participation is already significant (more than a quarter of the delegates registered in all the economic sectors), ILNAS continues to work on the development of this key sector for the economy. In this way, it undertakes several activities in order to develop a network of experts, support the transfer of knowledge and education about ICT standardization to national stakeholders, and strengthen their participation in related technical committees[6]. To reach these objectives, ILNAS is notably working with the University of Luxembourg to develop standards-related education and research. They have launched the University Certificate *Smart ICT for Business Innovation* in 2015, with the aim to provide standards-based knowledge on the main emerging and current Smart ICT domains at a national level. The course, spanning two semesters, was successfully completed in 2016 and a second class will be organized at the beginning of 2018. Moreover, ILNAS and the University of Luxembourg are also currently developing a research program whose objective is to analyze and extend standardization and digital trust knowledge in the Smart ICT areas of Cloud Computing, Internet of Things and Big Data. This project will also contribute to the evolution of the University Certificate and will serve as a basis for a future Master Program *Smart Secure ICT for Business Innovation* expected in 2019.

In this framework, this analysis of European and international standards constitutes a standardization knowledge base, which serves in all ICT-related developments lead by ILNAS. It has been started in 2012 and is regularly extended and improved thanks to the experience acquired in ICT standardization since the beginning of this project. This is the seventh version of the report, which will continue to be updated on a regular basis according to market interests. It contributes directly to raise awareness, interest and facilitate the access to ICT standardization information to national stakeholders. The main contribution of this document lies in the focus on ICT technical committees and the detection of niche opportunities for economic development at the national level. The purpose is to inform national stakeholders of the ICT sector about the main standardization activities and to offer them guidance for a potential future involvement in the standardization process.

Achieving this objective will support the ICT sector in terms of competitiveness, visibility and performance, while improving the international recognition of the Grand Duchy of Luxembourg in the standardization community.

[6] Note: In this report, the term "standardization technical committee" is generic and covers "technical committees", "subcommittees", "working groups", etc.

This analysis of European and international ICT standards has been realized in several steps:

- Execution of a watch on technical standardization committees and related standards (both published and under development), at the European and international levels;
- Definition of ICT subsectors to facilitate the mapping and identification of relevant technical committees;
- Presentation of the standards watch results using identification cards distributed across the ICT subsectors;
- Preparation of a final report of analysis and standardization-related opportunities for national stakeholders.

The report is organized as follows. After introductory chapters dedicated to standardization in general (**Chapter 2**) and the context of the ICT sector (**Chapter 3**), the method applied for the standards analysis is described in **Chapter 4**.

Chapter 5 then presents the main results of the standards analysis. The chapter offers an overview of the different subsectors and the technical committees identified for the ICT sector. Then, based on the results of the standards watch, **Chapter 6** is dedicated to a detailed presentation of the selected technical committees at European and international levels. It is organized by subsector (i.e., Cloud Computing, Internet of Things, Telecommunications, etc.), providing a prompt access to information for a specific technical committee.

To go further with the results of the standards analysis, **Chapter 7** presents opportunities related to standardization for national stakeholders, giving a general perspective about all the benefits of standardization.

Finally, the **Conclusion** provides a summary of the document and reiterates the commitment of ILNAS and ANEC GIE to assist national entities with their involvement in standardization.

In addition, the **Appendix** provides some complementary information regarding the process to follow in order to register in a technical committee, a list of the acronyms used in the report, as well as a table detailing some additional standardization entities, including ICT *Fora/Consortia* developing *de facto* standards.

2. STANDARDS AND STANDARDIZATION

2.1. DEFINITIONS

❖ ILNAS:

This acronym designates the "*Institut Luxembourgeois de la Normalisation, de l'Accréditation, de la Sécurité et qualité des produits et services*". ILNAS is an administration under the authority of the Minister of the Economy. It was created by the amended law of May 20, 2008, and began its activities on June 1, 2008. Since August 1, 2014, the law on the reorganization of ILNAS, dated July 4, 2014, constitutes the new legal basis of the administration.

❖ OLN:

This acronym designates the "*Organisme luxembourgeois de normalisation*". OLN is an ILNAS department, which fulfills the ILNAS missions as the national standards body, according to the law of July 4, 2014. It is a member of the European (CEN, CENELEC and ETSI) and international (ISO and IEC) standardization organizations.

❖ ANEC GIE:

This acronym designates the Interest Economic Grouping *"Agence pour la Normalisation et l'Economie de la Connaissance".* ANEC GIE was created in October 2010 by ILNAS,"*Chambre de Commerce*", "*Chambre des Métiers*" and STATEC. It is divided into 3 departments: Standardization, Knowledge-based Economy and Metrology. The role of the standardization department of ANEC GIE is to implement the national standardization strategy established by ILNAS in order to support the development of standardization activities at national level and to promote the benefits of participating in the standardization process.

❖ STANDARDIZATION:

Standardization corresponds to the definition of voluntary technical or quality specifications with which current or future products, production processes or services may comply. Standardization is organized by and for the stakeholders concerned based on national representation (CEN, CENELEC, ISO and IEC) and direct participation (ETSI and ITU-T), and is founded on the principles recognized by the World Trade Organization (WTO) in the field of standardization, namely coherence, transparency, openness, consensus, voluntary application, independence from special interests and efficiency. In accordance with these founding principles, it is important that all relevant interested parties, including public authorities and small and medium-sized enterprises, are appropriately involved in the national, European and international standardization process[7].

❖ STANDARD:

A standard is a "*document established by consensus and approved by a recognized body that provides, for common and repeated use, rules, guidelines or characteristics for activities or their results, aimed at the achievement of the optimum degree of order in a given context*"[8].

They have a national, regional or international concern. Standards are created by bringing together all interested parties, such as manufacturers, consumers and regulators of a particular material, product, process or service. All parties benefit from standardization. Several categories of standards exist: core standards, standards of analysis and testing, standards of specifications, methodological standards, etc.

[7] Based on: Regulation (EU) N°1025/2012 of the Parliament and of the Council

[8] ISO/IEC Guide 2:2004, ISO/IEC Guide 2:2004, *Standardization and Related Activities -- General Vocabulary* (definition 3.2)

❖ **STANDARDS BODY:**

A standards body can be defined as a standardizing organization recognized at national, regional or international level whose main function is the preparation, approval or adoption of standards available to the public. In this report, a distinction has been made between formal standards bodies (e.g. CEN or ISO) and non-formal standards bodies (e.g. W3C or IEEE).

❖ **STANDARDIZATION TECHNICAL COMMITTEE:**

A standardization technical committee is a technical decision-making body with a precise title, scope and work program, within European and/or international standardization organizations, essentially to manage the preparation of deliverables as standards in accordance with an agreed upon business plan[9].

❖ **NATIONAL MIRROR COMMITTEE:**

A national mirror committee is a national structure to European or international technical committees ensuring, for example, the formulation of coherent national positions as a first round of consensus finding.

2.2. STANDARDIZATION OBJECTIVES AND PRINCIPLES

As stated in the Regulation (EU) N°1025/2012 on European standardization, and according to the World Trade Organization (WTO)[10], standardization is based on founding principles, which are observed by the formal standards bodies for the development of international standards:

- **Transparency**:

All essential information regarding current work programs, as well as on proposals for standards, guides and recommendations under consideration and on the final results should be made easily accessible to all interested parties.

- **Openness**:

Membership of an international standards body should be open on a non-discriminatory basis to relevant bodies.

- **Impartiality and Consensus**:

All relevant bodies should be provided with meaningful opportunities to contribute to the elaboration of an international standard so that the standard development process will not give privilege to, or favor the interests of, a particular supplier, country or region. Consensus procedures should be established that seek to take into account the views of all parties concerned and to reconcile any conflicting arguments.

- **Effectiveness and Relevance**:

International standards need to be relevant and to effectively respond to regulatory and market needs, as well as scientific and technological developments in various countries. They should not distort the global market, have adverse effects on fair competition, or stifle innovation and technological development. In addition, they should not give preference to the characteristics or requirements of specific countries or regions when different needs or interests exist in other countries or regions. Whenever possible, international standards should be performance based rather than based on design or descriptive characteristics.

[9] Based on the information available on the CEN website/BOSS.

[10] Source: Second triennial review of the operation and implementation of the agreement on technical barriers to trade – Annex 4: Decision of the committee on principles for the development of international standards, guides and recommendations

- **Coherence**:

In order to avoid the development of conflicting international standards, it is important that international standards bodies avoid duplication of, or overlap with, the work of other international standards bodies. In this respect, cooperation and coordination with other relevant international bodies is essential.

- **Development dimension**:

Constraints on developing countries, in particular, to effectively participate in standards development, should be taken into consideration in the standards development process. Tangible ways of facilitating developing countries participation in international standards development should be sought.

Standardization is an efficient economical tool offering the possibility to pursue various objectives, such as:

- Management of the diversity;
- Convenience of use;
- Performance, quality and reliability;
- Health and safety;
- Compatibility;
- Interchangeability;
- Security;
- Environmental protection;
- Product protection;
- Mutual understanding;
- Economic performance;
- Trade;
- Etc.

2.3. STANDARDIZATION LANDSCAPE

In Europe, the three recognized European Standardization Organizations (ESO), as stated in the Regulation (EU) No 1025/2012[11], are:

- European Committee for Standardization (**CEN**);
- European Committee for Electrotechnical Standardization (**CENELEC**);
- European Telecommunications Standards Institute (**ETSI**).

At the international level, the three recognized standardization organizations are:

- International Organization for Standardization (**ISO**);
- International Electrotechnical Commission (**IEC**);
- International Telecommunication Union's Telecommunication Standardization Sector (**ITU-T**).

The standardization frame allows cooperation between standards organizations at the same level, or at different levels but on the same topics:

- CENELEC and IEC are specialized in electrotechnical standards;
- ETSI and ITU-T are focused on telecommunications standards;
- CEN and ISO are in charge of the standards in other sectors.

[11] Regulation (EU) No 1025/2012 of The European Parliament And of The Council : http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2012:316:0012:0033:EN:PDF

Table 1 presents the main characteristics of the European and international standards bodies.

***Table 1: Characteristics of European and International Standardization Organizations*[12]**

European and International Standardization Bodies		Date of Creation	Number of Members	Number of Published Standards
ISO	International Organization for Standardization	1946	163	21133
IEC	International Electrotechnical Commission	1906	84	6895
ITU-T	International Telecommunication Union's Telecommunication Standardization Sector	1865	258[13]	5201
CEN	European Committee for Standardization	1961	34	15985
CENELEC	European Committee for Electrotechnical Standardization	1973	34	6937
ETSI	European Telecommunications Standards Institute	1988	814[13] (68 countries)	15336

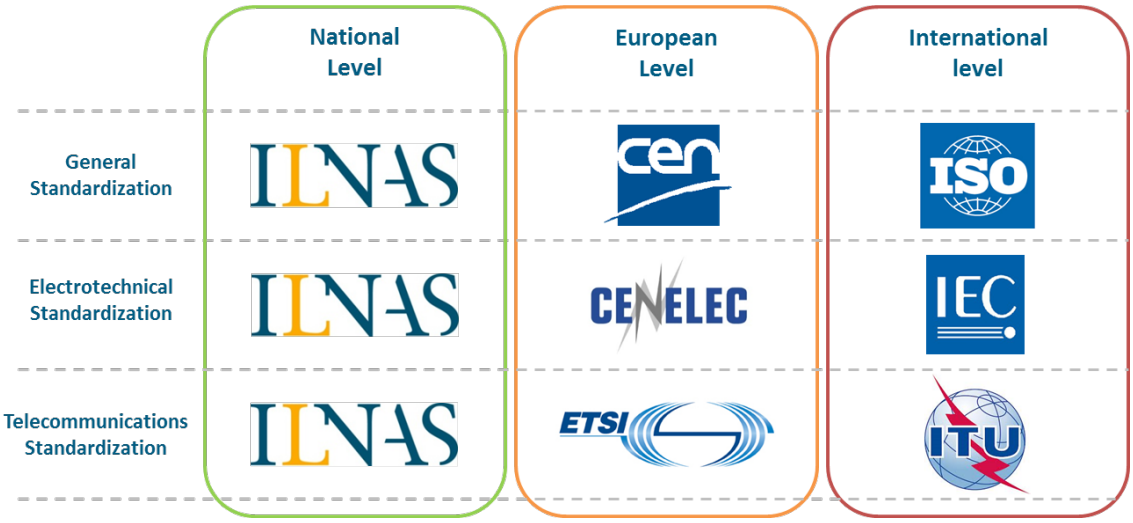
At national levels, one or several standards bodies protect the interests of the country within the European and international standardization organizations. In Luxembourg, ILNAS – the only official national standards body – is member of the European and international standardization organizations CEN, CENELEC, ISO, IEC and ETSI.

Several bridges exist between the national, European and international standardization organizations in order to facilitate the collaboration and coordination of the standardization work on the different fields (Figure 1).

[12] Source: Websites of organizations - February 2017

[13] ETSI and ITU-T have a specific way of working compared to the other recognized organizations, as they work through the direct participation of industry stakeholders

Figure 1: Interactions between the Standardization Organizations



Indeed, in order to ensure transparency in the work and avoid the duplication of standards, agreements have been established between international and European standardization organizations.

In 1991 ISO and CEN signed the Vienna Agreement[14], which is based on the following guiding principles:

- Primacy of international standards and implementation of ISO Standards at European level (EN ISO);
- Work at European level (CEN), if there is no interest at international level (ISO);
- Standardization documents should be approved between the two organizations.

Similarly, CENELEC and IEC signed the Dresden Agreement[15] in 1996 with the aim of developing intensive consultations in the electrotechnical field. This agreement has been replaced by the Frankfurt Agreement in 2016 with the aim to simplify the parallel voting processes, and increases the traceability of international standards adopted in Europe thanks to a new referencing system. It is intended to achieve the following guiding principles:

- Development of all new standardization projects by IEC (as much as possible);
- Work at European level (CENELEC), if there is no interest at international level (IEC);
- Ballots for documents made in parallel at IEC and CENELEC.

Under both agreements, 32% of all European standards ratified by CEN, as well as 72% of those ratified by CENELEC, are identical to ISO or IEC standards[16]; in that respect, the European and international organizations do not duplicate work.

Finally, ITU-T and ETSI have agreed on a Memorandum of Understanding (MoU) in 2012[17] (replacing the former MoU signed in 2000) that paves the way for European regional standards, developed by ETSI, to be recognized internationally.

[14] Agreement on technical co-operation between ISO and CEN (Vienna Agreement)
[15] IEC-CENELEC Agreement on Common planning of new work and parallel voting (Frankfurt Agreement)
[16] CEN-CENELEC Quarterly Statistical Pack – 2016 Q4
[17] Memorandum of understanding between ETSI and ITU

Agreements also exist between the standards organizations to facilitate their cooperation. For example, ISO and IEC have the possibility to sign conventions to create Joint Technical Committees (JTC) or Joint Project Committees (JPC) when the area of work is overlapping the two organizations. It is to avoid the creation of duplicative or incompatible standards. In this frame, the Joint Technical Committee ISO/IEC JTC 1 "Information Technology" has been created in 1987.

ISO, IEC and ITU have also established the World Standards Cooperation (WSC) in 2001, a high level collaboration system intending to strengthen and advance the voluntary consensus-based international standards system and to resolve issues related to the technical cooperation between the three organizations[18]. Similarly, the cooperation between CEN and CENELEC aims to create a European standardization system that is open, flexible and dynamic.

2.4. STANDARDS DEVELOPMENT

Developing a standard is characterized by four main steps:

- Proposal: following an identified need, a party proposes a preliminary draft;
- Study and preparation: a working group studies the draft and prepares the standard draft;
- Public inquiry and approval: the standard draft goes into public consultation and is subject to approval;
- Publication: the ratified standard is published by the standards body.

At each stage, a validation of all participating members of the standardization technical committee is required. This is done automatically through a vote; however, the rules of the vote differ between the European and international levels as outlined in Table 2 below.

Table 2: Voting rules at European and international level

Organization	Members	Method of adopting standards	Integration into the collections of national standards
International ISO and IEC	National bodies from countries members of ISO (163) and IEC (84)	1 country = 1 voice	Voluntary
European CEN and CENELEC	National bodies complying with membership criteria of CEN and CENELEC[19] (34)	Weighted Vote	Required: countries must eliminate conflicting provisions from their collections

At the European level, the weighted vote is defined by the "CEN/CENELEC Internal Regulations - Part 2, Common rules for standardization work"[20], which fixes the distribution of the voices for the CEN and CENELEC national members as showed in Table 3.

[18] http://www.worldstandardscooperation.org/

[19] CEN-CENELEC Guide 20 "Guide on membership criteria of CEN & CENELEC"

[20] Source: Internal regulation CEN/CENELEC – Part 2 – Annex D

Table 3: Weightings allocated to the CEN and CENELEC national members

Country	Weighting of votes in CENELEC	Weighting of votes in CEN (%)	Country	Weighting of votes in CENELEC	Weighting of votes in CEN (%)
Germany	29	13,35	Bulgaria	10	1,19
Turkey		12,52	Serbia	7	1,17
France		10,91	Denmark		0,93
United Kingdom		10,64	Finland		0,90
Italy		10,02	Slovakia		0,89
Spain	27	7,66	Norway		0,85
Poland		6,27	Ireland		0,76
Romania	14	3,28	Croatia		0,70
Netherlands	13	2,78	Lithuania		0,48
Belgium	12	1,85	The FYROM[21]	4	0,34
Greece		1,79	Slovenia		0,34
Czech Republic		1,73	Latvia		0,33
Portugal		1,71	Estonia		0,22
Hungary		1,63	Cyprus		0,19
Sweden	10	1,60	Luxembourg		0,09
Austria		1,41	Malta	3	0,07
Switzerland		1,35	Iceland		0,05

Another particularity at the European level is that every European standards approved shall be implemented identically in both technical content and presentation, with no restrictions for application by each national member. This implies enforcing the new standard through publication and withdrawing all conflicting standards already in place at national level, on average, in six months. The new European standard then takes the status of national standard.

In the Grand Duchy of Luxembourg, the prefix "ILNAS" is added at the beginning of the reference of the European Standard implemented at the national level. The list of new national standards is regularly published by ILNAS in the "*Mémorial A*"[22].

[21] Former Yugoslav Republic of Macedonia
[22] http://legilux.public.lu/

3. CONTEXT OF THE ICT SECTOR

3.1. DEFINITION AND ISSUES OF THE ICT SECTOR

Information and Communication Technology (ICT) has progressively gain importance in the last decades, becoming a foundation for all the sectors of the economy. The fast growing connectivity, storage, software and hardware capabilities have strongly impacted the society in all its aspects. The way of making business as well as daily lives of citizens are now strongly relying on ICT. This trend shows no signs of slowing and the sector still offer great promises, opportunities and challenges.

Dynamism in the ICT based technologies is driving innovation processes. Government and industry are now redesigning their operating methods to take advantage of digital technologies. The ability to create business models based on digital technologies could for example allow lowering the barrier to pursue new and innovative ventures for entrepreneurs.

These transformations have led to an even more interconnected ICT environment, which shifts towards more smartness and make possible the development of entangled and closely linked technologies, otherwise known as Smart ICT. Some examples are the Internet of Things, Cloud Computing or Big Data that work and interact together, offering previously unimagined possibilities for innovation and business development.

Definitions:

Information and Communication Technology (ICT)
ICT (also commonly called Information Technology or IT) is defined by ISO/IEC JTC 1 as follows: "*ICT includes the specification, design and development, integration and interoperability of systems, tools and applications dealing with the capture, representation, accessibility, processing, security, transfer, interchange, presentation, management, organization, storage and retrieval of information, and their related cultural, linguistic adaptability and societal aspects*"[23].

Smart ICT
Smart ICT corresponds to a holistic approach of ICT development, integration and implementation, where a range of emerging or innovative tools and techniques are used to maintain, improve or develop products, services or processes with the global objective to strengthen different societal, social, environmental and economic needs. It includes, through related interconnected ecosystems, advanced ICT such as Cloud Computing, Big Data and Analytics, Internet of Things, Artificial Intelligence, Robotic and new ways of gathering data, such as social media and crowdsourcing[24].

In terms of economic impact, the IT products and services were estimated to represent worldwide revenue of $ 2.4 trillion in 2016 according to IDC and this figure could reach $ 2.7 trillion in 2020[25]. Research & Development investment in the ICT sector is still very important, for example global Software and Hardware activities have increased by 12.3% and 7.6% respectively in 2015[26]. Moreover, the coming trends show that the sector is still innovating with the development of technologies such

[23] ISO/IEC JTC 1, Information technology - Business Plan 2016

[24] Definition proposed by ILNAS based on NICTA (National ICT Australia Ltd), Tzar C. Umang (Chief ICT Specialist of the Department of Science and Technology – Smarter Philippines Program) and exchanges with Pr. François Coallier (Chairman of the subcommittee ISO/IEC JTC 1/SC 41 "Internet of Things and related technologies").

[25] http://www.businesswire.com/news/home/20160829005519/en/Worldwide-Spending-Forecast-Reach-2.7-Trillion-2020

[26] The 2016 EU Industrial R&D Investment Scoreboard

as Intelligent Things, Artificial Intelligence and Advanced Machine Learning, Virtual Reality and Augmented Reality, Blockchains and Distributed Ledger Technologies, etc.[27]

At the European level, the ICT sector has been directly responsible for 4.5% of GVA[28] (Gross Value Added), with a market value of EUR 529 billion in 2013[29], but it contributes far more to the overall productivity growth. This is due to the high levels of dynamism and innovation inherent in this sector, but also due to the enabler role this sector plays, in changing how other sectors do business. At the same time, the social impact of ICT has become significant. This is supported by European statistics of 2016, with 85% (Luxembourg: 97%) of households having a broadband connection[30], 79% (Luxembourg: 97%) of individuals using the Internet on a regular basis[31] of which 67% (Luxembourg: 82%) used a mobile device to connect to the Internet away from home or work[32].

In 2014, the European Commission set up 10 priority policy areas[33], which include the creation of a connected Digital Single Market (DSM) in which "*the free movement of goods, persons, services and capital is ensured and where individuals and businesses can seamlessly access and exercise online activities under conditions of fair competition, and a high level of consumer and personal data protection, irrespective of their nationality or place of residence*", as stated in the companion "Digital Single Market strategy"[34], that was adopted in May 2016. It is built on three pillars:

- **Access**: better access for consumers and businesses to online goods and services across Europe.
- **Environment**: creating the right conditions and a level playing field for digital networks and innovative services to flourish;
- **Economy & Society**: maximizing the growth potential of the digital economy.

The completion of this strategy aims at strengthening the position of Europe in the digital economy and to erase existing barriers within Europe, which could generate an additional EUR 415 billion contribution to European GDP and create many jobs. In order to reach these objectives, the DSM strategy notably focuses on offering businesses and citizens a secure digital environment[35] fostering the use of Cloud Computing, Big Data and Future Internet (e.g.: Internet of Things, 5G, etc.) and making them able to seize the benefits of the digital revolution[36].

The European Commission also promotes research and innovation in the ICT sector, through innovative Public-Private Partnerships and through the Horizon 2020 research funding programs that encompasses a large range of ICT-related topics and capabilities, like reduction of energy consumption, support to ageing citizens' lives, revolution of health services and delivery of better public services. ICT can also drive the digitization of Europe's cultural heritage forward by providing online access to all. Currently, ICT plays a crucial role in[37]:

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[27] Source: Gartner (October 2016)

[28] Gross value added is the value of output less the value of intermediate consumption; it is a measure of the contribution to GDP made by an individual producer, industry or sector (source: OECD)

[29] http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=nama_nace10_c&lang=en (source: Eurostat)

[30] http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=isoc_ci_in_h&lang=en (source : Eurostat)

[31] http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=tin00091&lang=en (source : Eurostat)

[32] http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=tin00083&lang=en (source : Eurostat)

[33] http://ec.europa.eu/priorities/index_en

[34] A Digital Single Market Strategy for Europe - http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52015DC0192

[35] https://ec.europa.eu/digital-single-market/en/cybersecurity-privacy

[36] https://ec.europa.eu/digital-single-market/en/economy

[37] https://ec.europa.eu/programmes/horizon2020/sites/horizon2020/files/Guide%20to%20ICT-related%20activities%20in%20WP2016-17%20A4%20Sept2016.pdf

- Advanced research to uncover radically new technological possibilities and ICT contributions to research and innovation;
- Research and innovation activities on generic ICT technologies either driven by industrial roadmaps or through a bottom up approach;
- Multi-disciplinary application-driven research and innovation leveraging ICT to tackle societal challenges.

To conclude, Europe must master both the development and use of ICT to generate sustainable economic and social benefits.

Finally, at the national level, ICT is considered as a key economic sector. Within the National Government Program[38], having a developed ICT sector is a cornerstone, especially to support other economic sectors: eco-technologies (e.g. Smart Grid, IT management), logistics (e.g. e-commerce), biotechnologies (e.g. Archiving, Data Management), industrial and financial sector (e.g. Cloud Computing).

The ICT sector is already a competitive sector in Luxembourg, which ranks 10th out of the 28 EU Member States in the "European Commission Digital Economy and Society Index" (DESI) 2016[39]. The country is particularly running ahead in terms of connectivity, human capital (ranks 1st in Europe for Internet users and digital skills) and use of the Internet. The ICT sector represents more than 2,000 companies in 2014 or 4.23% of the total employment in 2016[40]. Moreover, the ICT sector has contributed to 6.2% of GVA in Luxembourg in 2013[41].

Through the national policy pursued in the recent years, Luxembourg aims to accompany the transition to a digital economy and society. Indeed, several initiatives have been launch to consolidate and expand the ICT capabilities of Luxembourg. For example:

- The "Digital Lëtzebuerg" initiative[42], launched in autumn 2014 to provide a common umbrella for the numerous public and private initiatives that make up the country's digital economy and society;
- The "Digital (4) Education" strategy[43], presented in May 2015 with the objective to offer reinforce digital skills in the educative system and answer the growing demand for skilled ICT professionals;
- The strategic study on the "Third Industrial Revolution"[44], presented in November 2016, which proposes concrete actions and tools, including a range of strategic measures and projects, to prepare the country, its society and its economy to begin the process of the "Third Industrial Revolution".

Last but not least, Luxembourg is also an active country in terms of ICT standardization as explained in more details in the next section, which is focused on the standards context of the ICT sector and present in particular the different lead projects established by ILNAS in order to strengthen ICT standardization in Luxembourg.

[38] http://www.gouvernement.lu/3322796/Programme-gouvernemental.pdf
[39] https://ec.europa.eu/digital-single-market/en/scoreboard/luxembourg
[40] Source: STATEC
[41] Source: Eurostat (online data code: nama_nace10_c)
[42] http://www.digital-luxembourg.public.lu/en/index.html
[43] http://portal.education.lu/digital4education/
[44] http://www.troisiemerevolutionindustrielle.lu/etude-strategique/

3.2. STANDARDS CONTEXT OF THE ICT SECTOR

ICT is omnipresent in the global economy, it penetrates all the industry sectors and has become a major lever to accelerate economic growth and improve living conditions. But ICT is also becoming ever more complex by integrating numerous and various infrastructures and services, as with Smart Cities or Internet of Things. In this context, standards play a crucial role to make technologies interoperable and to provide a common language that will facilitate the advance of the ICT industry.

The current landscape of Standards Developing Organizations (SDO) active in the ICT sector is very broad and composed both of formal standards bodies that are acknowledged standards bodies, developing *de jure* (formal) standards, and *fora/consortia* developing *de facto* (existing and being used by fact) standards[45].

3.2.1. International level

❖ ISO/IEC JTC 1

At the international level, ISO is a generic formal standards body, developing international standards for all industry sectors. IEC is another formal standards body preparing and publishing international standards for all electrical, electronic and related technologies collectively known as "electrotechnology". An agreement reached in 1976 defines the responsibilities of both of them: the IEC covers the field of electrical and electronic engineering and all other subject areas are attributed to ISO. In addition, to avoid an overlap of standardization and work in areas covered by both bodies, this agreement also allows the creation of Joint Technical Committees (JTC) between ISO and IEC. ICT is such an overlapping standardization domain that, in 1987, ISO and IEC formed a JTC known as ISO/IEC JTC 1. It is today clearly established that the committee ISO/IEC JTC 1 "Information Technology" (including its subcommittees) is the leading SDO for ICT standardization. ISO/IEC JTC 1 is composed of 20 subcommittees and 4 working groups, each of them responsible for the development of International Standards in its own ICT area (e.g.: Internet of Things, Big Data, Cloud Computing, etc.).

❖ Fora and Consortia

Fora and *consortia*, in the standardization context, are associations regrouping individuals, companies, organizations or governments with a common objective of participating in the creation of *de facto* standards or technical specifications. Many of them are active in the ICT domain. This national standards analysis focuses on *fora* and *consortia* collaborating with ISO/IEC JTC 1 at the international level or participating in the European Multi-Stakeholder Platform on ICT Standardization at the European level.

3.2.2. European level

At the European level, the "Digital Single Market strategy", presented in section 3.1, considers "*boosting competitiveness through interoperability and standardization*" as a key action to maximize the growth potential of the digital economy. Indeed, interoperability is clearly highlighted as a key issue in the DSM to ensure an "*effective communication between digital components like devices, networks or data repositories*" and standards are considered as enablers and guiding documents to develop new technologies like 5G wireless communications, digitization of manufacturing (Industry

[45] "*De facto* standards" is sometimes used for common solutions and practices that have not been formally developed and agreed upon. In this document, this term is used for technical specifications published by other structures than the official ones (i.e. ISO, IEC, ITU, CEN, CENELEC and ETSI)

4.0 or Smart Manufacturing) and construction processes, data driven services, cloud services, cybersecurity, e-health, e-transport and mobile payments. The DSM strategy therefore delegates the Commission the responsibility to "*launch an integrated standardisation plan to identify and define key priorities for standardisation with a focus on the technologies and domains that are deemed to be critical to the Digital Single Market*".

In this frame, the European Commission published, in April 2016, the COM (2016) 176 "ICT Standardisation Priorities for the Digital Single Market"[46] setting out priorities in terms of ICT standardization to promote the digitalization of the European economy. In relation, the "Joint Initiative on Standardisation"[47] launched in June 2016 recognizes that "*an effective standardisation environment for digital technologies is crucial for Digitising European Industry, and is key for the Digital Single Market*". Through these guiding documents, the European Commission has proposed a common vision that paves the way to identify and develop key ICT standardization areas at the European level. Five priority areas for ICT standardization have been identified in the COM (2016) 176: the 5G communications, Cloud Computing, the Internet of Things (IoT), technologies related to data (e.g.: Big Data) and Cybersecurity. They are considered as the essential building blocks to make the implementation of the Digital Single Market a success.

Finally, to concretely implement European ICT Standardization and complete the DSM strategy, several policy instruments and advisory groups have been set-up in relation with the Regulation (EU) N°1025/2012 and the work of the ESOs.

❖ The "Annual Union Work Programme for European Standardisation" (AUWP)

The AUWP is published each year by the European Commission and defines its standards-related program of work. It specifies the Commission's intentions to use standardization in support of new or existing legislation and policies and may lead to formal standardization requests (mandates) to the European Standardization Organizations (ESOs).

The AUWP for 2017[48] is directly in line with the identified priorities, namely 5G communications, Cloud Computing, the Internet of Things (IoT), (Big) Data technologies and Cybersecurity. The Commission does not plan to prepare any standardization request regarding these technologies in 2017, but ask ESOs to be involved in preparatory activities aiming at mapping and developing the appropriate standards. Specific actions are foreseen in the following areas:

- Cloud Computing: update the mapping of Cloud standards[49] and guidelines for end users by mid-2017.
- Internet of Things: in relation with ESOs and International SDOs, the Commission will promote the setting-up of an interoperable environment and will examine the possibility to use legal measures to recommend appropriate standards to tackle interoperability failures.
- Cybersecurity:
    - Draw-up practical guidelines covering IoT, 5G, Cloud, Big Data and smart factories;
    - Develop standards, by the end of 2018, that support global interoperability and seamless trustworthy authentication across objects, devices and natural and legal persons based on comparable trust models;

[46] COM(2016) 176: ICT Standardisation Priorities for the Digital Single Market http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=15265

[47] http://ec.europa.eu/DocsRoom/documents/17204/attachments/1/translations/en/renditions/native

[48] http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52016DC0357&from=EN

[49] http://csc.etsi.org/

- Over the next three years, will support ESOs in the development of standards-based cybersecurity risk management guidelines for organizations and of corresponding audit guidelines for authorities or regulators with oversight responsibilities.

❖ The "Rolling plan for ICT standardization"

The Rolling plan for ICT standardization is a document prepared by the European Commission, in collaboration with the European Multi-Stakeholder Platform on ICT Standardization (MSP). It provides a multi-annual overview of the needs for preliminary or complementary ICT standardization activities to be undertaken in support of the EU policy activities. It is addressed to all ICT stakeholders and gives a transparent view on how policies are planned to be practically supported. It is collaboratively and regularly reviewed, on an annual or by-need basis, and takes into consideration the input from the EU Services as well as the advice of the MSP. The last update has been published in March 2017[50].

It lists all the topics identified as EU policy priorities where standardization plays a role in the implementation of the respective policy. The main EU policy topics, related to ICT standardization, are grouped into four clusters, as described below in Table 4. For each topic, the Rolling Plan details the policy objectives, the legislation and policy documents, the needs and ongoing activities in terms of standardization, the other ongoing activities (stakeholder groups, technology platforms and research projects), and finally it proposes some new standardization actions to be taken.

Table 4: EU policy priorities related to ICT standardization

Societal Challenges	Innovation for the Digital Single Market
• eHealth • Active and healthy ageing • Accessibility of ICT products and services • e-Skills and e-Learning • Emergency communications • eGovernment • eCall	• e-Procurement - Pre and Post award • e-Invoicing • Card, internet and mobile payments • eXtensible Business Reporting Language (XBRL) • Preservation of digital cinema • Financial technologies (FinTech)
Sustainable growth	**Key enablers and security**
• 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 • Common Information Sharing Environment (CISE) for the EU maritime domain	• 5G • Cloud computing • Public sector information, open data and big data • Internet of Things • Cybersecurity / Network and Information Security • ePrivacy • E-Infrastructures for research data and computing-intensive science • Broadband Infrastructure Mapping • Electronic identification and trust services including e-signatures

[50] http://ec.europa.eu/DocsRoom/documents/21763/attachments/1/translations/en/renditions/native

❖ The "European Multi-Stakeholder Platform on ICT Standardization" (MSP)

The European Multi-Stakeholder Platform on ICT Standardization has been created by the European Commission through its Decision of November, 28 2011 (2011/C 349/04)[51], to advise on matters related to the implementation of ICT standardization policy (including the work program for ICT standardization, priority setting in support of legislation and policies, and identification of specifications developed by global ICT standards development organizations), in order to improve standards setting in the ICT field and to ensure interoperability between ICT applications, services and products[52].

This platform is an Advisory Expert Group on all matters related to European ICT standardization and its effective implementation. Its main responsibilities are to:

- Advise the European Commission on its ICT standardization work program;
- Identify potential future ICT standardization needs;
- Advise the European Commission on possible standardization mandates;
- Advise the European Commission on technical specifications in the field of ICT with regard to its referencing in public procurement and policies;
- Advise the European Commission on cooperation between standards developing organizations.

The MSP is composed of representatives of national authorities of the EU Member States and EFTA countries, stakeholder organizations representing industry, small and medium-sized enterprises, consumers and other societal stakeholders as well as European and international standardization bodies and other non-profit making organizations (which are professional societies, industry or trade associations) or other membership organizations active in Europe that, within their area of expertise, develop standards in the field of ICT.

Since January 2012, ILNAS - Digital trust department, is the Luxembourg's representative within the European Multi-Stakeholder Platform on ICT Standardization. ILNAS is therefore the official contact point between the national market and the MSP.

❖ The "Committee on Standards"

The Committee on Standards was set-up in the frame of the Regulation (EU) N°1025/2012, with the responsibility to assist the Commission in all matters related to this Regulation. One of its tasks is to deliver formal opinions on draft mandates before sending it to the ESOs. In case the Committee votes in favor of a mandate, this one is adopted by the Commission as a Commission Implementing Decision. ILNAS is member of this committee through its standardization department (OLN).

❖ European Standardization Organizations

CEN and CENELEC are two of the formal ESOs. Closely collaborating, through a common CEN-CENELEC Management Centre since 2010, they are notably in charge of developing ICT standards at the European level. The ICT sector is an active standardization domain especially for the CEN, which has 14 technical committees and additional other groups directly concerned under its supervision (according to this standards analysis). The other ICT-related topics are principally being tackled at the

[51] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:C:2011:349:0004:0006:EN:PDF

[52] In the context of the MSP, the term "standards" is used in a generic way for all such deliverables from both recognized standards organizations and from standardization *fora* and *consortia* – or the terms "standards and technical specifications" are used.

international level by ISO/IEC JTC 1, complying with the "Vienna Agreement" set up between CEN and ISO, as detailed in section 2.3.

The standardization activities of the CEN-CENELEC are detailed in an annual common Work Program, which was published in December 2016 for the year 2017[53]. They have foreseen to be active in several ICT-related areas covering both the Digital & Information Society and the Smart Technologies: Biometrics, Electronic invoicing, eSkills and eLearning, Privacy Management, e-Procurement, e-Signatures, Intelligent Transport Systems, Smart Grids, Smart Metering, IoT, Smart Homes and Smart Cities.

ETSI is the third ESO recognized by the European Commission. It produces globally applicable standards for ICT including fixed, mobile, radio, converged, broadcast and internet technologies. ETSI is particularly involved in Smart ICT standardization with activities regarding, for example, Internet of Things, Smart Cities, Cybersecurity or Green ICT. Crucially, ETSI is also in charge of developing all standards relating to spectrum management and electromagnetic compatibility used in European law.

ETSI is organized in ten clusters, each of them representing a major component of a global ICT architecture and covering the work of a number of Technical Committees and a wide range of technologies:

- Home & Office:

This cluster is focusing on different standardization aspects for home and offices: the wireless systems, the interconnection and the services, including the Quality of Services (QoS) and the security[54].

- Better Living with ICT:

One of the responsibilities of this cluster is to develop standards to ensure a better efficiency of products and services through ICT, particularly by assessing their environmental aspects during all their life cycle. It also works on the developments of standards to guarantee the usability and accessibility of the technology to all, including the elderly, the young and people with disabilities[55].

- Content Delivery:

The Content Delivery cluster is developing standards to allow the convergence of different specifications for content delivery. In this frame, it is working on supporting standards for Internet Protocol Television (IPTV), mobile TV and broadcast TV[56].

- Networks:

This cluster is developing "*a comprehensive set of standards for access network technologies, from Digital Subscriber Line technologies (xDSL), fibre and cable, through to the latest developments with Internet Protocol (IP) networking technology and the Cloud*". It is also active in the development of standards for new network technologies such as Network Functions Virtualisation (NFV)[57].

- Wireless Systems:

Through its Wireless Systems cluster, ETSI is developing standards to define the radio technologies and systems (e.g.: 2G and 3G mobile telephony, broadcast radio and television, Wireless LAN and

[53] http://www.cencenelec.eu/News/Publications/Publications/cen-cenelec-wp2017_en.pdf
[54] http://www.etsi.org/technologies-clusters/clusters/home-office
[55] http://www.etsi.org/index.php/technologies-clusters/clusters/better-living-with-ict
[56] http://www.etsi.org/technologies-clusters/clusters/content-delivery
[57] http://www.etsi.org/technologies-clusters/clusters/networks

cordless technology, Global Navigation Satellite Systems, RFID and short range devices). It also works with regulatory authorities in Europe to deliver the standards needed to manage the radio spectrum environment and to guarantee a safe coexistence of the different systems involved[58].

- Transportation:

The Transportation cluster has activities in several transportation domains: road, railways, aviation and maritime. It is particularly working on the development of cooperative Intelligent Transport Systems (ITS), Air Traffic Management Systems (ATM) and on the interoperability of the European rail system. It is also active in the satellite transport communications domain. Its work not only includes communications aspects but also efficiency, safety and energy consumption reduction considerations[59].

- Connecting Things:

This cluster is mainly focusing on the development of Internet of Things (IoT) standards. It is particularly working on Machine-to-Machine communications that will find applications in many promising and emerging domains such as Smart Cities, Smart buildings, Smart Grids, eHealth, etc. In this frame, ETSI is one of the founding partners of the oneM2M consortium, which is currently developing a common M2M Service Layer to ensure the interoperability of the numerous connected devices in the IoT landscape[60].

- Interoperability:

The Interoperability cluster is developing standards for testing the interoperability of ICT solutions. In this frame, ETSI regularly organizes interoperability events or Plugtests, to validate standards by testing the interoperability of equipment based on standards. Recently, some interoperability events have been organized to test technologies related to M2M and IoT, or regarding Electronic Signatures[61].

- Public Safety:

The Public Safety cluster is responsible for setting up standards to facilitate emergency communications for authorities, public safety and citizens. It is for example developing standards in support of emergency callings, Global Maritime Distress and Safety System or Satellite Emergency Communication[62].

- Security:

This cluster has a broad scope and holds a horizontal role in support of all the technical committees of ETSI. The cluster leads many activities in the security landscape, aiming to develop a secure digital environment for organizations and consumers: Electronic Signatures, Cybersecurity, Smart Cards, Security Algorithms, Mobile/Wireless communications, etc. ETSI is also working on emerging topics such as Quantum Key Distribution or Quantum-Safe Cryptography[63].

The "ETSI Annual Report April 2016"[64] of ETSI provides an overview of the recent achievements of the different clusters. ETSI has also published its "Work Programme 2016-2017"[65] to explain the objectives of the clusters regarding the period.

[58] http://www.etsi.org/technologies-clusters/clusters/wireless-systems
[59] http://www.etsi.org/technologies-clusters/clusters/transportation
[60] http://www.etsi.org/technologies-clusters/clusters/connecting-things
[61] http://www.etsi.org/technologies-clusters/clusters/interoperability
[62] http://www.etsi.org/technologies-clusters/clusters/public-safety
[63] http://www.etsi.org/technologies-clusters/clusters/security
[64] http://www.etsi.org/images/files/AnnualReports/etsi-annual-report-april-2016.pdf

Education about standardization is an important concern of ETSI. In this frame, it has become partner of the university certificate Smart ICT for Business Innovation (see section 3.2.3). This university diploma is a national pilot project initiative launched by ILNAS in collaboration with the University of Luxembourg and ETSI's involvement allows the organization to promote its innovative standardization activities and participates in the development of ICT standardization skills at the national level.

Moreover, ANEC GIE has become an ETSI member in March 2015 in order to closely follow Smart ICT technical standardization lead by ETSI. It ensures a better representation of the Grand Duchy of Luxembourg in the organization and facilitates the transfer of standardization knowledge from ANEC GIE to the national stakeholders.

3.2.3. National level

At the national level, the ICT sector is already an active standardization sector with 69 national delegates. The organization and development of the ICT technical standardization representation at the national level is one of the objectives of the "Policy on ICT technical standardization 2015-2020"[66] published by ILNAS. Through three lead projects, several activities have been launched by ANEC GIE, under the supervision of ILNAS, to foster and strengthen the national ICT sector in its involvement in standardization work:

- **Developing the interest and the involvement of the market:**
    - Drawing up a yearly national standards analysis for the ICT sector;
    - Defining a national implementation plan for ICT technical standardization (in line with the national standards analysis for the ICT sector).
- **Promoting and reinforcing the ICT standardization participation at national level:**
    - Participating in relevant technical committees:

In order to better bring the relevant information to the national ICT standardization community, ILNAS is Observing Member of ISO/IEC JTC 1 and has commissioned ANEC GIE to monitor the different activities of the technical committees of formal standards bodies, particularly ISO/IEC JTC 1 and ETSI.

- Providing information to the national community:

In order to share ICT standardization knowledge with the related community in Luxembourg (ISO/IEC JTC 1, ETSI, ICT *fora* and *consortia*, etc.), ANEC GIE organizes, under the supervision of ILNAS, related workshops at national level, specifically in the frame of the ICT prospective and the domain of "Smart ICT".

[65] http://www.etsi.org/images/files/WorkProgramme/etsi-work-programme-2016-2017.pdf

[66] https://portail-qualite.public.lu/content/dam/qualite/fr/publications/normes-normalisation/orientations-strategiques/politique-luxembourgeoise-pour-la-normalisation-technique-des-tic-2015-2020/policy-ict-technical-standardization-2015-2020.pdf

- **Supporting and strengthening the Education about Standardization and the related research activities:**

    - Managing the university certificate "Smart ICT for Business Innovation":

ILNAS, in collaboration with the University of Luxembourg, has developed the university certificate[67]. This diploma, in its current version has been designed for experienced professionals who wish to enhance their ICT skills to allow them to take a broad view of the cutting-edge Smart ICT concepts and tools at their disposal in order to develop their sense of innovation.

This university certificate focuses on important aspects of Smart ICT and their applications, such as Cloud Computing, Big Data and Analytics, Data Digitization, Smart cities, and environmental issues related to ICT. Furthermore, in an interconnected world, information security and ICT governance are essential and these aspects are dealt with by international experts.

Embracing all these issues, technical standardization is a key source of knowledge in constant evolution. Therefore, the courses of the university certificate are substantially based on completed, on-going and planned standardization developments.

In this frame, all the Smart ICT issues are being detailed and studied by an international community of experienced industrials and researchers involved in international and European standardization committees and, in particular, in the different technical committees followed by ANEC GIE.

ILNAS instructed ANEC GIE to implement this university certificate, and to carry out its development.

    - Developing research activities:

ILNAS commissioned ANEC GIE to reinforce the research and innovation activities related to standardization in the field of ICT, notably by defining some new research projects with the different stakeholders at national level, principally with the University of Luxembourg. Different developments could be future PhDs on "Smart ICT" topics, white papers on "Digital Trust for Smart ICT", development of a research program, with the University of Luxembourg, dedicated to the domains of "ICT Technical Standardization".

    - Prospective of new diplomas:

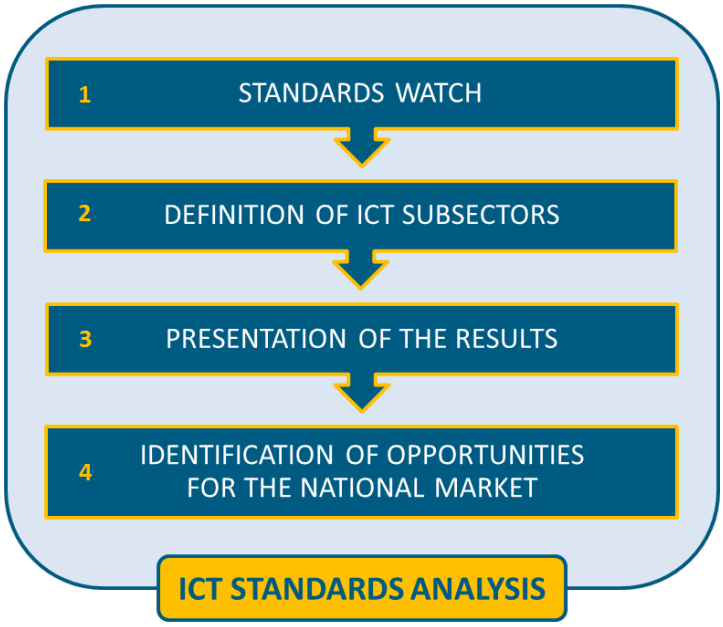
ILNAS and ANEC GIE, in collaboration with the University of Luxembourg, will analyze the possibility to define and propose new diplomas, in the area of ICT standardization, in line with the needs of the national market. These future developments will be based on the outcomes of the different research activities and the information provided by the different technical committees.

[67] https://portail-qualite.public.lu/fr/normes-normalisation/decouvrir-normalisation/education-recherche/projets-phares-dans-l_education-a-la-normalisation.html

4. METHOD FOR THE STANDARDS ANALYSIS

This chapter describes the methodology followed to carry out the standards analysis of the ICT sector that is regularly updated in the frame of the "Luxembourg's policy on ICT technical standardization 2015-2020"[68]. The standards analysis methodology is based on four steps (Figure 2). The following subsections describe these steps in details.

Figure 2: Main steps of the ICT standards analysis development



4.1. STANDARDS WATCH

The standards watch of the ICT sector aimed at identifying standardization technical bodies of potential interest for the national stakeholders in the ICT sector. This step has been carried out by:

- Identifying and selecting the relevant sources of information;
- Collecting, analyzing and processing the information.

The implementation of these phases led to the selection of the most relevant standardization technical bodies presented in this standards analysis.

4.1.1. Identification and selection of the sources of information

In order to guarantee the quality of the information provided in this document, only recognized standards bodies have been analyzed to select the technical bodies that are active in the ICT sector.

From one side, the formal standards bodies recognized by the Regulation (EU) No 1025/2012 - ISO, IEC, ITU-T, CEN, CENELEC and ETSI - have been examined, as well as ISO/IEC that forms a system for international standardization as a whole by means of the ISO/IEC Agreement of 1976[69].

[68] https://portail-qualite.public.lu/content/dam/qualite/fr/publications/normes-normalisation/orientations-strategiques/politique-luxembourgeoise-pour-la-normalisation-technique-des-tic-2015-2020/policy-ict-technical-standardization-2015-2020.pdf

[69] ISO/IEC Directives, Part 1 (2016, 12th Ed.)

From the other side, some non-formal standards bodies, also known as *fora* and *consortia*, have also been surveyed. The selected organizations develop *de facto* standards widely spread in the ICT sector and meet at least one of the following criteria:

- Organizations which have a "Category A" liaison with ISO/IEC JTC 1. They make an effective contribution to the work of the technical committee and such organizations are given access to all the relevant documentation and are invited to the meetings. They may nominate experts to participate in a WG and propose an existing technical report or technical specification from any source to be submitted for vote as respectively a draft technical report or draft technical specification through the fast-track procedure[70];
- The Publicly Available Specifications (PAS) Submitters of ISO/IEC JTC 1. The work quality of these organizations is recognized by ISO/IEC JTC 1, and they are allowed to submit PAS as drafts for review and approval as international ISO/IEC JTC 1 standards[71];
- Organizations which have signed a Partner Standards Development Organization (PSDO) Cooperation Agreement (e.g. IEEE-SA) with formal standards bodies. The PSDO cooperation agreement provides opportunities to adopt and jointly develop international standards to serve the global marketplace;
- Member organizations of the European Multi-Stakeholder Platform on ICT standardization.

For each of these organizations, standards databases, technical committees databases, strategic documents (e.g.: business plans, work programs, etc.) constitute the main sources of information.

4.1.2. Collecting, analyzing and processing the information

A survey of all the standards bodies identified in the previous section was carried out in order to associate the technical committees or related structures that could be of interest in the frame of the standards analysis. Using both the International Classification for Standards (ICS) codes related to the ICT sector, as shown in Table 5, and a controlled list of keywords, a selection of technical committees and *Fora* / *Consortia* has been completed.

For each of these technical committees, relevant data has been collected to provide a valuable level of information in the last step corresponding to the results presentation. It consists for example in the scope, standards (both published and under development) or business plan of the technical committees.

Table 5: ICS Codes related to the ICT sector

33 TELECOMMUNICATIONS. AUDIO AND VIDEO ENGINEERING:	35 INFORMATION TECHNOLOGY. OFFICE MACHINES:
- 33.020 Telecommunications in general; - 33.030 Telecommunication services. Applications; - 33.040 Telecommunication systems; - 33.050 Telecommunication terminal equipment; - 33.060 Radiocommunications; - 33.070 Mobile services; - 33.080 Integrated Services Digital Network	- 35.020 Information technology (IT) in general; - 35.030 IT Security; - 35.040 Information coding; - 35.060 Languages used in information technology; - 35.080 Software; - 35.100 Open systems interconnection (OSI); - 35.110 Networking;

[70] ISO/IEC Directives, part 1 – Consolidated JTC 1 Supplement 2016, Annex F

[71] List of approved JTC 1 PAS Submitters

33 TELECOMMUNICATIONS. AUDIO AND VIDEO ENGINEERING:	35 INFORMATION TECHNOLOGY. OFFICE MACHINES:
(ISDN); - 33.100 Electromagnetic compatibility (EMC); - 33.120 Components and accessories for telecommunications equipment; - 33.140 Special measuring equipment for use in telecommunications; - 33.160 Audio, video and audiovisual engineering; - 33.170 Television and radio broadcasting; - 33.180 Fibre optic communications; - 33.200 Telecontrol. Telemetering.	- 35.140 Computer graphics; - 35.160 Microprocessor systems; - 35.180 IT terminal and other peripheral equipment; - 35.200 Interface and interconnection equipment; - 35.210 Cloud Computing; - 35.220 Data storage devices; - 35.240 Applications of information technology; - 35.260 Office machines.

4.2. DEFINITION OF ICT SUBSECTORS

The ICT sector covers many issues, whose responsibility, from a standardization point of view, is dispatched among a number of technical committees. In order to facilitate the identification of the relevant technical committees by interested stakeholders, the ICT sector was divided into subsectors (e.g.: Cloud Computing, Internet of Things, etc.) grouping the related technical committees.

Theses subsectors, presented in section 5.2, have been mainly defined on the basis of the national interest as well as national and European standardization policy objectives for the ICT sector, particularly focusing on the priorities identified by the European Commission in the COM(2016) 176[72]. Indeed, they are strongly related to the ICT standardization context described in section 3.2 and aim at focusing on the main potential areas of interest of the national stakeholders.

Additionally, a more general ICT category has been created to include some technical committees that are not related to any particular subsector. They have however been presented since they could be of interest for some national organizations.

Finally, *Fora* and *consortia* have not been included in the subsectors. Indeed, their scope is generally too large to be related to only one subsector. Moreover, it is usually difficult to have a clear view of the scope of committees composing the studied *Fora/Consortia*.

4.3. PRESENTATION OF THE RESULTS

The technical committees and related information collected during the standards watch have been presented using identification cards (ID-Cards), which were designed using a common template (Figure 3) depending on the parent organizations of the technical committees, some information can sometimes be unavailable. The objective of these ID-Cards is to offer a quick overview of each surveyed technical committees and foster the involvement of national stakeholders in the relevant standardization areas.

In addition, the ID-Cards have been sorted according to their relevance for the different subsectors defined in the second step of this standards analysis, as shown in Section 5.3. In this way, the categorized ID-Cards, available in Chapter 6, provide a mapping of the ICT sector from a standardization perspective.

[72] http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52016DC0176

Finally, the *Fora* and *Consortia* that have been analyzed in the frame of the standards watch, as well as additional standardization groups with particular way of functioning are presented through a table available in the Appendix 9.3.

Figure 3: ID-Card template

General information			
Committee		Title	
Creation date		MEMBERS 	
Secretariat			
Secretary			
Chairperson			
Organizations in liaison			
Web site			
Scope			
Structure			
Standardization work			
Published standards			
Standards under development			
Involvement of Luxembourg			
Comments			

4.4. IDENTIFICATION OF OPPORTUNITIES FOR THE NATIONAL MARKET

The last step of the standards analysis consists in the identification of opportunities for the national market. On the basis of the experience of ILNAS regarding national stakeholders' motivations to invest in the standardization process, and particularly to participate in technical committees, some potential interests have been identified, as shown in Table 6.

Table 6: National stakeholders' potential interests to participate in technical standardization

Potential Interests	Descriptions
Information	Thanks to the participation in a standardization technical committee, the stakeholders are informed on the latest standardization developments related to their activities, allowing them to identify future requirements and to anticipate the consequences on their activities.
Performance	Through participating in standardization activities within a technical committee, stakeholders contribute to increase their performance, in particular: - Development of new skills through the contact with other key actors (networking);

	- Information on directions taken by other states or others organizations (benchmarking); - Translation of innovations into future rules (knowledge codification); - Anticipation of the obligation to comply with European regulatory requirements.
Services	In some cases, the follow-up of standards developments offers stakeholders the opportunity to develop new services related to their activities.
Projects	Research projects directly related to standardization or involving standards in order to codify the acquired knowledge are regularly launched. Stakeholders can access useful information in the framework of future calls for tenders as well as benefit from specific support to get involved in projects.
Training	Thanks to the knowledge of standards and its development process, stakeholders have solid and reliable elements to update, improve or develop trainings in the ICT sector.
Investments	Stakeholders could have an interest in investing in new technologies or concepts that are standardized, indicating a growing maturity.

These potential interests constitute some levers to make national organizations aware of the benefits of the participation in technical standardization. In this context, ILNAS, through the "Luxembourg's policy on ICT technical standardization 2015-2020", aims to provide them some opportunities to change standardization from potential to real benefits. Some related opportunities currently offered at national level are thus described in Chapter 7.

Moreover, in the context of the national ICT policy, ILNAS annually sets up an implementation plan related to the national standards analysis. This document defines the priorities regarding ICT standardization subsectors development and intends to serve as an annual roadmap to raise awareness in national organizations with the final objective to foster the national involvement in ICT technical standardization. For example, in 2017, ILNAS plans to concentrate the technical standardization development efforts on the areas of Cloud Computing, Internet of Things, Big Data and Digital Trust.

This implementation plan facilitates the transfer of ICT standardization related knowledge from the national standards body to the national market and, consequently, supports the ICT sector in terms of development, competitiveness, visibility and performance, while enhancing the international recognition of the Grand Duchy of Luxembourg at the standardization level.

5. RESULTS OF THE STANDARDS ANALYSIS

5.1. STANDARDS WATCH

The standards watch performed, as described in Section 4.1, allowed the identification of 81 standardization technical committees (TC) related to the ICT sector. Moreover, 18 *Fora* and *Consortia* meeting the selection criteria have been selected and analyzed.

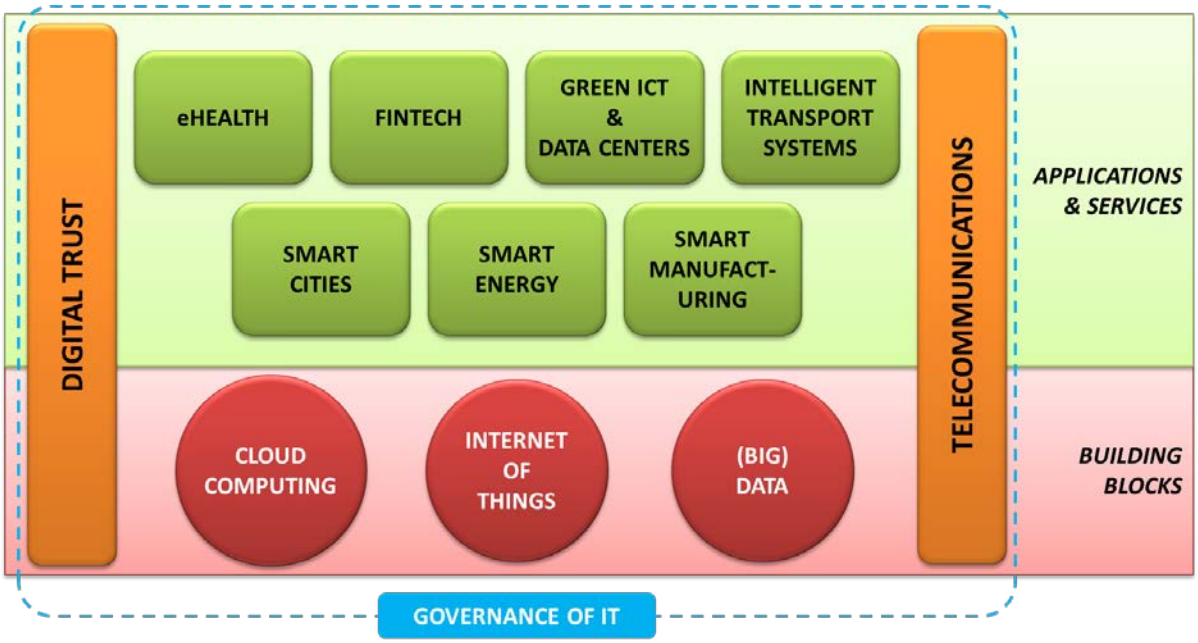
In total 65 of the 80 identified TCs are described, through ID-Cards, in Chapter 6, while the rest are presented more succinctly in the Appendix 9.3, as well as the 18 selected *Fora* and *Consortia*. This Appendix includes the standardization structures that are not directly linked with the national market interests and the national standardization strategy.

5.2. ICT SUBSECTORS

As explained in Section 4.2, some ICT-related subsectors have been defined in order to facilitate the identification of technical committees active in specific ICT areas by the national organizations. Thirteen subsectors have been defined in connection with European and national standardization policy objectives for the ICT sector as well as main potential areas of interest of the national stakeholders.

The 13 ICT subsectors defined in this standards analysis are closely interlinked and aim at covering the main ICT-related areas of interest for the national market. Figure 4 shows the proposed mapping of the ICT landscape and the relationship between the different subsectors.

Figure 4: ICT standards analysis subsectors



Indeed, the ICT sector is a keystone of the global economy and become ever smarter, notably due to the convergence of the different technologies. This standards watch, considers five building blocks (Figure 4) as a basis for maturing Smart ICT and developing the economy and society in general. Cloud Computing, Internet of Things and Big Data are three of these building blocks that represent disruptive technologies being able to deeply change and improve work practices in other economic sectors. In addition, Digital Trust and Telecommunications constitute, from one side, building blocks essential for the development of the other sectors (e.g.: with the development of Cybersecurity, 5G, etc.) and from the other side, also form economic sectors beneficiating from others building blocks.

The examples of sectors where Smart ICT act as a catalyst are numerous: automotive, energy, biomedical, finance, manufacturing industry, etc. Considering the national economy, the standards analysis focuses on 7 subsectors, at "Applications & Services" level, that have emerged or flourished thanks to Smart ICT: eHealth, Fintech, Green ICT & Data Centers, Intelligent Transport Systems, Smart Cities, Smart Energy and Smart Manufacturing.

Finally, another subsector - Governance of IT - has been identified to emphasize the importance of the governance in the development of all other subsectors. Indeed, Smart ICT projects require the support and involvement of public and private leaders to succeed. This component is thus essential to achieve the digitization of the economy as a whole and benefit from its potential.

The subsectors are defined in Table 7.They cover 68 TCs, listed in Table 8, while the 12 remaining TC are not related to any particular subsector and are thus included in a more general part (see Table 10). According to market interests and standardization strategic developments, new subsectors may be added in future versions of this analysis.

Table 7: ICT subsectors

SUBSECTOR	DESCRIPTION
Cloud Computing	Cloud Computing is currently a hot topic in ICT and is closely followed by many organizations at national level, making it relevant as a subsector. The main idea behind Cloud Computing is to store and process data in the cloud, access applications from anywhere and to maintain important information in the cloud, all of this being done faster and at lower cost than through conventional means. Cloud Computing is defined by ISO/IEC 17788:2014 as "*a paradigm for enabling network access to a scalable and elastic pool of shareable physical or virtual resources with self-service provisioning and administration on-demand*"[73]. The main characteristics of Cloud Computing are: - Broad network access: physical and virtual resources are available over a network and accessed through standard mechanisms that promote use by heterogeneous client platforms; - Measured service: the metered delivery of cloud services is such that usage can be monitored, controlled, reported, and billed; - Multi-tenancy isolation: in case of multi-tenancy of a Cloud resource, physical or virtual resources are allocated in such a way that multiple tenants and their computations and data are isolated from and inaccessible to one another; - On-demand self-service: a cloud service customer can provision computing capabilities, as needed, automatically or with minimal interaction with the cloud service provider; - Rapid elasticity and scalability: physical or virtual resources can be rapidly and elastically adjusted, in some cases automatically, to quickly increase or decrease resources; - Resource pooling: a cloud service provider's physical or virtual resources can be aggregated in order to serve one or more cloud service customers.
Internet of Things (IoT)	The final study report of ISO/IEC JTC 1/SWG 5[74] defined Internet of Things (IoT) as: "*An infrastructure of interconnected objects, people, systems and information resources together with intelligent services to allow them to process information of the physical and the virtual world and react*". Many services can be envisioned as a result of technological progress and all objects can play an active role thanks to their connection to the Internet: real-time traffic updates (thanks to mobile

[73] International Standard ISO/IEC 17788:2014, Information technology -- Cloud computing -- Overview and Vocabulary (developed by ISO/IEC JTC 1/SC 38)

[74] Based on the Study Report on Internet of Things (IoT) submitted to the 2014 ISO/IEC JTC 1 Plenary by the ISO/IEC JTC 1/SWG 5 on IoT. This SWG has been replaced at the end of 2014 by the WG 10 on IoT

	tracking), building automation and controls, automatic energy management, intelligent shopping applications, vehicle auto-diagnosis, assistance for elderly or disabled people to help them living independently, etc. In this frame, standardization is essential to define a universal approach and thus ensure interoperability of IoT infrastructures. IoT is highly related to other ICT areas like Sensor Networks, Machine-to-Machine (M2M) communications or Automatic identification and data capture techniques (e.g.: RFID) and these domains are thus included in this subsector.
(Big) Data	The Big Data Preliminary Report published by ISO/IEC JTC 1[75] defines Big Data as "*a data set(s) with characteristics (e.g. volume, velocity, variety, variability, veracity, etc.) that for a particular problem domain at a given point in time cannot be efficiently processed using current/existing/established/traditional technologies and techniques in order to extract value.*" Big Data is at the top of the agenda of a number of ICT stakeholders. Analytical functions performed on these large amounts of data may allow the production of new knowledge, offering great promises in terms of applications in all the economic sectors. In this standards analysis, the (Big) Data subsector encompasses the whole scope of data management, as defined by ISO/IEC TR 10032:2003: "*the activities of defining, creating, storing, maintaining and providing access to data and associated processes in one or more information systems*"[76].
Digital Trust	Digital trust[77] indicates a positive and verifiable belief about the perceived reliability of a digital information source, product or service, leading to an intention to use[78]. This subsector covers various areas that are essential to allow trust in digital technologies and notably these relevant blocks: - Information security, which includes three main dimensions: confidentiality, availability and integrity. In addition, other properties, such as authenticity, accountability, non-repudiation, and reliability can also be involved. Information security involves the application and management of appropriate security measures that involves consideration of a wide range of threats, with the aim of ensuring sustained business success and continuity, and minimizing the impacts of information security incidents. - Electronic signature, defined as a "*data in electronic form that is attached to or logically associated with other electronic data and that serves as a method of authentication*"[79]. This area includes the different concepts and mechanisms upon which electronic signatures are based including public key cryptography, public key certificate, hash functions and Public Key Infrastructures (PKI). - Electronic archiving, which consists in the long-term repository of data or information of any kind and from any source, whose temporal existence is evidenced by being stored in or on any electronic medium[80].

[75] Based on the Preliminary Report on Big Data submitted to the 2014 ISO/IEC JTC 1 Plenary by the ISO/IEC JTC 1/SG 2 on Big Data. This SG has been replaced at the end of 2014 by the WG 9 on Big Data

[76] ISO/IEC TR 10032:2003, Information technology -- Reference Model of Data Management (developed by ISO/IEC JTC 1/SC 32)

[77] At the end of 2016, ILNAS published a White Paper "Digital Trust for Smart ICT" in relation with this subsector

[78] F. Rowley, J., & Johnson, "Understanding Trust Formation in Digital Information Sources: The Case of Wikipedia," J. Inf. Sci., 2013.

[79] ETSI TS 101 733, Electronic Signatures and Infrastructures (ESI); CMS Advanced Electronic Signatures (CAdES) (developed by ETSI/TC ESI)

[80] Based on ISO/IEC 30300:2011, Information and documentation -- Management systems for records -- Fundamentals and vocabulary (developed by ISO/TC 46/SC 11)

Telecommunications	Telecommunications is defined by ISO 5127:2001 as the "*theory and techniques of the transmission of signals by electromagnetic or electronic means*"[81]. The telecommunications subsector covers any transmission, emission or reception of signs, signals, writing, images and sounds or intelligence of any nature by wire, radio, optical or other electromagnetic systems[82].
Governance of IT	Corporate governance involves a set of relationships between a company's management, its board, its shareholders and other stakeholders. Corporate governance also provides the structure through which the objectives of the company are set, and the means of attaining those objectives and monitoring performance are determined[83]. The governance of IT is thus a component or a subset of organization governance, which is one key element in improving economic efficiency and growth as well as enhancing investors' confidence. Governance of IT can be defined as the system by which the current and future use of IT is directed and controlled[84].
E-Health	E-Health refers to the combined use of electronic communication and information technology in the health sector to enable better health and healthcare[85].
Fintech	Fintech, or Financial Technologies, can be defined as "*finance at the crossroads with IT*", as stated by Mr. Pierre Gramegna, Luxembourg Finance Minister, during the 2015 ALFI Global Distribution conference. For the Wharton Business School, it represents "*an economic industry composed of companies that use technology to make financial systems more efficient*" Whatever the definition, it is currently a topic at the top of the agenda in Luxembourg since Fintech are foreseen to rethink the traditional financial sector by exploiting the potential of new technologies. In the standards analysis, this subsector encompasses standardization aspects of both "traditional" financial technologies and more disrupted ones like with the recently created technical committee on Blockchains and Distributed Ledger Technologies.
Green ICT and Data Centers	Green ICT focuses from one side on the ability to reduce the environmental impact of IT (hardware and software) throughout its life cycle. It addresses waste associated with the use of hardware and software and energy consumption. From the other side, it concerns the development and use of information systems to reduce the environmental impact (e.g. energy savings) of products and services that require IT. The standards analysis particularly addresses Green ICT related to Data Centers, in relation with the great position of Luxembourg in this area. Indeed, the country boasts one of the most modern data center parks in Europe and has around 20 data centers in operation and is now a leading data center marketplace with one of the highest data center densities in Europe and the world[86]. In the frame of the report, Data center is defined as "*a structure, or group of structures, dedicated to the centralized accommodation, interconnection and operation of information technology and network telecommunications equipment providing data storage, processing and transport services together with all the facilities and infrastructures for power distribution and environmental control together with the necessary levels of resilience and security required to provide the desired service availability*"[87].

[81] ISO/IEC 27050-1:2016, Information technology — Security techniques — Electronic discovery — Part 1: Overview and concepts (developed by ISO/IEC JTC 1/SC 27)

[82] Definition extracted from the International Telecommunication Convention (Nairobi, 1982)

[83] OECD principles of corporate Governance

[84] Based on ISO/IEC TR 38502:2014, Information Technology -- Governance of IT -- Framework and model (developed by ISO/IEC JTC 1/SC 40)

[85] Source: ISO/TR 28380-3:2014, Health informatics — IHE global standards adoption — Part 3: Deployment

[86] https://ict.investinluxembourg.lu/why-luxembourg/ict-luxembourg/data-centres-ecosystems

[87] International Standard ISO/IEC 30134-1:2016, Information Technology -- Data Centres -- Key performance indicators -- Part 1: Overview and general requirements (developed by ISO/IEC JTC 1/SC 39)

Intelligent Transport Systems (ITS)	Intelligent Transport Systems (ITS) are "transport systems in which advanced information, communication, sensor, and control technologies, including the Internet, are applied to increase safety, sustainability, efficiency, and comfort"[88]. Intelligent Transport Systems (ITS) can significantly contribute to a cleaner, safer and more efficient transport system. The most important benefits from ITS are: minimize the impact of traffic on the environment, improve energy efficiency and decrease dependency on fossil fuels; reduce congestion and optimize the use of existing infrastructure; increase the use of environmental friendly transport modes; increase traffic safety and security; increase convenience of transport[89].
Smart Cities	There are many definitions of a smart city and many designations that refer to the same concept. ISO/TC 268 prefers the expression "smart community infrastructure". It proposes the following definition of this concept: "*a community infrastructure with enhanced technological performance that is designed, operated, and maintained to contribute to sustainable development and resilience of the community*"[90]. Smart Cities have many dimensions and encompass many economic sectors and technologies. Different dimensions are proposed for a smart city (e.g.: smart economy, smart mobility, smart environment, smart people, smart living, smart governance, etc.). In this frame we can consider a smart city as a system of systems, meaning it is a complex construction that requires the development of many other technologies (e.g.: Internet of Things, Big Data, Intelligent Transport Systems, etc.). The standardization issues are thus numerous and do not only concern ICT, which can be seen as a facilitator to help the city to become smart.
Smart Energy	The Smart Energy subsector primarily focuses on the use of ICT to automatize and optimize the production and distribution of energy, allowing from one side to better connect the demand and the supply between consumers and producers and from the other side to improve the stability and availability of energy. The main goal consists in energy savings. It covers in particular the standardization of Smart Meters and Smart Grids.
Smart Manufacturing	Smart Manufacturing is an umbrella term including many technologies and domains. The idea behind this term is to create smart systems using modernization trends in the manufacturing environment. Smart Manufacturing corresponds to the use of smart ICT systems to transform the manufacturing environment, with the objective to maximize energy efficiency and productivity. It is an umbrella subsector, which includes, in the context of the standards analysis, additive manufacturing (3D printing), robotics and automation systems in the industrial context.

5.3. TECHNICAL COMMITTEES AND ICT SUBSECTORS

Following the definition of the subsectors categorizing the ICT sector, technical committees have been classified in the relevant ones.

5.3.1. Technical committees related to ICT subsectors

The 68 standardization technical committees identified that are related to the selected ICT subsectors are listed below (Table 8). ETSI and ITU-T are included as a whole. In addition, in order to have access to more details, the main technical committees, 54 out of 68, have a detailed ID-Card presented in the

[88] International Standard ISO 17465-1:2014, Intelligent transport systems -- Cooperative ITS -- Part 1: Terms and definitions (developed by ISO/TC 204)

[89] CEN/TC 278 Website (http://www.itsstandards.eu/)

[90] Definition available in ISO/TS 37151:2015, Smart community infrastructures -- Principles and requirements for performance metrics

following chapter, while the rest are summarized in Appendix 9.3. The exact page number referring to the specific ID-Card or to the appendix is also available in Table 8.

Table 8: Identified technical committees by ICT subsector

SUBSECTOR	ORIGIN*	TECHNICAL COMMITTEE (TC)	ID-CARD Ref. Page
CLOUD COMPUTING	INT	ISO/IEC JTC 1/SC 38 - Cloud Computing and Distributed Platforms	39
INTERNET OF THINGS	INT	ISO/IEC JTC 1/WG 7 - Sensor Networks	43
	INT	ISO/IEC JTC 1/WG 10 - Internet of Things	45
	INT	ISO/IEC JTC 1/SC 31 - Automatic identification and data capture techniques	47
	INT	ISO/IEC/JTC 1/SC 41 - Internet of Things and related technologies	49
	EU	ETSI/TC SmartM2M - Smart Machine-to-Machine Communications	50
	EU	CEN/TC 225 - AIDC Technologies	51
(BIG) DATA	INT	ISO/IEC JTC 1/WG 9 - Big Data	55
	INT	ISO/IEC JTC 1/SC 2 - Coded character sets	57
	INT	ISO/IEC JTC 1/SC 23 - Digitally Recorded Media for Information Interchange and Storage	58
	INT	ISO/IEC JTC 1/SC 24 - Computer graphics, image processing and environmental data representation	59
	INT	ISO/IEC JTC 1/SC 29 - Coding of audio, picture, multimedia and hypermedia information	61
	INT	ISO/IEC JTC 1/SC 32 - Data management and interchange	63
	INT	ISO/IEC JTC 1/SC 34 - Document description and processing languages	65
DIGITAL TRUST	INT	ISO/IEC JTC 1/SC 17 - Cards and personal identification	69
	INT	ISO/IEC JTC 1/SC 27 - IT Security techniques	71
	INT	ISO/IEC JTC 1/SC 37 - Biometrics	74
	INT	ISO/TC 46/SC 11 - Archives/records management	76
	INT	ISO/TC 290 - Online reputation	78
	EU	ETSI/TC CYBER - Cyber Security	80
	EU	ETSI/TC ESI - Electronic Signatures and Infrastructures	81
	EU	CEN/TC 224 - Personal Identification, Electronic Signature and Cards	83
	EU	CEN/CLC JWG 8 - Privacy management in products and services	85
	EU	ETSI/TC SAGE - Security Algorithms Group of Experts	197
	EU	ETSI/ISG ISI - Information Security Indicators	197
	EU	ETSI/ISG QKD - Quantum Key Distribution	197
	EU	ETSI/ISG QSC - Quantum-Safe Cryptography	197
	EU	CEN/TC Project Committee 365 - Internet Filtering	197
	EU	CEN/CLC CSCG - Focus Group on Cybersecurity	197
TELECOMMUNICATIONS	INT	ISO/IEC JTC 1/SC 6 - Telecommunications and information exchange between systems	88
	INT	ISO/IEC JTC 1/SC 25 - Interconnection of information technology equipment	90
	INT	ITU-T - International Telecommunication Union's	92

SUBSECTOR	ORIGIN*	TECHNICAL COMMITTEE (TC)	ID-CARD Ref. Page
		Telecommunication Standardization Sector	
	EU	ETSI - European Telecommunications Standards Institute	94
GOVERNANCE OF IT	INT	ISO/IEC JTC 1/SC 40 - IT Service Management and IT Governance	99
E-HEALTH	INT	ISO/TC 215 - Health informatics	103
	EU	ETSI/EP eHealth - ETSI Project (EP) eHEALTH	105
	EU	CEN/TC 251 - Health Informatics	107
FINTECH	INT	ISO/TC 68 - Financial services	110
	INT	ISO/TC 68/SC 2 - Financial Services, security	112
	INT	ISO/TC 68/SC 4 - Securities and related financial instruments	113
	INT	ISO/TC 68/SC 7 - Core banking	114
	INT	ISO/TC 307 - Blockchain and electronic distributed ledger technologies	116
GREEN ICT & DATA CENTERS	INT	ISO/IEC JTC 1/SC 39 - Sustainability for and by Information Technology	120
	EU	ETSI/TC EE - Environmental Engineering	122
	EU	CLC/TC 215 - Electrotechnical aspects of telecommunication equipment	123
	EU	ETSI/ISG OEU - Operational energy Efficiency for Users	197
INTELLIGENT TRANSPORT SYSTEMS (ITS)	INT	ISO/TC 204 - Intelligent Transport Systems	127
	EU	ETSI/TC ITS - Intelligent Transport Systems	129
	EU	CEN/TC 278 - Intelligent Transport Systems	130
SMART CITIES	INT	ISO/IEC JTC 1/WG 11 - Smart Cities	134
	INT	ISO/TC 268 - Sustainable Cities and communities	136
	INT	ISO/TC 268/SC 1 - Smart community infrastructures	138
	EU	CEN/TC 247 - Building Automation, Controls and Building Management	140
	INT	IEC/SyC Smart Cities - Electrotechnical aspects of Smart Cities	197
	EU	CEN/CLC/ETSI SSCC-CG - Coordination group on Smart and Sustainable cities and communities	197
SMART ENERGY	INT	IEC/PC 118 - Smart grid user interface	144
	EU	CEN/TC 294 - Communication systems for meters	145
	INT	IEC/SyC Smart Energy - System Committee Smart Energy	197
	EU	CEN/CLC/ETSI SEG-CG - Smart Energy Grids Coordination Group	197
	EU	CEN/CLC/ETSI SM-CG - Smart Meters Co-ordination Group	197
SMART MANUFACTURING	INT	ISO/TC 184 - Automation systems and integration	149
	INT	ISO/TC 261 - Additive manufacturing	151
	INT	ISO/TC 299 - Robots and robotic devices	153
	INT	IEC/TC 65 - Industrial-process measurement, control and automation	155
	EU	CEN/TC 310 - Advanced automation technologies and their applications	157
	EU	CEN/TC 438 - Additive manufacturing	159
	INT	IEC/SEG 7 - Smart Manufacturing	197
	INT	IEC/ACART - Advisory Committee on Applications of Robot Technology	197

** EU: European origin and INT: International origin*

In summary, the 67 technical committees, which are relevant regarding the national ICT subsectors, are specified in Table 9. Note that ETSI and ITU-T as a whole are also related to the "Telecommunications" subsector.

Table 9: Distribution of the selected technical committees in the ICT subsector

SUBSECTOR	EUROPEAN TC	INTERNATIONAL TC	TOTAL
CLOUD COMPUTING	0	1	**1**
INTERNET OF THINGS	2	4	**6**
(BIG) DATA	0	7	**7**
DIGITAL TRUST	10	5	**15**
TELECOMMUNICATIONS	1	3	**4**
GOVERNANCE OF IT	0	1	**1**
E-HEALTH	2	1	**3**
FINTECH	0	5	**5**
GREEN ICT & DATA CENTERS	3	1	**4**
INTELLIGENT TRANSPORT SYSTEMS	2	1	**3**
SMART CITIES	2	4	**6**
SMART ENERGY	3	2	**5**
SMART MANUFACTURING	2	6	**8**
Total	**27**	**41**	**68**

5.3.2. Technical committees not related to ICT subsectors

Finally, the standards watch has identified 12 technical committees that focus on ICT standardization, but not related to any subsector (Table 7). Although these committees are not related to the current subsectors, they might be interesting for stakeholders.

These technical committees are presented in Table 10.

Table 10: Technical committees not related to subsectors

SDO	ORIGIN*	TECHNICAL COMMITTEE (TC)	ID-CARD Ref. Page
ISO/IEC	INT	ISO/IEC JTC 1 - Information technology	162
	INT	ISO/IEC JTC 1/JAG – JTC 1 Advisory Group	197
	INT	ISO/IEC JTC 1/SC 7 – Software and systems engineering	164
	INT	ISO/IEC JTC 1/SC 22 - Programming languages, their environments and system software interfaces	167
	INT	ISO/IEC JTC 1/SC 28 - Office equipment	169
	INT	ISO/IEC JTC 1/SC 35 - User interfaces	170
	INT	ISO/IEC JTC 1/SC 36 - Information technology for learning, education and training	172
CEN	EU	CEN/TC 287 - Geographic Information	174
	EU	CEN/TC 428 - Project Committee - e-competences and ICT Professionalism	175
	EU	CEN/TC 434 - Project Committee - Electronic Invoicing	176
	EU	CEN/TC 440 - Electronic Public Procurement	178
	EU	CEN/TC 445 - Digital information Interchange in the Insurance Industry	180

6. ICT STANDARDS WATCH

As detailed in the previous chapters, the objective of the standards analysis is to facilitate the involvement of the national organizations in the technical standardization process. In this way, this chapter presents the main result of the standards analysis, consisting in the presentation of the technical committees identified during the standards watch stage using ID-Cards (see Chapter 4 for more details about the methodology followed to sets out the standards analysis). Additional standardization groups, as well as the retained Fora and Consortia, are detailed in Appendix 9.3.

This Chapter provides 65 ID-Cards dispatched among 13 ICT subsectors, as presented in the previous chapter. It focuses on the formal standards bodies, both at European and international levels:

- **ISO/IEC standardization committees**

ISO is the world's dominant developer and publisher of International Standards in terms of scope. It has around 21,000 standards published and more than 4,700 standards under development[91]. ISO is in charge of developing International Standards for all industry sectors. IEC prepares and publishes International Standards for all electrical, electronic and related technologies – collectively known as "electrotechnology". To prevent an overlap in standardization work related to information technology, ISO and IEC formed a Joint Technical Committee in 1987 known as ISO/IEC JTC 1.

In addition to ISO/IEC JTC 1 subcommittees, some other technical committees that are not directly related to the ICT domain are also presented, in relation with standardization activities relevant for Smart ICT applications and services (e.g.: Smart Energy, Smart Cities, etc.).

- **CEN and CENELEC standardization committees**

CEN, the European Committee for Standardization, and CENELEC, the European Committee for Electrotechnical Standardization, are the European counterparts of ISO and IEC. Regarding ICT, the standardization work is principally hosted at the CEN with some exceptions like for the technical committee CENELEC/TC 215, particularly relevant for the "Green ICT & Data center" subsector.

- **ETSI - European Telecommunications Standards Institute**

The European Telecommunications Standards Institute (ETSI) produces globally applicable standards for ICT including fixed, mobile, radio, converged, broadcast and internet technologies. ETSI is officially recognized by the European Union as a European Standardization Organization.

In this section, an ID-Card is provided for ETSI in general. By its scope – specifically focused on telecommunications – the whole of ETSI is considered as related to the "telecommunications" subsector. Specific technical committees are detailed due to their particular importance for subsectors (e.g.: ETSI/TC ESI and ETSI/TC CYBER for the "Digital Trust" subsector).

- **ITU-T - International Telecommunication Union - Telecommunication Standardization Sector**

The International Telecommunication Union - Telecommunication Standardization Sector (ITU-T) is an "intergovernmental public-private partnership organization" which brings together experts from around the world to develop international standards known as ITU-T Recommendations which

[91] https://www.iso.org/iso-in-figures.html

represents defining elements in the global infrastructure of information and communication technologies.

From its inception in 1865, with ITU originally meaning the International Telegraph Union, ITU-T has now evolved to a contribution-led, consensus-based approach to standards development in which all countries and companies, no matter how large or small, are afforded equal rights to influence the development of ITU-T Recommendations. From its beginnings, as a body standardizing international telegraph exchange (through its formative role in telecommunications and in today's converged ICT ecosystem), ITU-T has provided the world's best facilities to the global standardization community and remains the world's only truly global ICT standards body[92].

An ID-Card is provided for ITU-T in general. By its scope – specifically focused on telecommunications – the whole of ITU-T is considered as related to the "telecommunications" subsector.

[92] http://www.itu.int/en/ITU-T/about/Pages/default.aspx

6.1. CLOUD COMPUTING

Cloud Computing is currently a hot topic in ICT and is closely followed by many organizations at national level, making it relevant as a subsector. The main idea behind Cloud Computing is to store and process data in the cloud, access applications from anywhere and to maintain important information in the cloud, all of this being done faster and at lower cost than through conventional means.

Cloud Computing is defined by ISO/IEC 17788:2014 as "a paradigm for enabling network access to a scalable and elastic pool of shareable physical or virtual resources with self-service provisioning and administration on-demand"[93].

The main characteristics of Cloud Computing are:

- *Broad network access: physical and virtual resources are available over a network and accessed through standard mechanisms that promote use by heterogeneous client platforms;*
- *Measured service: the metered delivery of cloud services is such that usage can be monitored, controlled, reported, and billed;*
- *Multi-tenancy isolation: in case of multi-tenancy of a Cloud resource, physical or virtual resources are allocated in such a way that multiple tenants and their computations and data are isolated from and inaccessible to one another;*
- *On-demand self-service: a cloud service customer can provision computing capabilities, as needed, automatically or with minimal interaction with the cloud service provider;*
- *Rapid elasticity and scalability: physical or virtual resources can be rapidly and elastically adjusted, in some cases automatically, to quickly increase or decrease resources;*
- *Resource pooling: a cloud service provider's physical or virtual resources can be aggregated in order to serve one or more cloud service customers.*

[93] *International Standard ISO/IEC 17788:2014, Information technology -- Cloud computing -- Overview and Vocabulary (developed by ISO/IEC JTC 1/SC 38)*

6.1.1.ISO/IEC JTC 1/SC 38

General information			
Committee	**ISO/IEC JTC 1/SC 38**	**Title**	**Cloud Computing and Distributed Platforms**
Creation date	2009	**MEMBERS** 	**Participating Countries (30):** United States, Australia, Austria, Belgium, Brazil, Canada, China, Denmark, Finland, France, Germany, India, Ireland, Israel, Italy, Japan, Republic of Korea, **Luxembourg**, Netherlands, Pakistan, Panama, Poland, Russian Federation, Singapore, Slovakia, South Africa, Spain, Sweden, Switzerland, United Kingdom **Observing Countries (10):** Argentina, Bosnia and Herzegovina, Czech Republic, Hong Kong, Norway, Portugal, Serbia, Turkey, Uruguay, Zambia
Secretariat	ANSI (USA)		
Secretary	Ms. Lisa Rajchel		
Chairperson	Dr. Donald Deutsch		
Organizations in liaison	CSCC, Cloud security alliance, DMTF, Ecma International, INLAC, ITU, OASIS, OGF, SNIA, EC, EuroCloud, TM Forum		
Web site	https://www.iso.org/committee/601355.html		
Scope	Standardization in the area of Cloud Computing and Distributed Platforms including but not limited to: - Service Oriented Architecture (SOA); - Service Level Agreement; - Interoperability and Portability; - Data and their Flow Across Devices and Cloud Services.		
Structure	JTC 1/SC 38/WG 3 Cloud Computing Service Level Agreements (CCSLA) JTC 1/SC 38/WG 4 Cloud Computing Interoperability and Portability (CCIP) JTC 1/SC 38/WG 5 Cloud Computing Data and its Flow (CCDF)		
Standardization work			
Published standards	Number of published ISO/IEC standards under the direct responsibility of JTC 1/SC 38 (number includes updates): 10		
Standards under development	5		
Involvement of Luxembourg			
13 delegates - Mr. Michel Ayme — Atos Luxembourg PSF S.A. - Mr. Christophe Delogne — KPMG Luxembourg S.à r.l. - Mr. Cyril Cassagnes — KPMG Luxembourg S.à r.l. - Mrs. Myriam Djerouni — Banque de Luxembourg S.A. - Mrs. Shenglan Hu — POST Telecom PSF S.A. - Mrs. Digambal Nayagum — AS AVOCATS - Mr. Johnatan Pecero — ANEC GIE - Mr. Shyam Wagle — ANEC GIE - Mr. Joost Pisters — LuxCloud S.A. - Mr. Jean Rapp — Actimage S.A. - Mr. Jean-Michel Remiche — POST Telecom S.A. - Mrs. Ana-Maria Simionovici — University of Luxembourg - Mr. Qiang Tang — University of Luxembourg			

Comments

ISO/IEC JTC 1/SC 38, Cloud Computing and Distributed Platforms, is responsible for the development of standards to support distributed computing paradigms- especially in the area of Cloud Computing. With the progression of service oriented architecture specification and the publication of ISO/IEC 17788 and 17789, standards presenting a taxonomy, terminology and vocabulary, from the Cloud Computing collaboration with ITU-T/SG 13, SC 38 is turning its focus to identifying other standardization initiatives in these rapidly developing areas.

Based on an understanding of the market/business/user requirements for Cloud Computing standards and a survey of related standardization activities within ISO/IEC JTC 1 and other standards setting organizations, new Cloud Computing standardization initiatives will be proposed and initiated. SC 38 approved two new projects on Interoperability and Portability and Data Flow. By initiating standardization activities only after first identifying Cloud Computing standardization requirements, ISO/IEC JTC 1/SC 38 will address the public and private sector needs for standards that answer end-user requirements and facilitate the rapid deployment of Cloud Computing.

The current SC 38 work program includes:

- ISO/IEC CD 19086-2, Information technology -- Cloud computing -- Service level agreement (SLA) framework -- Part 2: Metric Model;
- ISO/IEC FDIS 19086-3, Information technology -- Cloud computing -- Service level agreement (SLA) framework -- Part 3: Core conformance requirements;
- ISO/IEC DIS 19941, Information Technology -- Cloud Computing -- Interoperability and portability;
- ISO/IEC DIS 19944, Information Technology -- Cloud Computing – Cloud services and devices: data flow, data categories and data use;
- ISO/IEC AWI 22123, Information Technology -- Cloud Computing -- Concepts and Terminology.

Moreover, projects related to Cloud Computing security are under the direct responsibility of ISO/IEC JTC 1/SC 27. In this frame, several International Standards have already been published, like ISO/IEC 27017:2015 or ISO/IEC 27018:2014, which respectively define code of practice for information security controls based on ISO/IEC 27002 for cloud services and for protection of personally identifiable information (PII) in public clouds acting as PII processors.

Currently, ISO/IEC JTC 1/SC 27 is developing the fourth part of ISO/IEC 19086, concerning the security and privacy aspects of the SLA framework and technology.

6.2. INTERNET OF THINGS

The final study report of ISO/IEC JTC 1/SWG 5[94] defined Internet of Things (IoT) as: "An infrastructure of interconnected objects, people, systems and information resources together with intelligent services to allow them to process information of the physical and the virtual world and react".

Many services can be envisioned as a result of technological progress and all objects can play an active role thanks to their connection to the Internet: real-time traffic updates (thanks to mobile tracking), building automation and controls, automatic energy management, intelligent shopping applications, vehicle auto-diagnosis, assistance for elderly or disabled people to help them living independently, etc.

In this frame, standardization is essential to define a universal approach and thus ensure interoperability of IoT infrastructures.

IoT is highly related to other ICT areas like Sensor Networks, Machine-to-Machine (M2M) communications or Automatic identification and data capture techniques (e.g.: RFID) and these domains are thus included in this subsector.

[94] *Based on the Study Report on Internet of Things (IoT) submitted to the 2014 ISO/IEC JTC 1 Plenary by the ISO/IEC JTC 1/SWG 5 on IoT. This SWG has been replaced at the end of 2014 by the WG 10 on IoT*

6.2.1.ISO/IEC JTC 1/WG 7

<table>
<tr><th colspan="4">General information</th></tr>
<tr><td>Committee</td><td>ISO/IEC JTC 1/WG 7</td><td>Title</td><td>Sensor networks</td></tr>
<tr><td>Creation date</td><td>2009</td><td rowspan="5">MEMBERS
  </td><td rowspan="5">Participating countries (22):
Republic of Korea, Australia, Austria, Canada, China, Finland, France, Germany, India, Israel, Japan, Mexico, Netherlands, Norway, Pakistan, Singapore, Slovenia, South Africa, Spain, Sweden, United Kingdom, United States</td></tr>
<tr><td>Secretariat</td><td>KATS (Republic of Korea)</td></tr>
<tr><td>Secretary</td><td>Ms. Jooran Lee</td></tr>
<tr><td>Chairperson</td><td>Dr. Yongjin Kim</td></tr>
<tr><td>Organizations in liaison</td><td>DEWI, OGC, IEEE Instrumentation and Measurement Society TC 9, ITU-T SG 20</td></tr>
<tr><td>Web site</td><td colspan="3">http://isotc.iso.org/livelink/livelink/open/jtc1wg7</td></tr>
<tr><td>Scope</td><td colspan="3">The ISO/IEC JTC 1/WG 7 has been established with the following Terms of Reference:

1) In the area of generic solutions for sensor networks, undertake standardization activities that support and can be applied to the technical work of all relevant JTC 1 entities and to other standards organizations. This includes activities in sensor networks such as the following:
- Standardization of terminology;
- Development of a taxonomy;
- Standardization of reference architectures;
- Development of guidelines for interoperability;
- Standardization of specific aspects of sensor networks.

2) In the area of application - oriented sensor networks, identify gaps and commonalities that may impact standardization activities within the scope of JTC 1. Further, share this information with relevant entities within and outside of JTC 1. Unless better pursued within another JTC 1 entity, the following standardization activities may be pursued as projects by this Working Group:
- Addressing the technology gaps within the scope of JTC 1 entities;
- Exploiting technology opportunities where it is desirable to provide common approaches to the use of sensor networks across application domains;
- Addressing emerging areas related to M2M and IoT.

3) In order to foster communication and sharing of information between groups working in the field of sensor networks:
- Seek liaison relationships with all relevant JTC 1 SCs/WGs;
- Seek liaison relationships with other organizations outside JTC 1 including but not limited to: relevant ISO TCs, IEC TCs and ITU-T SGs, IEEE 1451, IEEE 1588, IEEE P2030, IEEE 802.15, Open Geospatial Consortium, ZigBee Alliance, IETF 6LoWPAN, IETF ROLL WG, ETSI, IPSO Alliance, EPCglobal, ISA 100, LONMARK, KNX Association, Zwave Alliance;
- Consider the possibility of conducting joint projects with relevant ITU-T SG;
- Seek input from relevant research projects and consortia.</td></tr>
<tr><td>Structure</td><td colspan="3">/</td></tr>
</table>

Standardization work	
Published standards	Number of published ISO/IEC standards under the direct responsibility of JTC 1/WG 7 (number includes updates): 11
Standards under development	4
Involvement of Luxembourg	
NO (no registered delegate)	
Comments	

JTC 1/WG 7 has delivered International Standards on sensor networks since November 2009 when the Working Group was established directly under JTC 1. Initial and outstanding achievements of JTC 1/WG 7 are development and publication of Sensor Network Reference Architecture (SNRA): ISO/IEC 29182 Part 1 to Part 7. ISO/IEC 29182 series gives general overview, requirements, terminologies, views, entity models, interfaces to any users of sensor networks. Sensor Network and its Interface for Smart Grid System (ISO/IEC 30101:2014), Generic Sensor Network Application Interface (ISO/IEC 30128:2014), and Sensor Network Testing Framework (ISO/IEC 19637:2016) are also JTC 1/WG 7's main achievements.

JTC 1/WG 7 is currently developing International Standards on Underwater Acoustic Sensor Network (UWASN) and it will also, in cooperation with its Category C liaison DEWI (Dependable Embedded Wireless Infrastructure), develop Technical Reports on use-cases of sensor networks applications: aerospace, rail, building and automotive[95].

The current work program includes:

- ISO/IEC DIS 30140-1, Information technology -- Underwater acoustic sensor network (UWASN) -- Part 1: Overview and requirements;
- ISO/IEC DIS 30140-2, Information technology -- Underwater acoustics sensor network (UWASN) -- Part 2: Reference architecture;
- ISO/IEC CD 30140-3, Information technology -- Underwater acoustics sensor network (UWASN) -- Part 3: Entities and interface;
- ISO/IEC CD 30140-4, Information technology -- Underwater acoustics sensor network (UWASN) -- Part 4: Interoperability.

Resolution 12 of the 31st Meeting of ISO/IEC JTC 1 (November 2017) establishes a new JTC 1/SC 41 "Internet of Things and related technologies" that will include JTC 1/WG 7. JTC 1/WG 7 activities will continue until the first JTC 1/SC 41 Plenary Meeting scheduled in June 2017.

Scope of JTC 1/SC 41

- Standardization in the area of Internet of Things and related technologies.
    1. Serve as the focus and proponent for JTC 1's standardization program on the Internet of Things and related technologies, including Sensor Networks and Wearables technologies.
    2. Provide guidance to JTC 1, IEC, ISO and other entities developing Internet of Things related applications.

[95] Source: BUSINESS PLAN FOR JTC 1/WG 7, Sensor networks for the Period: September 2016 to August 2017

6.2.2.ISO/IEC JTC 1/WG 10

<table>
<tr><th colspan="4">General information</th></tr>
<tr><td>Committee</td><td>ISO/IEC JTC 1/WG 10</td><td>Title</td><td>Internet of Things (IoT)</td></tr>
<tr><td>Creation date</td><td>2014</td><td rowspan="5">MEMBERS
  </td><td rowspan="5">Participating countries (31):
Republic of Korea, Australia, Austria, Belgium, Canada, China, Czech Republic, Denmark, Finland, France, Germany, Hungary, India, Ireland, Israel, Italy, Japan, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Russian Federation, Singapore, Slovenia, South Africa, Spain, Sweden, Switzerland, United Kingdom, United States</td></tr>
<tr><td>Secretariat</td><td>KATS (Republic of Korea)</td></tr>
<tr><td>Secretary</td><td>Ms. Yaeseul Park</td></tr>
<tr><td>Chairperson</td><td>Mr. Sangkeun Yoo</td></tr>
<tr><td>Organizations in liaison</td><td>AIM Global, AIOTI/WG 3, ETSI, GS1, IEEE P2413, IIC, ITU-T, NIST CPS PWG, OGC, OMA DM, OMG, oneM2M, The Open Group, OCF, W3C</td></tr>
<tr><td>Web site</td><td colspan="3">http://isotc.iso.org/livelink/livelink/open/jtc1wg10</td></tr>
<tr><td>Scope</td><td colspan="3">The ISO/IEC JTC 1/WG 10 has been established with the following Terms of Reference:
- Serve as a focus of and proponent for JTC 1's IoT standardization program.
- Develop foundational standards for IoT related to JTC 1 for guiding IoT efforts throughout JTC 1 upon which other standards can be developed.
- The work will cover:
o Developing Terms and Definitions for JTC 1 IoT Vocabulary
o Developing IoT Reference Architecture and other foundational specifications as JTC 1 standards
o Continuing the work begun in SWG on IoT on standardization gaps
o Establishing a liaison with JTC 1, ISO, IEC or other entities undertaking work related to IoT
o Encouraging the prompt and efficient exchange of information within JTC 1 and with ISO, IEC, or other entities working on IoT, as appropriate
o Monitoring the ongoing IoT regulatory, market, business and technology requirements
o Developing other IoT standards that build on the foundational standards when relevant JTC 1 subgroups that could address these standards do not exist or are unable to develop them.</td></tr>
<tr><td>Structure</td><td colspan="3">/</td></tr>
<tr><th colspan="4">Standardization work</th></tr>
<tr><td>Published standards</td><td colspan="3">Number of published ISO/IEC standards under the direct responsibility of JTC 1/WG 10 (number includes updates): 0</td></tr>
<tr><td>Standards under development</td><td colspan="3">5</td></tr>
<tr><th colspan="4">Involvement of Luxembourg</th></tr>
<tr><td colspan="4">2 delegates

- Mr. Cyril Cassagnes KPMG Luxembourg S.à r.l.
- Mr. Hervé Collignon e-TIC Consulting S.à r.l.</td></tr>
</table>

Comments

WG 10 is developing foundational standards for the Internet of Things (IoT) to meet IT industry requirements as well as user requirements.

In 2017, WG 10 will deliver two standards of note. One is the IoT Reference Architecture (IoT RA: ISO/IEC 30141) that defines reference models and architectural views, which can be used to create the architecture of a specific IoT system. Second is the Definition and Vocabulary for IoT (ISO/IEC 20924). Also, a Technical Report on IoT use cases will be published. The TR on IoT use cases will be continuously updated to collect additional use cases including interoperability, smart manufacturing and smart wearable devices[96].

The current WG 10 work program includes the following projects:

- ISO/IEC CD 20924, Information technology -- Internet of Things -- Definition and Vocabulary;
- ISO/IEC PDTR 22417, Information technology -- Internet of things (IoT) use cases;
- ISO/IEC CD 30141, Information technology -- Internet of Things -- Internet of Things Reference Architecture (IoT RA);
- ISO/IEC AWI 21823-1, Internet of things (IoT) -- Interoperability for internet of things systems -- Part 1: Framework.

Resolution 12 of the 31st Meeting of ISO/IEC JTC 1 (November 2017) establishes a new JTC 1/SC 41 "Internet of Things and related technologies" that will include JTC 1/WG 10. JTC 1/WG 10 activities will continue until the first JTC 1/SC 41 Plenary Meeting scheduled in June 2017.

Scope of JTC 1/SC 41

- Standardization in the area of Internet of Things and related technologies.
    1. Serve as the focus and proponent for JTC 1's standardization program on the Internet of Things and related technologies, including Sensor Networks and Wearables technologies.
    2. Provide guidance to JTC 1, IEC, ISO and other entities developing Internet of Things related applications.

[96] Source: BUSINESS PLAN FOR ISO/IEC JTC 1/WG 10, Internet of Things (IoT) for the PERIOD COVERED: January 2017 – December 2017

6.2.3.ISO/IEC JTC 1/SC 31

General information			
Committee	**ISO/IEC JTC 1/SC 31**	**Title**	**Automatic identification and data capture techniques**
Creation date	1996	**MEMBERS** 	**Participating Countries (26):** United States, Austria, Belgium, Brazil, Canada, China, Colombia, Czech Republic, Denmark, France, Germany, India, Ireland, Israel, Japan, Kazakhstan, Republic of Korea, Netherlands, Peru, Philippines, Russian Federation, Slovakia, South Africa, Sweden, Switzerland, United Kingdom **Observing Countries (20):** Argentina, Bosnia and Herzegovina, Finland, Ghana, Hong Kong, Hungary, Indonesia, Islamic Republic of Iran, Italy, Kenya, **Luxembourg**, Malaysia, New Zealand, Romania, Serbia, Singapore, Spain, Thailand, Turkmenistan, Ukraine
Secretariat	ANSI (United States)		
Secretary	Mr. Eddy Merrill		
Chairperson	Mr. Dan Kimball		
Organizations in liaison	AIM Global, ETSI, Ecma International, GS1, IATA, ITU, OGC, UPU, NATO		
Web site	https://www.iso.org/committee/45332.html		
Scope	Standardization of data formats, data syntax, data structures, data encoding, and technologies for the process of automatic identification and data capture and of associated devices utilized in inter-industry applications and international business interchanges and for mobile applications.		
Structure	JTC 1/SC 31/WG 1 Data carrier JTC 1/SC 31/WG 2 Data structure JTC 1/SC 31/WG 4 Radio communications		
Standardization work			
Published standards	Number of published ISO/IEC standards under the direct responsibility of JTC 1/SC 31 (number includes updates): 120		
Standards under development	27		
Involvement of Luxembourg			
1 delegate - Mrs. Maria Sotiri POST Telecom S.A.			
Comments			
Technologies such as bar coding and radiofrequency identification (RFID) provide quick, accurate and cost-effective ways to identify, track, acquire and manage data and information about items, personnel, transactions and resources. These are known as the automatic identification and data capture (AIDC) technologies. AIDC is an industry term that describes the identification and/or direct collection of data into a microprocessor-controlled device, such as a computer system or a programmable logic controller (PLC), without the use of a			

keyboard. AIDC technologies provide a reliable means not only to identify but also to track items. It is possible to encode a wide range of information, beginning with a basic item or the identification of a person, to comprehensive details about the item or person, e.g. item description, size, weight, color, etc.

ISO/IEC JTC 1/SC 31, Automatic identification and data capture techniques, is responsible for more than 100 published or in-progress standards in this area. These standards address bar code symbologies (how a bar code is created and read), RFID air interface (how an RFID tag is read), real-time locating systems, and mobile item identification (which explains how a device such as a phone is used to read and access data as well as providing standards to define how the data associated with the technology are stored and read).

The current work program of ISO/IEC JTC 1/SC 31 includes for example:

- The revision of the multipart standard ISO/IEC 15961 regarding "Information technology -- Radio frequency identification (RFID) for item management: Data protocol";
- The development of the multipart standard ISO/IEC 19823 entitled "Information technology -- Conformance test methods for security service crypto suites";
- The development of the multipart standard ISO/IEC 29167 concerning security services in the area of "Information technology -- Automatic identification and data capture techniques".

It is also important to note that SC 31 is currently developing four standards regarding the Internet of Things in the supply chain:

- ISO/IEC AWI 18574, Information technology -- Internet of Things (IoT) in the supply chain -- Containerized cargo;
- ISO/IEC AWI 18575, Information technology -- Internet of Things (IoT) in the supply chain -- Products & product packages;
- ISO/IEC AWI 18576, Information technology -- Internet of Things (IoT) in the supply chain -- Returnable transport items (RTIs);
- ISO/IEC AWI 18577, Information technology -- Internet of Things (IoT) in the supply chain -- Transport units.

Moreover, SC 31 already published another standard to specify the common rules applicable for unique identification that are required to ensure full compatibility across different identities : ISO/IEC 29161, Information technology -- Data structure -- Unique identification for the Internet of Things.

6.2.4.ISO/IEC JTC 1/SC 41

General information			
Committee	**ISO/IEC JTC 1/SC 41**	**Title**	**Internet of Things and related technologies**
Creation date	2017	**MEMBERS** 	/
Secretariat	KATS (Republic of Korea)		
Secretary	Ms Jooran Lee		
Chairperson	Mr François Coallier		
Organizations in liaison	/		
Web site	http://www.iec.ch/dyn/www/f?p=103:29:2698958918431::::FSP_ORG_ID,FSP_LANG_ID:20486,25#3		
Scope	Standardization in the area of Internet of Things and related technologies. 1. Serve as the focus and proponent for JTC 1's standardization program on the Internet of Things and related technologies, including Sensor Networks and Wearables technologies. 2. Provide guidance to JTC 1, IEC, ISO and other entities developing Internet of Things related applications.		
Structure	/		
Standardization work			
Published standards	Number of published ISO/IEC standards under the direct responsibility of JTC 1/SC 41 (number includes updates): 0		
Standards under development	0		
Involvement of Luxembourg			
NO (no registered delegate)			
Comments			
ISO/IEC JTC 1/SC 41 "Internet of Things and related technologies", is still under construction. It has been established on the basis of the Resolution 12 of the 31st Meeting of ISO/IEC JTC 1 (November 2017) Its work program will include, at the beginning, the current work programs of ISO/IEC JTC 1/WG 7 and WG10. The activities of the WGs will continue until the first JTC 1/SC 41 Plenary Meeting scheduled in June 2017. The JTC 1/SC 41 should be structured in two WGs and one SG: - WG on Sensor Networks - WG on Internet of Things - SG on Wearables Some discussions also suggest the possibility to create a WG dedicated to Smart Manufacturing. The final structure, scope and work program will be discussed during the first plenary meeting of JTC 1/SC 41, as well as the liaisons to be established. Registration in this SC is already opened for interested national stakeholders.		

6.2.5.ETSI/TC SmartM2M

General information			
Committee	**ETSI/TC SmartM2M**	**Title**	**Smart Machine-to-Machine Communication**
Creation date	/	**MEMBERS** 	137 member organizations of ETSI
Chairperson	Mr. Enrico Scarrone		
Organizations in liaison	ATIS, Broadband Forum, CCC, CCSA, CEN, CENELEC, Continua Health Alliance, ESMIG, Eurosmart, GCF, GIFSI, GSMA, IEEE, IPSO Alliance, ISOC/IETF, ITU, NIST, OASIS, OMA, TIA, TSDSI, TTA, TTC, ULE Alliance		
Web site	http://portal.etsi.org/portal/server.pt/community/SmartM2M		
Scope	TC Smart M2M aims at referring to existing work done elsewhere, or encouraging existing groups to fulfil SmartM2M requirements. The TC undertakes necessary work that is not being provided for elsewhere. The activities of TC Smart M2M include: - Be a center of expertise in the area of M2M and Internet of Things (IoT) to support M2M services and applications; - Maintain ETSI M2M published specifications; - Produce specifications as needed for regulatory purposes; - Transpose the output of oneM2M to TC M2M.		
Structure	/		
Standardization work			
Published standards	31		
Standards under development	14		
Involvement of Luxembourg			
2 companies - Skylane Optics - FBConsulting S.A.R.L.			
Comments			
ETSI's Smart Machine-to-Machine Communications committee (TC SmartM2M) is developing standards to enable M2M services and applications and certain aspects of the IoT. The committee's focus is on an application-independent 'horizontal' service platform with architecture capable of supporting a very wide range of services including smart metering, smart grids, eHealth, city automation, consumer applications and car automation.			

6.2.6.CEN/TC 225

General information			
Committee	**CEN/TC 225**	**Title**	**AIDC Technologies**
Creation date	1989	**MEMBERS** 	34 members of CEN/CENELEC
Secretariat	TSE (Turkey)		
Secretary	Ms. Aysegül Ibrisim		
Chairperson	Mr. Claude Tételin		
Organizations in liaison	ECISS, EDIFICE, EDMA (Brussels), EFPIA, EHIBCC, EUCOMED, EuroCommerce, GS1, ODETTE, UPU		
Web site	http://standards.cen.eu/dyn/www/f?p=204:7:0::::FSP_ORG_ID:6206&cs=1E12277AECC001196A7556B8DBCDF0A1C		
Scope	Standardization of data carriers for automatic identification and data capture, of the data element architecture therefore, of the necessary test specifications and of technical features for the harmonization of cross-sector applications. Establishment of an appropriate system of registration authorities, and of means to ensure the necessary maintenance of standards.		
Structure	CEN/TC 225/WG 1 CEN/TC 225/WG 3 CEN/TC 225/WG 4 CEN/TC 225/WG 5 CEN/TC 225/WG 6	Optical Readable Media Security and data structure Automatic ID applications RFID, RTLS and on board sensors Internet of Things - Identification, Data Capture and Edge Technologies	
Standardization work			
Published standards	26		
Standards under development	2		
Involvement of Luxembourg			
NO (no registered delegate)			
Comments			

CEN/TC 225 takes into account the technical specifications, standards and regulations currently available or being prepared at international levels to prepare standards for Europe. In particular, the technical work in ISO/IEC JTC 1/SC 31 (Automatic Identification and Data Capture (AIDC) techniques) and ISO/IEC JTC 1/SC 27 (Privacy) are taken into account.

CEN/TC 225 delivers EN standards and technical reports to:

- Close the standardization gaps identified by the EC M436 mandate process (concerning RFID);
- Guide the deployment of AIDC systems in public and private enterprises within Europe;
- Ensure the deployments are secure and protect personal privacy issues identified by the EC M436 mandate process;

- Provide standards and industrial guidelines for the unique identification of all types of objects supporting the free global movement of goods, enhanced health and safety aspects in industries and in governmental sector;
- Pay a particular attention to Future Internet and the Internet of Things which includes unique identification schemes, privacy and security aspects.

The Working Group 6 of CEN/TC 225 is the focal point for IoT issues within CEN. It advises CEN TC 225 on IoT issues in order to ensure a consistent and proactive approach to the IoT by all its WGs and assists CEN/TC 225 to act as an agent of change within CEN by facilitating IoT knowledge transfer between CEN and CENELEC TCs.

Furthermore, CEN/TC 225:

- Focuses on issues arising from the EC M436 mandate process and rapidly develop EN/TR to deliver the objectives of the EC Mandate;
- Uses and refine the resulting frameworks, especially in relation to PIA's (Privacy Impact Assessment), to build application guidelines and standards;
- Promotes the CEN/TC 225 WG work plans to mirror committees in all CEN member states;
- Establishes and maintain effective liaisons with other ESOs (European Standardization Organizations), global standards organizations, trade associations and regulatory bodies;
- Evaluates the need for adopting ISO/IEC 18000 (and related) standards as EN standards;
- Takes into account technical standards and regulations currently available or being prepared at international levels. In particular, to take into account the technical work developed by ISO/IEC JTC 1/SC 31;
- Uses the Vienna Agreement to ensure alignment of European AIDC standards with the ISO environment.

The current work program of CEN/TC 225 includes the development of two standards concerning:

- prEN 17071, Information technology - Automatic identification and data capture techniques - Electronic identification plate;
- prEN 17099, Information technology - Fish and fish products - requirements for labelling of distribution units and pallets in the trade of seafood products.

6.3. (BIG) DATA

The Big Data Preliminary Report published by ISO/IEC JTC 1[97] defines Big Data as "a data set(s) with characteristics (e.g. volume, velocity, variety, variability, veracity, etc.) that for a particular problem domain at a given point in time cannot be efficiently processed using current/existing/established/traditional technologies and techniques in order to extract value."

Big Data is at the top of the agenda of numbers of ICT stakeholders. Analytical functions that will be performed on these large amounts of data will allow the production of new knowledge, offering great promises in terms of applications in all the economic sectors.

In this standards analysis, the (Big) Data subsector encompasses the whole scope of data management, as defined by ISO/IEC TR 10032:2003: "the activities of defining, creating, storing, maintaining and providing access to data and associated processes in one or more information systems" .

[97] *Based on the Preliminary Report on Big Data submitted to the 2014 ISO/IEC JTC 1 Plenary by the ISO/IEC JTC 1/SG 2 on Big Data. This SG has been replaced at the end of 2014 by the WG 9 on Big Data*

[98] *ISO/IEC TR 10032:2003, Information technology -- Reference Model of Data Management (developed by ISO/IEC JTC 1/SC 32)*

6.3.1. ISO/IEC JTC 1/WG 9

<table>
<tr><th colspan="4">General information</th></tr>
<tr><td>Committee</td><td>ISO/IEC JTC 1/WG 9</td><td>Title</td><td>Big Data</td></tr>
<tr><td>Creation date</td><td>2014</td><td rowspan="5">MEMBERS
  </td><td rowspan="5">Participating countries (26):
United States, Australia, Austria, Brazil, Canada, China, Finland, France, Germany, India, Ireland, Israel, Italy, Japan, Republic of Korea, Luxembourg, Mexico, Netherlands, Norway , Russian Federation, Singapore, Slovenia, South Africa, Spain, Sweden, United Kingdom</td></tr>
<tr><td>Secretariat</td><td>United States (ANSI)</td></tr>
<tr><td>Secretary</td><td>Ms. Sally Seitz</td></tr>
<tr><td>Chairperson</td><td>Mr. Wo Chang</td></tr>
<tr><td>Organizations in liaison</td><td>OGC, IIC, ITU-T SG 13</td></tr>
<tr><td>Web site</td><td colspan="3">http://isotc.iso.org/livelink/livelink/open/jtc1wg9</td></tr>
<tr><td>Scope</td><td colspan="3">The ISO/IEC JTC 1/WG 9 has been established with the following Terms of Reference:
- Serve as the focus of and proponent for JTC 1's Big Data standardization program.
- Develop foundational standards for Big Data ---including reference architecture and vocabulary standards---for guiding Big Data efforts throughout JTC 1 upon which other standards can be developed.
- Develop other Big Data standards that build on the foundational standards when relevant JTC 1 subgroups that could address these standards do not exist or are unable to develop them.
- Identify gaps in Big Data standardization.
- Develop and maintain liaisons with all relevant JTC 1 entities as well as with any other JTC 1 subgroup that may propose work related to Big Data in the future.
- Identify JTC 1 (and other organization) entities that are developing standards and related material that contribute to Big Data, and where appropriate, investigate ongoing and potential new work that contributes to Big Data.
- Engage with the community outside of JTC 1 to grow the awareness of and encourage engagement in JTC 1 Big Data standardization efforts within JTC 1, forming liaisons as is needed.</td></tr>
<tr><td>Structure</td><td colspan="3">/</td></tr>
<tr><th colspan="4">Standardization work</th></tr>
<tr><td>Published standards</td><td colspan="3">Number of published ISO/IEC standards under the direct responsibility of JTC 1/WG 9 (number includes updates): 0</td></tr>
<tr><td>Standards under development</td><td colspan="3">5</td></tr>
<tr><th colspan="4">Involvement of Luxembourg</th></tr>
<tr><td colspan="4">6 delegates

- Mr. Johnatan Pecero ANEC GIE
- Mr. Christophe Delogne KPMG Luxembourg S.à r.l.
- Mr. Cyril Cassagnes KPMG Luxembourg S.à r.l.
- Mr. Emmanuel Kieffer University of Luxembourg
- Mrs. Aida Horaniet Docler Holding S.à r.l.
- Mrs. Natalia Cassagnes Actimage S.A.</td></tr>
</table>

Comments

The current WG 9 work program includes the development of two foundational International Standard:

- ISO/IEC CD 20546, Big Data -- Definition and Vocabulary;
- ISO/IEC 20547, which specifies the Big Data Reference Architecture (BDRA) and includes the Big Data roles, activities, and functional components and their relationships. It is composed of 5 parts:
    - ISO/IEC AWI TR 20547-1, Information technology -- Big Data Reference Architecture -- Part 1: Framework and Application Process;
    - ISO/IEC PDTR 20547-2, Information technology -- Big Data Reference Architecture -- Part 2: Use Cases and Derived Requirements;
    - ISO/IEC AWI 20547-3, Information technology -- Big Data Reference Architecture -- Part 3: Reference Architecture;
    - ISO/IEC AWI 20547-4, Information technology -- Big Data Reference Architecture -- Part 4: Security and Privacy Fabric (under the responsibility of JTC 1/SC 27);
    - ISO/IEC PDTR 20547-5, Information technology -- Big Data Reference Architecture -- Part 5: Standards Roadmap.

It has to be noted that the 4th part of ISO/IEC 20547, dedicated to security and privacy aspects of the BDRA, is developed under the direct responsibility of ISO/IEC JTC 1/SC 27 (IT security techniques) in close collaboration with ISO/IEC JTC 1/WG 9.

6.3.2.ISO/IEC JTC 1/SC 2

General information			
Committee	**ISO/IEC JTC 1/SC 2**	**Title**	**Coded character sets**
Creation date	1987	**MEMBERS** 	**Participating Countries (27):** Japan, Austria, Canada, China, Egypt, Finland, France, Germany, Greece, Hungary, Iceland, India, Indonesia, Ireland, Democratic People's Republic of Korea, Republic of Korea, Lithuania, Mongolia, Norway, Poland, Russian Federation, Serbia, Sri Lanka, Tunisia, Ukraine, United Kingdom, United States **Observing Countries (21):** Armenia, Belgium, Bosnia and Herzegovina, Cuba, Czech Republic, Ghana, Hong Kong, Islamic Republic of Iran, Israel, Italy, Kazakhstan, Malaysia, Morocco, Netherlands, Romania, Slovenia, Sweden, Switzerland, Thailand, Turkey, Viet Nam
Secretariat	JISC(Japan)		
Secretary	Ms. Toshiko Kimura		
Chairperson	Mr. Shuichi Tashiro		
Organizations in liaison	CCSDS, EC, ISOC, ITU, UNCTAD, UNECE, UNICODE, WIPO, WMO, UC Berkeley, UNU-IIST, HKITF, W3C, TCA		
Web site	https://www.iso.org/committee/45050.html		
Scope	Standardization of graphic character sets and their characteristic including string ordering, associated control functions, their coded representation for information interchange and code extension techniques. Excluded: audio and picture coding.		
Structure	JTC 1/SC 2/WG 2 Universal coded character set		
Standardization work			
Published standards	Number of published ISO/IEC standards under the direct responsibility of JTC 1/SC 2 (number includes updates): 54		
Standards under development	3		
Involvement of Luxembourg			
NO (no registered delegate)			
Comments			

Noteworthy standards of ISO/IEC JTC 1/SC 2 are:

- ISO 646:1991, Information technology -- ISO 7-bit coded character set for information interchange;
- ISO/IEC 8859 series of standards entitled "8-bit single-byte coded graphic character sets";
- ISO/IEC 10646:2014, Information technology -- Universal Coded Character Set (UCS) (published for the first time in 1993).

The SC is currently revising ISO/IEC 10646 concerning the Universal Coded Character Set (UCS).

6.3.3.ISO/IEC JTC 1/SC 23

General information			
Committee	**ISO/IEC JTC 1/SC 23**	**Title**	**Digitally Recorded Media for Information Interchange and Storage**
Creation date	1987	**MEMBERS** 	**Participating Countries (6):** Japan, China, Republic of Korea, Netherlands, Russian Federation, Switzerland **Observing Countries (20):** Argentina, Belgium, Bosnia and Herzegovina, Bulgaria, Cuba, Czech Republic, Finland, France, Ghana, Hungary, Iceland, India, Indonesia, Islamic Republic of Iran, Italy, Kazakhstan, Poland, Romania, Serbia, Thailand
Secretariat	JISC(Japan)		
Secretary	Ms. Toshiko Kimura		
Chairperson	Mr. Key Yamashita		
Organizations in liaison	Ecma International, WIPO		
Web site	https://www.iso.org/committee/45240.html		
Scope	Standardization in the field of removable digital storage media utilizing optical, holographic and magnetic recording technologies, and flash memory technologies for digital information interchange, including: - Algorithms for the lossless comprehension of data; - Volume and file structure; - Methods for determining the life expectancy of digital storage media; - Methods for error monitoring of digital storage media.		
Structure	/		
Standardization work			
Published standards	Number of published ISO/IEC standards under the direct responsibility of JTC 1/SC 23 (number includes updates): 142		
Standards under development	2		
Involvement of Luxembourg			
NO (no registered delegate)			
Comments			

Examples of standards developed by ISO/IEC JTC 1/SC 23 are:

- ISO/IEC 10995:2011, Information technology -- Digitally recorded media for information interchange and storage -- Test method for the estimation of the archival lifetime of optical media;
- ISO/IEC 12862:2011, Information technology -- 120 mm (8,54 Gbytes per side) and 80 mm (2,66 Gbytes per side) DVD recordable disk for dual layer (DVD-R for DL).

The current work program of ISO/IEC JTC 1/SC 23 includes the revision of ISO/IEC 29121, which specifies a data migration method for optical disks for long-term data storage, and ISO/IEC 19693 that specifies the test method for the estimation of lifetime of optical disks for long-term data storage.

6.3.4.ISO/IEC JTC 1/SC 24

<table>
<tr><th colspan="4">General information</th></tr>
<tr><td>Committee</td><td>ISO/IEC JTC 1/SC 24</td><td>Title</td><td>Computer graphics, image processing and environmental data representation</td></tr>
<tr><td>Creation date</td><td>1987</td><td rowspan="5">MEMBERS
  </td><td rowspan="5">Participating Countries (10):
United Kingdom, Australia, China, Egypt, France, Japan, Republic of Korea, Russian Federation, Switzerland, United States

Observing Countries (24):
Argentina, Austria, Belgium, Bosnia and Herzegovina, Canada, Cuba, Czech Republic, Finland, Ghana, Hungary, Iceland, India, Indonesia, Islamic Republic of Iran, Italy, Kazakhstan, Malaysia, Poland, Portugal, Romania, Serbia, Slovakia, Thailand, Ukraine</td></tr>
<tr><td>Secretariat</td><td>BSI (United Kingdom)</td></tr>
<tr><td>Secretary</td><td>Dr. Charles Whitlock</td></tr>
<tr><td>Chairperson</td><td>Mrs. Myeong Won Lee</td></tr>
<tr><td>Organizations in liaison</td><td>OGC, SEDRIS, SISO, WIPO, Web3D, IHO, DGIWG</td></tr>
<tr><td>Web site</td><td colspan="3">https://www.iso.org/committee/45252.html</td></tr>
<tr><td>Scope</td><td colspan="3">The current area of work for JTC 1/SC 24 consists of:
- Standardization of interfaces for information technology based applications relating to computer graphics and virtual reality,
- Image processing,
- Environmental data representation,
Support for Mixed and Augmented Reality (MAR), and interaction with, and visual presentation of, information</td></tr>
<tr><td>Structure</td><td colspan="3">JTC 1/SC 24/WG 6 Augmented reality continuum presentation and interchange
JTC 1/SC 24/WG 7 Image processing and interchange
JTC 1/SC 24/WG 8 Environmental representation
JTC 1/SC 24/WG 9 Augmented reality continuum concepts and reference model</td></tr>
<tr><th colspan="4">Standardization work</th></tr>
<tr><td>Published standards</td><td colspan="3">Number of published ISO/IEC standards under the direct responsibility of JTC 1/SC 24 (number includes updates): 80</td></tr>
<tr><td>Standards under development</td><td colspan="3">8</td></tr>
<tr><th colspan="4">Involvement of Luxembourg</th></tr>
<tr><td colspan="4">NO (no registered delegate)</td></tr>
<tr><th colspan="4">Comments</th></tr>
<tr><td colspan="4">Examples of standards developed by ISO/IEC JTC 1/SC 24 are:
- ISO/IEC 11072:1992, Information technology -- Computer graphics -- Computer Graphics Reference Model;
- ISO/IEC 18041-4:2007, Information technology -- Computer graphics, image processing and environmental data representation -- Environmental Data Coding Specification (EDCS) language bindings -- Part 4: C (under revision);
- ISO/IEC 19777-2:2006, Information technology -- Computer graphics and image processing -- Extensible 3D (X3D) language bindings -- Part 2: Java.</td></tr>
</table>

The current work program notably includes:

- ISO/IEC AWI 18038, Information technology -- Computer graphics, image processing and environmental data representation and coding of audio, picture, multimedia and hypermedia information -- Sensor representation in mixed and augmented reality (MAR);
- ISO/IEC CD 18039, Information technology -- Computer graphics, image processing and environmental data representation and coding of audio, picture, multimedia and hypermedia information -- Mixed and augmented reality reference model;
- ISO/IEC AWI 18040, Information technology -- Computer graphics, image processing and environmental data representation and coding of audio, picture, multimedia and hypermedia information -- Live actor and entity representation in mixed and augmented reality (MAR);
- ISO/IEC AWI 18520, Benchmarks for MAR -- Geometric registration and tracking method;
- ISO/IEC 19774 series of standards regarding Humanoid Animation (H-Anim);
- The revision of ISO/IEC 19777-1, Information technology -- Computer graphics, image processing and environmental data representation -- Extensible 3D (X3D) language bindings -- Part 1: ECMAScript;
- ISO/IEC AWI 21858, Information model for mixed and augmented reality (MAR) contents.

6.3.5.ISO/IEC JTC 1/SC 29

<table>
<tr><th colspan="4">General information</th></tr>
<tr><td>Committee</td><td>ISO/IEC JTC 1/SC 29</td><td>Title</td><td>Coding of audio, picture, multimedia and hypermedia information</td></tr>
<tr><td>Creation date</td><td>1991</td><td rowspan="5">MEMBERS
  </td><td rowspan="5">Participating Countries (27):
Japan, Australia, Austria, Belgium, Canada, China, Finland, France, Germany, Greece, Hungary, India, Israel, Italy, Japan, Republic of Korea, Lebanon, Netherlands, Poland, Portugal, Russian Federation, Singapore, Spain, Sweden, Switzerland, Ukraine, United Kingdom, United States

Observing Countries (16):
Argentina, Bosnia and Herzegovina, Czech Republic, Denmark, Hong Kong, Indonesia, Islamic Republic of Iran, Ireland, Malaysia, Morocco, Norway, Romania, Serbia, Slovakia, South Africa, Turkey</td></tr>
<tr><td>Secretariat</td><td>JISC (Japan)</td></tr>
<tr><td>Secretary</td><td>Ms. Mayumi Koike</td></tr>
<tr><td>Chairperson</td><td>Mr. Kohtaro Asai</td></tr>
<tr><td>Organizations in liaison</td><td>3GPP, AES, AGICOA, ATSC, CIE, CISAC, ETSI, FIAPF, IMTC, ISOC, ITU, MMA, SMPTE, WIPO, NATO, VSF, OMA, VESA, Ecma International, I3A, ABU, ISMA, IPTC, Entertainment Content Ecosystem, OPF, W3C, IDF, J2G, CEA, CCSDS, VirF, OIPF, CableLabs, Photoconsortium, AVS, DVB, NISO, QUALINET, Wireless Gigabit Alliance, OMG, EBU, OGC, Khronos, IFPI, ATIS, AFPC, IEEE, BDA, DICOM, DMP, Digital TV Group</td></tr>
<tr><td>Web site</td><td colspan="3">https://www.iso.org/committee/45316.html</td></tr>
<tr><td>Scope</td><td colspan="3">Standardization of coded representation of audio, picture, multimedia, and hypermedia information - and sets of compression and control functions for use with such information - such as:
- Audio information;
- Bi-level and Limited Bits-per-pixel Still Pictures;
- Digital Continuous-tone Still Pictures;
- Computer Graphic Images;
- Moving Pictures and Associated Audio;
- Multimedia and Hypermedia Information for Real-time Final Form Interchange;
- Audio Visual Interactive Script ware.
Excluded: Character Coding.</td></tr>
<tr><td>Structure</td><td colspan="3">JTC 1/SC 29/AG 1 Advisory Group on Management
JTC 1/SC 29/WG 1 Coding of still pictures
JTC 1/SC 29/WG 11 Coding of moving pictures and audio</td></tr>
<tr><th colspan="4">Standardization work</th></tr>
<tr><td>Published standards</td><td colspan="3">Number of published ISO/IEC standards under the direct responsibility of JTC 1/SC 29 (number includes updates): 577</td></tr>
<tr><td>Standards under development</td><td colspan="3">94</td></tr>
</table>

Involvement of Luxembourg
NO (no registered delegate)
Comments

Coding of audio, picture, multimedia and hypermedia information provides efficient way to represent, preserve and convey entertainment, art, news, education, record of experiences and so on. People can enjoy any kind of media anywhere they want, employing handheld devices equipped with wireless capabilities. This does not mean just consuming media but generating media as well.

The coding technologies have a significant role in any service and activity employing digital media information. SC 29 has been working to standardize coding of multimedia and their control function, interface with other elements, middleware for general and/or specific applications. Many international standards from SC 29 have been adopted and used, and those standards have been contributing to the industry.

There are still emerging needs for digital media representation with higher quality or advanced features such as Ultra HD with scalability in some applications, 3D and free viewpoint video with rich media interface. Moreover, the industry keeps improving methods for compression, composition, description and manipulation of digital media. This, and pervasiveness of digital information, is offering a lot of opportunities for the industry.

Examples of success standards developed by ISO/IEC JTC 1/SC 29 are:

- ISO/IEC 10918-1:1994, Information technology -- Digital compression and coding of continuous-tone still images: Requirements and guidelines;
- ISO/IEC 10918-5:2013, Information technology -- Digital compression and coding of continuous-tone still images: JPEG File Interchange Format (JFIF);
- ISO/IEC 11172:1993, Information technology -- Coding of moving pictures and associated audio for digital storage media at up to about 1,5 Mbit/s -- Parts 1 to 3;
- ISO/IEC 15444-1:2004, Information technology -- JPEG 2000 image coding system: Core coding system;
- ISO/IEC 23001 series of standards concerning MPEG systems technologies.

6.3.6.ISO/IEC JTC 1/SC 32

<table>
<tr><th colspan="4">General information</th></tr>
<tr><td>Committee</td><td>ISO/IEC JTC 1/SC 32</td><td>Title</td><td>Data management and interchange</td></tr>
<tr><td>Creation date</td><td>1997</td><td rowspan="5">MEMBERS
  </td><td rowspan="5">Participating Countries (14):
United States, Canada, China, Czech Republic, Côte d'Ivoire, Egypt, Finland, Germany, India, Japan, Kazakhstan, Republic of Korea, Russian Federation, United Kingdom

Observing Countries (23):
Argentina, Austria, Belgium, Bosnia and Herzegovina, France, Ghana, Hungary, Iceland, Indonesia, Islamic Republic of Iran, Ireland, Italy, Luxembourg, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Spain, Switzerland, Turkey, Ukraine</td></tr>
<tr><td>Secretariat</td><td>ANSI (USA)</td></tr>
<tr><td>Secretary</td><td>Ms. Michaela Miller</td></tr>
<tr><td>Chairperson</td><td>Mr. Jim Melton</td></tr>
<tr><td>Organizations in liaison</td><td>Infoterm, UNECE</td></tr>
<tr><td>Web site</td><td colspan="3">https://www.iso.org/committee/45342.html</td></tr>
<tr><td>Scope</td><td colspan="3">Standards for data management within and among local and distributed information systems environments. SC32 provides enabling technologies to promote harmonization of data management facilities across sector-specific areas. Specifically, SC32 standards include:
- Reference models and frameworks for the coordination of existing and emerging standards;
- Definition of data domains, data types and data structures, and their associated semantics;
- Languages, services and protocols for persistent storage, concurrent access, concurrent update and interchange of data;
- Methods, languages, services, and protocols to structure, organize, and register metadata and other information resources associated with sharing and interoperability, including electronic commerce.</td></tr>
<tr><td>Structure</td><td colspan="3">JTC 1/SC 32/WG 1 eBusiness
JTC 1/SC 32/WG 2 MetaData
JTC 1/SC 32/WG 3 Database language
JTC 1/SC 32/WG 4 SQL/Multimedia and application packages</td></tr>
<tr><th colspan="4">Standardization work</th></tr>
<tr><td>Published standards</td><td colspan="3">Number of published ISO/IEC standards under the direct responsibility of JTC 1/SC 32 (number includes updates): 77</td></tr>
<tr><td>Standards under development</td><td colspan="3">12</td></tr>
<tr><th colspan="4">Involvement of Luxembourg</th></tr>
<tr><td colspan="4">1 delegate

- Mr. Johnatan Pecero (Acting as Chairman) ANEC GIE</td></tr>
</table>

Comments

ISO/IEC JTC 1/SC 32 is especially in charge of standardizing the SQL language and developing XML-related standards.

Examples of standards developed by ISO/IEC JTC 1/SC 32 are:

- ISO/IEC 9075-1:2011, Information technology -- Database languages -- SQL -- Part 1: Framework (SQL/Framework) (under revision);
- ISO/IEC 11179-1:2004, Information technology -- Metadata registries (MDR) -- Part 1: Framework (under revision);
- ISO/IEC 19503:2005, Information technology -- XML Metadata Interchange (XMI);
- ISO/IEC 19763-1:2015, Information technology -- Metamodel framework for interoperability (MFI) -- Part 1: Framework.

Current work program of JTC 1/SC 32 includes for example:

- The revision of the ISO/IEC 9075 series of standards concerning the SQL database language;
- The development of ISO/IEC AWI 21838 that will recommend the characteristics of a top-level ontology, which will provide guidance to various parties who are currently developing or who will develop a top-level ontology. For those seeking to select and use an existing top-level ontology, it will provide at least one from which to choose. It will also facilitate the merging of top-level ontologies, since they will already possess the recommended characteristics.

The topics of next generation analytics and big data appear frequently both in computing industry and more general news reports. SC 32 initiated a study group in these areas and delivered a preliminary report to JTC 1 that identified existing SC 32 standards that support these technologies and opportunities for enhancing work in these areas. SC 32 is well-represented in meetings of JTC 1/WG 9.

6.3.7.ISO/IEC JTC 1/SC 34

General information			
Committee	**ISO/IEC JTC 1/SC 34**	**Title**	**Document description and processing languages**
Creation date	1998	**MEMBERS** 	**Participating Countries (22):** Japan, Armenia, Bulgaria, Chile, China, Czech Republic, Egypt, Finland, France, Germany, India, Italy, Republic of Korea, Lebanon, Malta, Netherlands, Pakistan, Poland, Russian Federation, Slovakia, Sri Lanka, United Kingdom **Observing Countries (32):** Argentina, Austria, Belgium, Bosnia and Herzegovina, Canada, Croatia, Cyprus, Côte d'Ivoire, Denmark, Greece, Hong Kong, Hungary, Indonesia, Islamic Republic of Iran, Ireland, Israel, Kazakhstan, Lithuania, **Luxembourg**, Malaysia, Mexico, Norway, Portugal, Romania, Serbia, South Africa, Spain, Sweden, Switzerland, Thailand, Turkey, Ukraine
Secretariat	JISC (Japan)		
Secretary	Ms. Toshiko Kimura		
Chairperson	Professor Sam Gyun Oh		
Organizations in liaison	Ecma International, OASIS, W3C, ETSI		
Web site	https://www.iso.org/committee/45374.html		
Scope	Standardization in the field of document structures, languages and related facilities for the description and processing of compound and hypermedia documents, including: - Languages for describing document logical structures and their support facilities; - Languages for describing document-like objects in web environments; - Document processing architecture and formatting for logical documents; - Languages for describing interactive documents; - Multilingual font information interchange and related services; - Final-form document architecture and page information interchange; - Hypermedia document structuring language and application resources; - API's for document processing.		
Structure	JTC 1/SC 34/AG 1 Forward planning JTC 1/SC 34/WG 4 Office Open XML JTC 1/SC 34/WG 6 OpenDocument Format JTC 1/SC 34/JWG 7 Joint JTC 1/SC 34 – TC 46/SC 4 – IEC/TC 100/TA 10 WG: EPUB JTC 1/SC 34/WG 8 Document processing and presentation		
Standardization work			
Published standards	Number of published ISO/IEC standards under the direct responsibility of JTC 1/SC 34 (number includes updates): 80		
Standards under development	4		
Involvement of Luxembourg			
1 delegate - Mr. David Naramski (Acting as Chairman) NOWINA SOLUTIONS S.à.r.l.			

Comments

ISO/IEC JTC 1/SC 34 has inherited from its predecessors (ISO/TC 97/SC 18/WG 8 and ISO/IEC JTC 1/SC 18/WG 8) the responsibility for the maintenance of many important standards that have been hugely influential in the development of the World Wide Web.

These standards include ISO 8879 (SGML), ISO/IEC 10179 (DSSSL) and ISO/IEC 10744 (HyTime). These standards still inform work on new standards development within ISO/IEC JTC 1/SC 34, as well as continuing to influence the work of other bodies such as OASIS and W3C. The subcommittee is currently working on International Standards regarding Office Open XML File Formats and Font information interchange.

6.4. DIGITAL TRUST

Digital trust[99] indicates a positive and verifiable belief about the perceived reliability of a digital information source, product or service, leading to an intention to use[100]. This subsector covers various areas that are essential to allow trust in digital technologies and notably these relevant blocks:

- *Information security, which includes three main dimensions: confidentiality, availability and integrity. In addition, other properties, such as authenticity, accountability, non-repudiation, and reliability can also be involved. Information security involves the application and management of appropriate security measures that involves consideration of a wide range of threats, with the aim of ensuring sustained business success and continuity, and minimizing the impacts of information security incidents.*
- *Electronic signature, defined as a "data in electronic form that is attached to or logically associated with other electronic data and that serves as a method of authentication"[101]. This area includes the different concepts and mechanisms upon which electronic signatures are based including public key cryptography, public key certificate, hash functions and Public Key Infrastructures (PKI).*
- *Electronic archiving, which consists in the long-term repository of data or information of any kind and from any source, whose temporal existence is evidenced by being stored in or on any electronic medium[102].*

[99] *At the end of 2016, ILNAS published a White Paper "Digital Trust for Smart ICT" in relation with this subsector*

[100] *F. Rowley, J., & Johnson, "Understanding Trust Formation in Digital Information Sources: The Case of Wikipedia," J. Inf. Sci., 2013*

[101] *ETSI TS 101 733, Electronic Signatures and Infrastructures (ESI); CMS Advanced Electronic Signatures (CAdES) (developed by ETSI/TC ESI)*

[102] *Based on ISO/IEC 30300:2011, Information and documentation -- Management systems for records -- Fundamentals and vocabulary (developed by ISO/TC 46/SC 11)*

6.4.1.ISO/IEC JTC 1/SC 17

General information			
Committee	**ISO/IEC JTC 1/SC 17**	**Title**	**Cards and personal identification**
Creation date	1987	**MEMBERS** 	**Participating Countries (33):** United Kingdom, Armenia, Australia, Austria, Belgium, Canada, China, Czech Republic, Denmark, Finland, France, Germany, India, Israel, Italy, Japan, Kenya, Republic of Korea, **Luxembourg**, Malaysia, Netherlands, Norway, Poland, Romania, Russian Federation, Singapore, Slovakia, Slovenia, South Africa, Spain, Sweden, Switzerland, United States **Observing Countries (19):** Argentina, Bosnia and Herzegovina, Croatia, Ghana, Hong Kong, Hungary, Iceland, Indonesia, Islamic Republic of Iran, Ireland, Kazakhstan, Lithuania, New Zealand, Portugal, Serbia, Thailand, Turkey, Ukraine, Viet Nam
Secretariat	BSI (United Kingdom)		
Secretary	Ms. Jean Stride		
Chairperson	Mr. Peter Waggett		
Organizations in liaison	AMEX, CCETT, Ecma International, IATA, ICAO, ICMA, ILO, MasterCard International, MasterCard Europe, VISA, VISA EUROPE, NFC Forum, UNECE, JAVA CARD FORUM, EUDCA		
Web site	https://www.iso.org/committee/45144.html		
Scope	The current area of work for JTC 1/SC 17 consists of: - Identification and related documents; - Cards; - Devices associated with their use in inter-industry applications and international interchange.		
Structure	JTC 1/SC 17/CAG 1 Chairman advisory group JTC 1/SC 17/WG 1 Physical characteristics and test methods for ID-cards JTC 1/SC 17/WG 3 Identification cards - Machine readable travel documents JTC 1/SC 17/WG 4 Integrated circuit card with contacts JTC 1/SC 17/WG 5 Registration Management Group (RMG) JTC 1/SC 17/WG 8 Integrated circuit cards without contacts JTC 1/SC 17/WG 10 Motor vehicle driver license and related documents JTC 1/SC 17/WG 11 Application of biometrics to cards and personal identification		
Standardization work			
Published standards	Number of published ISO/IEC standards under the direct responsibility of JTC 1/SC 17 (number includes updates): 114		
Standards under development	31		
Involvement of Luxembourg			
4 delegates			
- Mr. Valentin Lacave (Chairman)	Telindus Luxembourg S.A.		
- Mr. Benoit Poletti	INCERT GIE		
- Mr. Abdelkrim Nehari	INCERT GIE		
- Mr. Enrico Ozzano	BIL S.A.		

Comments

ISO/IEC JTC 1 subcommittee SC 17, Cards and personal identification, is responsible for the development of a large portfolio of card standards in support of interoperability and data interchange.

At a minimum, the standards define the physical dimensions of the card and the geometry of the terminals which read those cards (e.g. the slot in an ATM). Then, depending on the reading technology, the standards define how the card "couples" with the card terminal and thereby communicates with the underlying application (e.g. motorized mag strip readers in ATMs, magnetic stripe swipe readers in Point-of-Sale terminals, slot readers in hotel card key locks).

At their most basic level, standards maintain interoperability between cards and the card readers that read them. For a closed system or national implementation, interoperability is important so that components, such as the cards or the chips on smart cards sourced on the open market from various manufacturers, will interoperate, with a high degree of confidence, with card readers sourced from different manufacturers.

Two of the most sophisticated technologies involve microprocessors embedded in the card, also known as "smart cards". These are "cards with contacts" and "contactless cards". Cards with contacts are usually inserted manually into a "dip reader" whereas contactless cards use radio frequency coupling to enable "touch and go" for rapid transit ticket gates and "wave and pay" to make low value purchases in retail outlets such as fast food restaurants. Electronic passports (ePassports) and citizen identification cards are further examples where contactless standards have been adopted.

JTC 1/SC 17 has recently revised ISO/IEC 7812-1, Identification cards -- Identification of issuers -- Part 1: Numbering system, to answer the need to expand the Issuer Identification Numbering scheme (IINs) from its present 6-digit IIN to an 8-digit IIN going forward.

Current work program of JTC 1/SC 17 includes for example:

- The revision of ISO/IEC 7810:2003 regarding the physical characteristics of identification cards;
- The revision of ISO/IEC 18013 series of standards concerning ISO-compliant driving licence.

6.4.2.ISO/IEC JTC 1/SC 27

<table>
<tr><th colspan="4">General information</th></tr>
<tr><td>Committee</td><td>ISO/IEC JTC 1/SC 27</td><td>Title</td><td>IT Security techniques</td></tr>
<tr><td>Creation date</td><td>1989</td><td rowspan="5">MEMBERS
  </td><td rowspan="5">Participating Countries (53):
Germany, Algeria, Argentina, Australia, Austria, Belgium, Brazil, Canada, Chile, China, Cyprus, Czech Republic, Côte d'Ivoire, Denmark, Finland, France, India, Indonesia, Ireland, Israel, Italy, Japan, Kazakhstan, Kenya, Republic of Korea, Lebanon, Luxembourg, Malaysia, Mauritius, Mexico, Netherlands, New Zealand, Norway, Panama, Peru, Poland, Portugal, Romania, Russian Federation, Rwanda, Singapore, Slovakia, South Africa, Spain, Sri Lanka, Sweden, Switzerland, The Former Yugoslav Republic of Macedonia, Ukraine, United Arab Emirates, United Kingdom, United States, Uruguay

Observing Countries (20):
Belarus, Bosnia and Herzegovina, Costa Rica, El Salvador, Estonia, Ghana, Hong Kong, Hungary, Iceland, Islamic Republic of Iran, Lithuania, Morocco, State of Palestine, Portugal, Saudi Arabia, Serbia, Slovenia, Swaziland, Thailand, Turkey</td></tr>
<tr><td>Secretariat</td><td>DIN (Germany)</td></tr>
<tr><td>Secretary</td><td>Ms. Krystyna Passia</td></tr>
<tr><td>Chairperson</td><td>Vacant</td></tr>
<tr><td>Organizations in liaison</td><td>(ISC)2, CCETT, Cloud security alliance, ECBS, ENISA, EPC, ETSI, Ecma International, IEEE, ISACA, ISSEA, ITU, MasterCard International, MasterCard Europe, CCBD, TCG, Opengroup UK, TMForum, ISA, ABC4Trust, CSCC, INLAC, TAS3, Cyber Security, PRACTICE, ISF, OECD, FIRST, OIDF, PQCCRYPTO, WITDOM, Kantara Initiative, ISCI, PRIPARE, EuroCloud, PICOS, Article 29 Data Protection Working Party, Interpol, ETSI, TREsPASS, EUDCA</td></tr>
<tr><td>Web site</td><td colspan="3">https://www.iso.org/committee/45306.html</td></tr>
<tr><td>Scope</td><td colspan="3">The development of standards for the protection of information and ICT. This includes generic methods, techniques and guidelines to address both security and privacy aspects, such as:
- Security requirements capture methodology;
- Management of information and ICT security; in particular, information security management systems (ISMS), security processes, security controls and services;
- Cryptographic and other security mechanisms, including but not limited to mechanisms for protecting the accountability, availability, integrity and confidentiality of information;
- Security management support documentation including terminology, guidelines as well as procedures for the registration of security components;
- Security aspects of identity management, biometrics and privacy;
- Conformance assessment, accreditation and auditing requirements in the area of information security;
- Security evaluation criteria and methodology.

SC 27 engages in active liaison and collaboration with appropriate bodies to ensure the proper development and application of SC 27 standards and technical reports in relevant areas.</td></tr>
</table>

Structure	JTC 1/SC 27/SWG-T	Transversal Items
	JTC 1/SC 27/WG 1	Information security management systems
	JTC 1/SC 27/WG 2	Cryptography and security mechanisms
	JTC 1/SC 27/WG 3	Security evaluation testing and specification
	JTC 1/SC 27/WG 4	Security controls and services
	JTC 1/SC 27/WG 5	Identity management and privacy technologies

Standardization work

Published standards	Number of published ISO/IEC standards under the direct responsibility of JTC 1/SC 27 (number includes updates): 164
Standards under development	62

Involvement of Luxembourg

25 delegates

- Mr. Benoit Poletti (Chairman)	INCERT GIE
- Mr. Cédric Mauny (Vice-Chairman)	Telindus Luxembourg S.A.
- Mr. Carlo Harpes (Vice-Chairman)	itrust consulting S.à.r.l.
- Mr. Tom Leclerc	Telindus Luxembourg S.A.
- Mr. Peter Schaffer	Ernst & Young Business Advisory Services S.à.r.l.
- Mr. Olivier Montee	Cours@home Luxembourg S.à.r.l.
- Mr. Stéphane Cortina	Luxembourg Institute of Science and Technology (LIST)
- Mr. Hervé Cholez	LIST
- Mr. Nicolas Mayer	LIST
- Mr. René Saint-Germain	ALTIRIAN S.A.
- Mr. Sébastien Poggi	Victor Buck Services S.A.
- Mr. Alex Mckinnon	itrust consulting S.à.r.l.
- Mr. Matthieu Aubigny	itrust consulting S.à.r.l.
- Mrs. Shenglan Hu	POST Telecom PSF S.A.
- Mrs. Myriam Djerouni	Banque de Luxembourg S.A.
- Mr. Qiang Tang	University of Luxembourg
- Mrs. Emelyne Baudrier	Luxembourg Conseil S.à.r.l.
- Mr. David Naramski	NOWINA SOLUTIONS S.à.r.l.
- Mrs. Mélanie Gagnon	MGSI S.à.r.l.
- Mr. Serge Raucq	Vectif ACF S.A.
- Mr. Clement Gorlt	INCERT GIE
- Mrs. Hatice Baskaya	INCERT GIE
- Mr. Enrico Ozzano	BIL S.A.
- Mr. Benoit Bertholon	COINPLUS S.A.
- Mr. Nicolas Domenjoud	ANEC GIE

Comments

SC 27 is an internationally recognized center of information and IT security standards expertise serving the needs of business sectors as well as governments. Its work covers the development of standards for the protection of information and ICT.

Working Groups

The scope of the **WG 1** covers all aspects of standardization related to information security management systems: requirements, methods and processes, security controls, sector and application specific use of ISMS, governance, information security economics and accreditation, certification and auditing of ISMS.

The scope of the **WG 2** covers both cryptographic and non-cryptographic techniques and mechanisms including confidentiality, entity authentication, non-repudiation, key management and data integrity (e.g.: message authentication, hash-functions, digital signatures, etc.).

The scope of the **WG 3** covers aspects related to security engineering, with particular emphasis on, but not limited to standards for IT security specification, evaluation, testing and certification of IT systems, components, and products. The following aspects may be distinguished: security evaluation criteria, methodology for application of the criteria, security functional and assurance specification of IT systems, components and products, testing methodology for determination of security functional and assurance conformance, accreditation schemes, administrative procedures for testing, evaluation and certification.

The **WG 4** is developing and maintaining International Standards, Technical Specifications and Technical Reports for information security in the area of Security Controls and Services, to assist organizations in the implementation of the ISO/IEC 27000-series of ISMS International Standards and Technical Reports. Also the Scope of WG 4 includes evaluating and developing International Standards for addressing existing and emerging information security issues and needs and other security aspects that resulted from the proliferation and use of ICT and Internet related technology in organizations (such as multinationals corporations, SMEs, government departments, and non-profit organizations).

Finally, **WG 5** is responsible of the development and maintenance of standards and guidelines addressing security aspects of identity management, biometrics and privacy.

Standards

The best-known standard developed by SC 27 are ISO/IEC 27001:2013, Information technology -- Security techniques -- Information security management systems -- Requirements and ISO/IEC 27002:2013, Information technology -- Security techniques -- Code of practice for information security controls. Organizations setting up an ISMS certified compliant with ISO/IEC 27001 are increasingly numerous[103].

It is important to note that the committee works in liaison with many other JTC 1/SCs on the development of standards related to security for specific subsectors. For example, SC 27 has published International Standard related to the security for Cloud Computing and a new one regarding security and privacy aspects in cloud SLAs is currently under development (in liaison with ISO/IEC JTC 1/SC 38):

- ISO/IEC 27018:2014, Information technology -- Security techniques -- Code of practice for protection of personally identifiable information (PII) in public clouds acting as PII processors;
- ISO/IEC 27017:2015, Information technology -- Security techniques -- Code of practice for information security controls based on ISO/IEC 27002 for cloud services;
- ISO/IEC 27036-4:2016, Information technology -- Security techniques -- Information security for supplier relationships -- Part 4: Guidelines for security of cloud services;
- ISO/IEC CD 19086-4, Information technology -- Cloud computing -- Service level agreement (SLA) framework and technology -- Part 4: Security and privacy.

Similarly, a standard concerning Big Data security and privacy is currently under development in JTC 1/SC 27, in close collaboration with ISO/IEC JTC 1/WG 9 on Big Data:

- ISO/IEC AWI 20547-4, Information technology -- Big data reference architecture -- Part 4: Security and privacy fabric.

[103] Source: ISO survey 2015

6.4.3.ISO/IEC JTC 1/SC 37

General information			
Committee	**ISO/IEC JTC 1/SC 37**	**Title**	**Biometrics**
Creation date	2002	**MEMBERS** 	**Participating Countries (29):** United States, Australia, Canada, China, Czech Republic, Denmark, Egypt, Finland, France, Germany, India, Israel, Italy, Japan, Republic of Korea, Malaysia, Netherlands, New Zealand, Norway, Poland, Portugal, Russian Federation, Singapore, South Africa, Spain, Sweden, Switzerland, Ukraine, United Kingdom **Observing Countries (13):** Austria, Belgium, Bosnia and Herzegovina, Ghana, Hungary, Indonesia, Islamic Republic of Iran, Ireland, Kenya, Romania, Serbia, Thailand, Turkey
Secretariat	ANSI (United States)		
Secretary	Ms. Michaella Miller		
Chairperson	Vacant		
Organizations in liaison	IBIA, ILO, ITU, OASIS, VoiceXML, FRONTEX		
Web site	https://www.iso.org/committee/313770.html		
Scope	Standardization 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; application of evaluation criteria to biometric technologies; methodologies for performance testing and reporting and cross jurisdictional and societal aspects. Excluded is the work in ISO/IEC JTC 1/SC 17 to apply biometric technologies to cards and personal identification. Excluded is the work in ISO/IEC JTC 1/SC 27 for biometric data protections techniques, biometric security testing, evaluations, and evaluations methodologies.		
Structure	JTC 1/SC 37/WG 1 Harmonized biometric vocabulary JTC 1/SC 37/WG 2 Biometric technical interfaces JTC 1/SC 37/WG 3 Biometric data interchange formats JTC 1/SC 37/WG 4 Technical Implementation of Biometric Systems JTC 1/SC 37/WG 5 Biometric testing and reporting JTC 1/SC 37/WG 6 Cross-Jurisdictional and Societal Aspects of Biometrics		
Standardization work			
Published standards	Number of published ISO/IEC standards under the direct responsibility of JTC 1/SC 37 (number includes updates): 119		
Standards under development	20		
Involvement of Luxembourg			
NO (no registered delegate)			

Comments

The goal of ISO/IEC JTC 1/SC 37 is to ensure a high priority, focused, and comprehensive approach worldwide for the rapid development and approval of formal international biometric standards. These standards are necessary to support the rapid deployment of significantly better, open systems standard-based security solutions for purposes such as homeland defense and the prevention of ID theft.

Biometrics provide for secure transactions, positive identification and better informed human judgment. The deployment of standards-based, high-performance, interoperable biometric solutions is expected to increase levels of security for critical infrastructures that have not, until now, been properly served by other technologies. ISO/IEC JTC 1/SC 37, Biometrics, is responsible for the development of a large portfolio of biometric standards in support of interoperability and data interchange. These standards support a diverse range of systems and applications designed to provide the reliable verification and identification of individuals.

Topics addressed by these standards include biometric data interchange formats for a number of biometric modalities (e.g. finger, face, iris, signature/sign, vascular data), biometric technical interface standards (e.g. APIs), biometric performance and conformance testing methodology standards, biometric application profiles, biometric sample quality standards, and standards in support of cross-jurisdictional issues related to the utilization of biometric technologies in commercial applications. Moreover, a harmonized biometric vocabulary (ISO/IEC 2382-37:2017) that serves the standards community as well as other customers has been published in 2017.

The current work program of ISO/IEC JTC 1/SC 37 includes for example:

- The development of the ISO/IEC 24779 series of standards, which define pictograms, icons and symbols for use with biometric systems;
- The development of ISO/IEC 30137 series of standards concerning the use of biometrics in video surveillance systems.

6.4.4.ISO/TC 46/SC 11

General information			
Committee	**ISO/TC 46/SC 11**	**Title**	**Archives/records management**
Creation date	1998	**MEMBERS** 	**Participating Countries (30):** Australia, Bulgaria, Canada, Chile, China, Colombia, Czech Republic, Estonia, Finland, France, Germany, Ireland, Italy, Japan, Kenya, Republic of Korea, **Luxembourg**, Malaysia, Netherlands, New Zealand, Norway, Portugal, Russian Federation, South Africa, Spain, Sweden, Switzerland, Ukraine, United Kingdom, United States **Observing Countries (17):** Argentina, Austria, Belgium, Brazil, Cuba, Denmark, Greece, Islamic Republic of Iran, Lithuania, Poland, Romania, Serbia, Singapore, Slovakia, Slovenia, Sri Lanka, Thailand
Secretariat	SA (Australia)		
Secretary	Ms. Clare Hobern		
Chairperson	Ms. Judith Ellis		
Organizations in liaison	ICA, IRMT, InterPARES		
Web site	https://www.iso.org/committee/48856.html		
Scope	Standardization of principles for the creation and management of documents, records and archives as evidence of transactions and covering all media including digital multimedia and paper.		
Structure	TC 46/SC 11/WG 1 Metadata TC 46/SC 11/WG 7 Digital Records preservation TC 46/SC 11/WG 8 Management of systems for records TC 46/SC 11/WG 10 Implementation Guidelines for the disposition of records TC 46/SC 11/WG 14 Records requirements in enterprise Architecture TC 46/SC 11/WG 15 Appraisal for Managing Records TC 46/SC 11/WG 16 Systems design for records TC 46/SC 11/WG 17 Records in the cloud		
Standardization work			
Published standards	Number of published ISO standards under the direct responsibility of TC 46/SC 11 (number includes updates): 17		
Standards under development	2		
Involvement of Luxembourg			
6 delegates			
- Mr. Lucas Colet (Chairman)	PricewaterhouseCoopers SC		
- Mrs. Sylvie Forastier	Linklaters LLP		
- Mr. Alain Wahl	ILNAS		
- Mr. Serge Raucq	Vectis ACF S.A.		
- Mr. Michel Picard	Luxembourg Institute of Science and Technology (LIST)		
- Mr. Henri Montin	Centre des Technologies de l'Information de l'Etat		

Comments

ISO/TC 46/SC 11 is responsible for the standardization of best practices in managing archives and records by providing a managerial framework, as well as standards and guidance for the design and application of records practices and processes to ensure authoritative and reliable information and evidence of business activity in organizations.

ISO/TC 46/SC 11 is currently developing the following standards:

- ISO/DIS 17068, Information and documentation -- Trusted third party repository for digital records (revision);
- ISO/NP TR 21965, Information and documentation -- Records management in enterprise architecture.

6.4.5.ISO/TC 290

General information			
Committee	**ISO/TC 290**	**Title**	**Online reputation**
Creation date	2014	**MEMBERS** 	**Participating Countries (9):** France, Austria, Canada, China, Germany, Italy, Malaysia, Spain, United Kingdom **Observing Countries (18):** Argentina, Belgium, Czech Republic, Egypt, Finland, India, Islamic Republic of Iran, Israel, Japan, Republic of Korea, Netherlands, Norway, Peru, Saudi Arabia, Slovakia, Switzerland, Thailand, Uganda
Secretariat	AFNOR (France)		
Secretary	Mr. Clément Chevauché		
Chairperson	Mr. Laurent Petit		
Organizations in liaison	ANEC, CI, ETTSA, HOTREC		
Web site	https://www.iso.org/committee/5166853.html		
Scope	Standardization of methods, tools, processes, measures and best practices related to online reputation of organizations or individuals providing services or products, derived from user-generated content available on the internet. Excluded: - Privacy and data protection frameworks or security information standardization already covered by ISO/IEC JTC 1/SC 27; - Management system standards already covered by ISO/TC 176/SC 3; - Fraud countermeasures and controls already covered by ISO/TC 247; - Brand evaluation already covered by ISO/TC 289; - Customer contact centres already covered by ISO/PC 273; - Market, opinion and social research already covered ISO/TC 225.		
Structure	ISO/TC 290/WG 1 Online Consumer Reviews		
Standardization work			
Published standards	0		
Standards under development	1		
Involvement of Luxembourg			
NO (no registered delegate)			
Comments			

ISO/TC 290 is working on standardization in the field of online reputation. It aims at developing high quality global standards in order to shape and improve usages on internet and social media. The objective is the standardization of methods, tools, key performance indicators and best practices based upon data that can be captured through social media related to online reputation of organizations or individuals providing services or products.

The TC will develop a package of International Standards in the Online Reputation sector for organizations and individuals providing services and products including:

- Definitions and terminology;
- Content analysis and measurement (tools, methods, processes, best practices and performance

indicators);
- Management of Online Reputation for organizations (orient to different types of reviews, such as employment / job service, online education/ training, etc.);
- Best practices for Online Consumer Reviews (online trading platforms, independent evaluation platforms including social media, mass media, websites, from professionals, blogs, comparators, forums);
- Risk control of Online Reputation for organizations (risk identification, risk analysis, risk shift and control, use insurance service to protect organization and consumer, etc.).

ISO/TC 290 has currently one standard registered in its program of work: ISO/CD 20488, Online Consumer Reviews -- Principles and requirements for collection, moderation and delivery processes for online consumer reviews.

6.4.6.ETSI/TC CYBER

General information			
Committee	**ETSI/TC CYBER**	**Title**	**Cyber Security**
Creation date	2014	**MEMBERS** 	134 member organizations of ETSI
Chairperson	Mr. Charles Brookson		
Organizations in liaison	CEN, CENELEC, ENISA, Eurosmart, GIFSI, ISO/IEC JTC 1, TCG, TTA		
Web site	https://portal.etsi.org/cyber		
Scope	The activities of ETSI TC CYBER include the following broad areas: - Cyber Security - Security of infrastructures, devices, services and protocols - Security advice, guidance and operational security requirements to users, manufacturers and network and infrastructure operators - Security tools and techniques to ensure security - Creation of security specifications and alignment with work done in other TCs.		
Structure	/		
Standardization work			
Published standards	15		
Standards under development	11		
Involvement of Luxembourg			
Note: ILNAS is monitoring the developments of the ETSI/TC CYBER.			
Comments			

ETSI/TC CYBER is responsible for the standardization of cyber security and for providing a center of relevant security expertise. In addition, TC CYBER is working in cooperation with the CEN and the CENELEC in response to European Commission (EC) Mandate M/530 on Privacy by Design.

The work program of TC CYBER include the following projects:

- DTS/CYBER-0024, CYBER; Critical Infrastructure Metrics for Identification of CI;
- DTS/CYBER-0025, CYBER; Attribute Based Encryption for Attribute Based Access Control;
- ETSI TS 102 165-1, CYBER; Methods and protocols; Part 1: Method and proforma for Threat, Vulnerability, Risk Analysis (TVRA);
- ETSI TS 102 165-2, CYBER; Methods and protocols; Part 2: Protocol Framework Definition; Security Counter Measures;
- ETSI TR 103 370, CYBER; Practical introductory guide to privacy;
- ETSI TR 103 421, CYBER; Network Gateway Cyber Defence;
- ETSI TR 103 456, CYBER; Implementation of the Network and Information Security (NIS) Directive;
- ETSI TS 103 457, CYBER; Specifying a common interface to transfer sensitive functions to a trusted domain;
- ETSI TS 103 458, CYBER; Application of Attribute-Based Encryption (ABE) for data protection on smart devices, cloud and mobile services
- ETSI TS 103 485, CYBER; Mechanisms for privacy assurance and verification;
- ETSI TS 103 486, CYBER; Identity management and naming schema protection mechanisms.

6.4.7.ETSI/TC ESI

<table>
<tr><th colspan="4">General information</th></tr>
<tr><td>Committee</td><td>ETSI/TC ESI</td><td>Title</td><td>Electronic Signatures and Infrastructures</td></tr>
<tr><td>Creation date</td><td>/</td><td rowspan="3">MEMBERS
  </td><td rowspan="3">71 member organizations of ETSI</td></tr>
<tr><td>Chairperson</td><td>Mr. Riccardo Genghini</td></tr>
<tr><td>Organizations in liaison</td><td>CAB Forum, CEN, CENELEC, EA, ENISA, Eurosmart, ISO, ISO/IEC JTC 1, ISOC/IETF, ITU, OASIS, SAFE-BioPharma, TTA, UNECE, UPU</td></tr>
<tr><td>Web site</td><td colspan="3">http://portal.etsi.org/esi</td></tr>
<tr><td>Scope</td><td colspan="3">TC ESI is the lead body within ETSI in relation to Electronic Signatures and Infrastructures, including the preparation of reports and other necessary activities, by:
- Developing generic standards, guides and reports relating to electronic signatures and related trust infrastructures to protect electronic transactions and ensure trust and confidence with business partners;
- Liaising with other ETSI bodies in relation to electronic signatures and related trust infrastructures;
- Liaising with bodies external to ETSI in relation to electronic signatures and related trust infrastructures;
- Establishing a continuing work plan in relation to electronic signatures and related trust infrastructures.</td></tr>
<tr><td>Structure</td><td colspan="3">/</td></tr>
<tr><th colspan="4">Standardization work</th></tr>
<tr><td>Published standards</td><td colspan="3">199</td></tr>
<tr><td>Standards under development</td><td colspan="3">54</td></tr>
<tr><th colspan="4">Involvement of Luxembourg</th></tr>
<tr><td colspan="4">3 companies

- eWitness S.A.
- Luxtrust
- POST Luxembourg

Note: ILNAS is also monitoring the developments of the ETSI/TC ESI.</td></tr>
<tr><th colspan="4">Comments</th></tr>
<tr><td colspan="4">The committee addresses some basic needs of secure electronic commerce and of secure electronic document exchange in general by providing specifications for a selected set of technical items that have been found both necessary and sufficient to meet minimum interoperability requirements. Examples of business transactions based on electronic signatures and public key certificates are purchase requisitions, contracts and invoice</td></tr>
</table>

applications.

The lack of standards to support the use of electronic signatures and public key certificates has been identified as one of the greatest impediments to electronic commerce. The deployment of vendor-specific new infrastructures is currently in progress. It is recognized by different parties that there is an urgent need for standards to provide the basis for an open electronic commerce environment. Speedy specifications in this area will make it possible to influence early developments.

The ETSI strategy is in line with, and endorsed by the initiative of the EU Commission to establish a harmonized infrastructure for electronic signatures. In this frame, ETSI/TC ESI works, in collaboration will CEN TC 224, on the execution of EC Mandate M/460 to provide a rationalized framework for digital signatures standardization.

6.4.8.CEN/TC 224

General information			
Committee	**CEN/TC 224**	**Title**	**Personal identification and related personal devices with secure element, systems, operations and privacy in a multi sectorial environment**
Creation date	1989	**MEMBERS** 	34 members of CEN/CENELEC
Secretariat	AFNOR (France)		
Secretary	Ms. Caroline De Condé		
Chairperson	Mr. Franck Leroy		
Organizations in liaison	ANEC, FRONTEX, GlobalPlatform, UIC		
Web site	http://standards.cen.eu/dyn/www/f?p=204:7:0::::FSP_LANG_ID,FSP_ORG_ID:25,6205&cs=1A98C573151AB3D7A22712120D94364C1#1		
Scope	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 sectorial environment. It covers: - Operations such as applications and services like electronic identification, electronic signature, payment and charging, access and border control; - Personal devices with secure elements independently of their form factor, such as cards, mobile devices, and their related interfaces; - Security services including authentication, confidentiality, integrity, biometrics, protection of personal and sensitive data; - System components such as accepting devices, servers, cryptographic modules; CEN/TC 224 multi-sectorial environment involves sectors such as Government/Citizen, Transport, Banking, e-Health, as well as Consumers and providers from the supply side such as card manufacturers, security technology, conformity assessment body, software manufacturers.		
Structure	CEN/TC 224/WG 6 User Interface CEN/TC 224/WG 11 Transport applications CEN/TC 224/WG 15 European citizen card CEN/TC 224/WG 16 Application Interface for smart cards used as Secure Signature Creation Devices CEN/TC 224/WG 17 Protection Profiles in the context of SSCD CEN/TC 224/WG 18 Biometrics		
Standardization work			
Published standards	52		
Standards under development	23		

Involvement of Luxembourg

3 delegates

- Mr. Benoit Poletti (Chairman)	INCERT GIE
- Mrs. Shenglan Hu	POST Telecom PSF
- Mr. Enrico Ozzano	BIL S.A.

Comments

As a matter of principle, CEN/TC 224 does not duplicate the work of ISO/IEC JTC 1/SC 17 but, either transposes some of the related International Standards or uses them as the basis for specific European works. In a number of cases, the ultimate objective of the work of CEN/TC 224 is to contribute to international standardization.

The current objectives of CEN/TC 224 are to elaborate or maintain standards on:

- General card characteristics and technologies;
- Man machine interface;
- Inter-sector electronic purse;
- Telecommunications integrated circuit cards and terminals;
- Surface transport applications;
- Identification, Authentication and Signature (IAS) services based on smart secure devices;
- Biometrics for the need of European travel or governmental documents;
- Health sector cards.

Additional objectives of CEN/TC 224 are to consider the requirements for further standardization in the following areas:

- Additional devices under the control of the card (new displays, new embedded input/output devices on-board the card including electronic display, capacitive or resistive keypad, button, biosensor, power supply device, etc.) leading to new use relevant cases
- Privacy Impact Assessment (PIA): requirement for an evaluation model of privacy-by-design card-based products and/or services
- Privacy by design and convergence platform: starting the design with privacy requirements at the project outset and capitalizing on a common platform ground fulfilling a minimum requirement set for privacy supporting a diversity of applications on top of it.

CEN/TC 224 is particularly involved in the development of standards under the standardization mandate M/460 concerning Electronic Signatures. In this context, it is currently developing standards on protection profiles for signature creation and verification application (EN 419111 series), an application interface for secure elements for electronic identification, authentication and Trusted Services (EN 419212 series), and trustworthy systems supporting server signing (EN 419241 series).

6.4.9.CEN/CLC JWG 8

General information			
Committee	**CEN/CLC JWG 8**	**Title**	**Privacy management in products and services**
Creation date	2014	**MEMBERS** 	/
Secretariat	AFNOR (France)		
Secretary	Mr. Philippe Magnabosco		
Chairperson	Mrs. Claire Waast-Richard		
Organizations in liaison	/		
Web site	https://standards.cen.eu/dyn/www/f?p=204:7:0::::FSP_ORG_ID:1931122&cs=180E9EA343331CCD519E943B73BC775F0		
Scope	The scope of the JWG 8 is to cover privacy and personal data protection in products and services.		
Structure	/		
Standardization work			
Published standards	0		
Standards under development	0		
Involvement of Luxembourg			
NO (no registered delegate)			
Comments			

In 2014, CEN and CENELEC created a new Joint Working Group whose main task is to provide the response to the new EC standardization request on 'Privacy management in the design and development and in the production and service provision processes of security technologies'[104]. The request aims at the implementation of Privacy-by-design principles for security technologies and/or services lifecycle. The new standardization deliverables are intended to define and share best practices balancing security, transparency and privacy concerns for security technologies, manufacturers and service providers in Europe.

In 2017 CEN-CLC/JWG 8 will begin work on the development of a new European Standard setting out requirements on privacy by design principles in the design and implementation of security technologies and services in response to a request from the European Commission (M/530). The committee will also begin work on two Technical Reports with specific guidelines for the application of privacy by design principles for video-surveillance and for biometrics for access control including facial recognition[105].

[104] http://ec.europa.eu/growth/tools-databases/mandates/index.cfm?fuseaction=search.detail&id=548
[105] Source: CEN and CENELEC Work Programme 2017

6.5. TELECOMMUNICATIONS

Telecommunications is defined by ISO 5127:2001 as the "theory and techniques of the transmission of signals by electromagnetic or electronic means"[106].

The telecommunications subsector covers any transmission, emission or reception of signs, signals, writing, images and sounds or intelligence of any nature by wire, radio, optical or other electromagnetic systems[107].

[106] *ISO 5127:2001, Information and documentation -- Vocabulary (developed by ISO/TC 46)*
[107] *Definition extracted from the International Telecommunication Convention (Nairobi, 1982)*

6.5.1.ISO/IEC JTC 1/SC 6

General information			
Committee	**ISO/IEC JTC 1/SC 6**	**Title**	**Telecommunications and information exchange between systems**
Creation date	1964	**MEMBERS** 	**Participating Countries (20):** Republic of Korea, Austria, Belgium, Canada, China, Czech Republic, Finland, Germany, Greece, Japan, Kazakhstan, Republic of Moldova, Netherlands, Russian Federation, Spain, Switzerland, Tunisia, Ukraine, United Kingdom, United States **Observing Countries (29):** Argentina, Bosnia and Herzegovina, Colombia, Cuba, Cyprus, France, Ghana, Hong Kong, Hungary, Iceland, India, Indonesia, Islamic Republic of Iran, Ireland, Italy, Kenya, Malaysia, Malta, New Zealand, Norway, Philippines, Poland, Romania, Saudi Arabia, Serbia, Singapore, Slovenia, Thailand, Turkey,
Secretariat	KATS (Republic of Korea)		
Secretary	Ms. Jooran Lee		
Chairperson	Dr. Hyun Kook Kahng		
Organizations in liaison	CEPT, CERN, EC, ETSI, Ecma International, ICAO, IEEE, ISOC, ITSO, ITU, OASIS, UNCTAD, UNECE, UPU, WMO, NFC Forum, MFA Forum		
Web site	https://www.iso.org/committee/45072.html		
Scope	SC6 works on standardization in the field of telecommunications dealing with the exchange of information between open systems, including system functions, procedures, parameters as well as the conditions for their use. This standardization encompasses protocols and services of lower layers including physical, data link, network, and transport as well as those of upper layers including but not limited to Directory and ASN.1: MFAN, NFC, PLC, Future Networks and OID.		
Structure	JTC 1/SC 6/WG 1 Physical and data link layers JTC 1/SC 6/WG 7 Network, transport and future network JTC 1/SC 6/WG 10 Directory, ASN.1 and Registration		
Standardization work			
Published standards	Number of published ISO/IEC standards under the direct responsibility of JTC 1/SC 6 (number includes updates): 354		
Standards under development	32		
Involvement of Luxembourg			
NO (no registered delegate)			
Comments			

ISO/IEC JTC 1/SC 6 is, amongst other, in charge of the development of the ISO/IEC 29181 series of standards entitled "Future Network -- Problem Statement and Requirements", that aims to specify problem statement and requirements for the various issues of Future Network such as overall aspects, naming and addressing, switching and routing, mobility, security, media transport, and service composition.

Examples of noteworthy standards developed by ISO/IEC JTC 1/SC 6 are:

- ISO/IEC 8824 series of standards entitled "Information technology -- Abstract Syntax Notation One

(ASN.1)";

- ISO/IEC 9594 series of standards entitled "Information technology -- Open Systems Interconnection -- The Directory";
- ISO/IEC 18092:2013, Information technology -- Telecommunications and information exchange between systems -- Near Field Communication -- Interface and Protocol (NFCIP-1);
- ISO/IEC 21481:2012, Information technology -- Telecommunications and information exchange between systems -- Near Field Communication Interface and Protocol -2 (NFCIP-2);
- ISO/IEC TR 20002:2012, Information technology -- Telecommunications and Information Exchange Between Systems -- Managed P2P: Framework.

6.5.2.ISO/IEC JTC 1/SC 25

General information			
Committee	**ISO/IEC JTC 1/SC 25**	**Title**	**Interconnection of information technology equipment**
Creation date	1990	**MEMBERS** 	**Participating Countries (29):** Germany, Australia, Austria, Belgium, Canada, China, Czech Republic, Denmark, Finland, France, India, Ireland, Israel, Italy, Japan, Kazakhstan, Republic of Korea, Lebanon, Mexico, Netherlands, Norway, Poland, Russian Federation, Singapore, Spain, Sweden, Switzerland, United Kingdom, United States **Observing Countries (18):** Argentina, Bosnia and Herzegovina, Croatia, Cuba, Ghana, Greece, Hong Kong, China, Hungary, Iceland, Indonesia, Kenya, Malaysia, New Zealand, Philippines, Romania, Serbia, Turkey, Ukraine
Secretariat	DIN (Germany)		
Secretary	Mr. Jürgen Tretter		
Chairperson	Mr. Rainer Schmidt		
Organizations in liaison	EC, Ecma International, ITU, UNCTAD, UNECE		
Web site	https://www.iso.org/committee/45270.html		
Scope	Standardization of microprocessor systems; and of interfaces, protocols, architectures and associated interconnecting media for information technology equipment and networks, generally for commercial and residential environments, to support embedded and distributed computing environments, storage systems, other input/output components, home and building electronic systems including customer premises smart grid applications for electricity, gas, water and heat. NOTE: This scope includes requirements for components, assemblies and subsystems. However, standardization of cables, waveguides and connectors remains within the relevant product technical committees and subcommittees of IEC. The scope includes the development of network interfaces, in liaison with committees for external utility networks, to support smart grid applications at the customer premises.		
Structure	JTC 1/SC 25/TG 1 Project Team: Taxonomy and Terminology (PTTT) JTC 1/SC 25/WG 1 Home electronic systems JTC 1/SC 25/WG 3 Customer premises cabling JTC 1/SC 25/WG 4 Interconnection of computer systems and attached equipment		
Standardization work			
Published standards	Number of published ISO/IEC standards under the direct responsibility of JTC 1/SC 25 (number includes updates): 187		
Standards under development	26		
Involvement of Luxembourg			
NO (no registered delegate)			

Comments

Some standards in development or developed, that are representative of the work of ISO/IEC JTC 1/SC 25 are:

- ISO/IEC 14165 series of standards concerning Fiber Channel;
- ISO/IEC 30100 series of standards on home network resource management.

Standards for Generic cabling, Small Computer System Interface (SCSI), Fiber Channel and Intelligent homes and buildings are at some of the priorities of the subcommittee. A revision of all generic cabling standards – ISO/IEC 11801 series - addressing offices, industrial premises, homes and data centres is also currently in development and takes into account the requirements of the upcoming 40 Gbit/s specification.

6.5.3. ITU-T - International Telecommunication Union - Telecommunication Standardization Sector

<table>
<tr><th colspan="4">General information</th></tr>
<tr><td>Organization</td><td>ITU-T</td><td>Title</td><td>ITU - Telecommunication Standardization Sector</td></tr>
<tr><td>Creation date</td><td>1865</td><td rowspan="2">MEMBERS
  </td><td rowspan="2">258 member organizations</td></tr>
<tr><td>Chairperson</td><td>Mr. Chaesub Lee</td></tr>
<tr><td>Web site</td><td colspan="3">http://www.itu.int/en/ITU-T/Pages/default.aspx</td></tr>
<tr><td>Scope</td><td colspan="3">The International Telecommunication Union (ITU) is the United Nations specialized agency in the field of telecommunications. The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of ITU. ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.</td></tr>
<tr><td>Structure</td><td colspan="3"><u>Advisory Group</u>
- Telecommunication Standardization Advisory Group (TSAG)

<u>Study Groups</u>
- SG 2: Operational aspects of service provision and telecommunications management
- SG 3: Tariff and accounting principles including related telecommunication economic and policy issues
- SG 5: Environment and climate change
- SG 9: Television and sound transmission and integrated broadband cable networks
- SG 11: Signaling requirements, protocols and test specifications
- SG 12: Performance, QoS and QoE
- SG 13: Future networks including cloud computing, mobile and next generation networks
- SG 15: Networks, Technologies and Infrastructures for Transport, Access and Home
- SG 16: Multimedia coding, systems and applications
- SG 17: Security
- SG 20: IoT and its applications including smart cities and communities (SC&C)

<u>Focus Groups</u>
- Focus Group on IMT-2020 (FG IMT-2020)
- Focus Group Digital Financial Services (FG DFS)

<u>Joint Coordination Activities</u>
- Joint Coordination Activity on Software-Defined Networking (JCA-SDN)
- Joint Coordination Activity on technical aspects of telecommunication networks to support the Internet (JCA-Res178)
- Joint Coordination Activity on Child Online Protection (JCA-COP)
- Joint Coordination Activity on Internet of Things and Smart Cities & Communities (JCA-IoT and SC&C)
- Joint Coordination Activity on Accessibility and Human factors (JCA-AHF)
- Joint Coordination Activity for Identity Management (JCA-IdM)
- Joint Coordination Activity on IPTV (JCA-IPTV)

<u>Global Standards Initiative</u>
- IPTV Global Standards Initiative (IPTV-GSI)</td></tr>
</table>

	Regional Groups - Africa Region - Americas Region - Arab Region - Asia and Pacific Region - RCC-CIS Region **Committees** - Standardization Committee for Vocabulary - Review Committee
Standardization work	
Published standards	5200 ITU-T Recommendations
Standards under development	Unknown
Involvement of Luxembourg	
3 members - *Service des medias et des Communications* - *Institut Luxembourgeois de Régulation* (ILR) - POST Luxembourg	
Comments	
The main products of ITU-T are normative Recommendations, which are standards that define how telecommunication networks operate and interwork. ITU-T Recommendations are non-binding, however they are generally complied with due to their high quality and because they guarantee the interconnectivity of networks and enable telecommunication services to be provided on a worldwide scale.	

6.5.4. ETSI – European Telecommunications Standards Institute

<table>
<tr><th colspan="4">General information</th></tr>
<tr><td>Organization</td><td>ETSI</td><td>Title</td><td>European Telecommunications Standards Institute</td></tr>
<tr><td>Creation date</td><td>1988</td><td rowspan="2">MEMBERS
  </td><td rowspan="2">814 ETSI member organizations drawn from 68 countries across 5 continents worldwide</td></tr>
<tr><td>Chairperson</td><td>Mr. Luis Jorge Romero</td></tr>
<tr><td>Web site</td><td colspan="3">http://www.etsi.org/website/homepage.aspx</td></tr>
<tr><td>Scope</td><td colspan="3">ETSI is a producer of globally applicable standards for Information and Communications Technologies (ICT), including fixed, mobile, radio, converged, broadcast and Internet technologies. The high quality of its work and its open approach to standardization has seen its influence extend from its European roots to impact the world.

ETSI is officially recognized by the European Union as a European Standards Organization. Its activities are driven by time to market and our standards help ensure the free movement of goods within the single European market, allowing enterprises in the EU to be more competitive. Members include some of the world's leading companies and national administrations working alongside R&D organizations, smaller businesses and innovative start-ups.

ETSI is at the forefront of emerging technologies. It is building close relationships with research bodies and addressing the technical issues that will drive the economy of the future and improve life for the next generation.

ETSI is a world-renowned organization with a solid reputation for technical excellence. It makes its expertise available to its members and customers through a range of services for growing ideas and enabling technology.</td></tr>
<tr><td>Structure</td><td colspan="3"><u>Technical committees/Projects:</u>
- TC ATTM Access, Terminals, Transmission and Multiplexing
- TC BRAN Broadband Radio Access Networks
- TC Broadcast Joint EBU/CENELEC/ETSI Technical Committee Broadcast
- TC CABLE Integrated Broadband Cable Telecommunication Networks
- TC CYBER Cyber Security
- TC DECT Digital Enhanced Cordless Telecommunications
- TC EE Environmental Engineering
- EP eHEALTH ETSI Project (EP) eHEALTH
- TC ERM EMC and Radio Spectrum Matters
- TC ESI Electronic Signatures and Infrastructures
- TC HF Human Factors
- TC INT Core Network and Interoperability Testing
- TC ITS Intelligent Transport Systems
- TC LI Lawful Interception
- TC MSG Mobile Standards Group
- TC MTS Methods for Testing and Specification
- TC NTECH Network Technology
- TC PLT Power-Line Telecommunications
- TC RRS Reconfigurable Radio Systems
- TC RT Railways Telecommunications
- TC Safety Electronic communications and systems Safety
- TC SCP Smart Card Platform
- TC SES Satellite Earth Stations and Systems</td></tr>
</table>

	- TC SmartBAN Smart Body Area Network - TC SmartM2M Smart Machine-to-Machine communications - TC STQ Speech and multimedia Transmission Quality - TC TCCE TETRA and Critical Communications Evolution **Industry Specification Groups:** - ISG CCM intelligent Compound Content Management - ISG CIM Cross-cutting Context Information Management - ISG ECI Embedded Common Interface - ISG IP6 IPv6 Integration - ISG ISI Information Security Indicators - ISG MBC Mobile & Broadcast Convergence - ISG MEC Mobile-Edge Computing - ISG NFV Network Functions Virtualization - ISG NGP Next Generation Protocols - ISG OEU Operational Energy Efficiency for Users - ISG QKD Quantum Key Distribution - ISG QSC Quantum-Safe Cryptography - ISG SMT Surface Mount Technique - ISG mWT millimeter Wave Transmission **Special Committees and other groups** - SC EMTEL Emergency Communications - SC FC Finance - SC IPR Intellectual Property Rights - SC SAGE Security Algorithms Group of Experts - SC User Group User Group Identity **Other Group:** - OSM Open Source MANO **Partnership Projects:** - EPP 3GPP Third Generation Partnership Project - oneM2M Machine-to-Machine Communications Partnership Project
Standardization work	
Published standards	15336
Standards under development	958
Involvement of Luxembourg	
9 members - ILNAS - ANEC GIE - eWitness S.A. - FBConsulting S.à r.l. - Interdisciplinary Centre for Security, Reliability and Trust (SnT) – University of Luxembourg - Luxtrust - POST Luxembourg - SES S.A. - Skylane Optics	
Comments	

High quality and low time-to-market are ETSI's constant aims and it continually strives to collaborate with research bodies. ETSI is active in vital complementary areas such as interoperability and offers event services related to standardization including forum hosting.

The international reputation of ETSI is built on openness, discussion, consensus, and direct input from their members. ETSI is officially recognized by the European Union as a European Standardization Organization. The quality of its work and its open approach to standardization has helped it to evolve into a European roots - global branches operation with a good reputation for technical excellence. The following ETSI standards are used in Luxembourg by ILNAS to supervise Qualified Trust Service Providers:

- ETSI EN 319 401 "General Policy Requirements for Trust Service Providers";
- ETSI EN 319 403 "Trust Service Provider Conformity Assessment - Requirements for conformity assessment bodies assessing Trust Service Providers";
- ETSI EN 319 411-1 "Policy and security requirements for Trust Service Providers issuing certificates; Part 1: General requirements";
- ETSI EN 319 411-2 "Policy and security requirements for Trust Service Providers issuing certificates; Part 2: Requirements for trust service providers issuing EU qualified certificates".

6.6. GOVERNANCE OF IT

Corporate governance involves a set of relationships between a company's management, its board, its shareholders and other stakeholders. Corporate governance also provides the structure through which the objectives of the company are set, and the means of attaining those objectives and monitoring performance are determined[108].

The governance of IT is thus a component or a subset of organization governance, which is one key element in improving economic efficiency and growth as well as enhancing investors' confidence. Governance of IT can be defined as the system by which the current and future use of IT is directed and controlled[109].

[108] *OECD principles of corporate Governance*

[109] *Based on ISO/IEC TR 38502:2014, Information Technology -- Governance of IT -- Framework and model (developed by ISO/IEC JTC 1/SC 40)*

6.6.1.ISO/IEC JTC 1/SC 40

<table>
<tr><th colspan="4">General information</th></tr>
<tr><td>Committee</td><td>ISO/IEC JTC 1/SC 40</td><td>Title</td><td>IT Service Management and IT Governance</td></tr>
<tr><td>Creation date</td><td>2013</td><td rowspan="5">MEMBERS
  </td><td rowspan="5">Participating Countries (32):
Australia, Brazil, Canada, China, Côte d'Ivoire, Denmark, Finland, France, Germany, India, Ireland, Italy, Japan, Republic of Korea, Luxembourg, Malaysia, Mexico, Netherlands, New Zealand, Panama, Peru, Poland, Portugal, Romania, Russian Federation, Rwanda, Singapore, South Africa, Spain, Sweden, United Kingdom, United States

Observing Countries (12):
Argentina, Austria, Belgium, Bulgaria, Czech Republic, Hong Kong, Islamic Republic of Iran, Kenya, Norway, Switzerland, Ukraine, Uruguay</td></tr>
<tr><td>Secretariat</td><td>SA (Australia)</td></tr>
<tr><td>Secretary</td><td>Ms. Suba Ananth</td></tr>
<tr><td>Chairperson</td><td>Ms. Jan Begg</td></tr>
<tr><td>Organizations in liaison</td><td>IEEE, ISACA, OASIS, itSMFI, IAF</td></tr>
<tr><td>Web site</td><td colspan="3">https://www.iso.org/committee/5013818.html</td></tr>
<tr><td>Scope</td><td colspan="3">Standardization of IT Service Management and IT Governance.

Develop standards, tools, frameworks, best practices and related documents for IT Service Management and IT Governance, including areas of IT activity such as audit, digital forensics, governance, risk management, outsourcing, service operations and service maintenance, but excluding subject matter covered under the scope and existing work programs of JTC 1/SC 27 and JTC 1/SC 38.

The work will initially cover:
- Governance of IT, including the development of the ISO/IEC 38500 series standards and related documents;
- Operational aspects of Governance of IT, including ISO/IEC 30121 Information Technology -- Governance of digital forensic risk framework, and interfaces with the management of IT as well as the role of governance in the area of business innovation;
- All aspects relating to IT service management, including the development of the ISO/IEC 20000 series standards and related documents;
- All aspects relating to IT-Enabled Services -- Business Process Outsourcing, including the development of the ISO/IEC 30105 series standards and related documents.</td></tr>
<tr><td>Structure</td><td colspan="3">JTC 1/SC 40/CAG 1 Chairman Advisory Group
JTC 1/SC 40/WG 1 Governance of Information Technology
JTC 1/SC 40/WG 2 Maintenance and development of ISO/IEC 20000 - Information Technology - Service Management
JTC 1/SC 40/WG 3 IT-enabled services / Business process outsourcing
JTC 1/SC 40/WG 4 Management System Standard (MSS) of business process outsourcing</td></tr>
<tr><th colspan="4">Standardization work</th></tr>
<tr><td>Published standards</td><td colspan="3">Number of published ISO/IEC standards under the direct responsibility of JTC 1/SC 40 (number includes updates): 19</td></tr>
</table>

Standards under development	7

Involvement of Luxembourg

8 delegates

- Mrs. Béatrix Barafort (Chairwoman)	Luxembourg Institute of Science and Technology (LIST)
- Mr. Alain Renault	LIST
- Mr. Stéphane Cortina	LIST
- Mr. Michel Picard	LIST
- Mr. Christophe Feltus	LIST
- Mr. Jean-Michel Remiche	POST Telecom S.A.
- Mr. Cyril Cassagnes	KPMG Luxembourg S.à r.l.
- Mr. Pierre-Olivier Portmann	

Comments

ISO/IEC JTC 1/SC 40 has been created during the 2013 JTC 1 Plenary Meeting. It pursues the work of three working groups which have been disbanded on December 1, 2013:

- ISO/IEC JTC 1/WG 8: Governance of IT;
- ISO/IEC JTC 1/SC 7/WG 25: IT Service Management;
- ISO/IEC JTC 1/SC 7/WG 27: IT Enabled Services/Business Process Outsourcing Lifecycle Processes (ITES/BPO).

JTC 1/SC 40 is in charge of the ISO/IEC 38500 family of standards on Governance of IT and has already published four related standards:

- ISO/IEC 38500:2015, Information technology -- Governance of IT for the organization;
- ISO/IEC TS 38501:2015, Information technology -- Governance of IT -- Implementation guide;
- ISO/IEC TR 38502:2014, Information technology -- Governance of IT -- Framework and model;
- ISO/IEC TR 38504:2016, Governance of information technology -- Guidance for principles-based standards in the governance of information technology.

The committee has also recently published the five parts of the ISO/IEC 30105 series of standards related to IT Enabled Services-Business Process Outsourcing (ITES/BPO) lifecycle processes.

The following standards are currently under development:

- ISO/IEC FDIS 38505-1, Information Technology -- Governance of IT -- Part 1: The application of ISO/IEC 38500 to the governance of data;
- ISO/IEC WD TR 38505-2, Information Technology -- Governance of IT -- Part 2: Implications of 38505-1 for data management;
- ISO/IEC AWI 38506, Information technology -- Governance of IT -- Governance of IT enabled investments;
- Several standards in the ISO/IEC 20000 series standards on IT service management (parts 1, 2, 3 and 6).

6.7. E-HEALTH

E-Health refers to the combined use of electronic communication and information technology in the health sector to enable better health and healthcare[110].

[110] *Source: ISO/TR 28380-3:2014, Health informatics — IHE global standards adoption — Part 3: Deployment*

6.7.1.ISO/TC 215

General information			
Committee	**ISO/TC 215**	**Title**	**Health informatics**
Creation date	1998	**MEMBERS** 	**Participating Countries (30):** United States, Australia, Austria, Belgium, Brazil, Canada, China, Czech Republic, Denmark, Finland, Germany, India, Islamic Republic of Iran, Ireland, Italy, Japan, Republic of Korea, **Luxembourg**, Malaysia, Mexico, Netherlands, Norway, Peru, Russian Federation, South Africa, Spain, Sweden, Switzerland, Tunisia, United Kingdom **Observing Countries (30):** Argentina, Armenia, Bulgaria, Colombia, Croatia, Cyprus, Ecuador, Ethiopia, France, Hong Kong, Hungary, Israel, Kazakhstan, Kenya, Mongolia, Montenegro, New Zealand, Philippines, Poland, Portugal, Romania, Serbia, Singapore, Slovakia, Slovenia, Thailand, Turkey, Ukraine, Uruguay, Zimbabwe
Secretariat	United States		
Secretary	Ms. Lisa Spellman		
Chairperson	Mr. Michael Glickman		
Organizations in liaison	CDISC, COCIR, DICOM, EFPIA, GS1, HON, ICN, IEEE, IHE, IHTSDO, IMIA, INLAC, ITU, UNECE, WHO, WONCA, mHealth Alliance, IHE, Continua Health Alliances, CDISC, ICH		
Web site	https://www.iso.org/committee/54960.html		
Scope	Standardization in the field of health informatics, to facilitate the coherent and consistent interchange and use of health-related data, information, and knowledge to support and enable all aspects of the health system.		
Structure	ISO/TC 215/CAG 1 ISO/TC 215/CAG 2 ISO/TC 215/TF 1 ISO/TC 215/WG 1 ISO/TC 215/WG 2 ISO/TC 215/WG 3 ISO/TC 215/WG 4 ISO/TC 215/WG 6 ISO/TC 215/JWG 1 ISO/TC 215/JWG 7	Executive council, harmonization and operations Advisory group Task Force on Quantities and Units to be used in e-health Architecture, Frameworks and Models Systems and Device Interoperability Semantic content Security, Safety and Privacy Pharmacy and medicines business Joint ISO/TC 215 - ISO/TC 249 WG: Traditional Chinese Medicine (Informatics) Joint ISO/TC 215 - IEC/SC 62A WG: Application of risk management to information technology (IT) networks incorporating medical devices	
Standardization work			
Published standards	168		
Standards under development	52		

Involvement of Luxembourg

2 delegates

- Mrs. Valérie Boissart — Centre Hospitalier de Luxembourg
- Mrs. Natalia Cassagnes — Travelsify

Comments

ISO/TC 215 operates in the field of health informatics, creating standards for information and communications technology (ICT) in health to promote interoperability between independent systems, to enable compatibility and consistency of health information and data, as well as to reduce duplication of effort and redundant activity.

Developments in the following areas were identified during the 2016 revision of the TC 215 strategic business plan as being potentially relevant to the work of TC 215:

- A major emphasis on clinical interoperability and greater clinical use of the newest tools, systems, mobile devices and apps of digital health;
- A trend for full use of data analytics in transforming, sustaining, planning and supporting the delivery, operation and management of health care;
- A move to greater patient participation and personalization in their health care;
- A desire to better connect patients, providers and health delivery organizations in the access, scheduling, referral, decision-making and management of patients health and care needs;
- A need to better manage chronic disease across the entire population and the requirements of an aging population;
- A drive to continue to transform health care delivery and management to enable a financially sustainable and well-resourced health care system;
- mHealth service integration and ageing Societies;
- The need for competent workforce to support standards development, implementation, operation and use;
- Internet of Things / Internet of Medical / Internet of Healthcare Things;
- Cloud Computing;
- Genomics;
- Cyber-security, privacy, security, "ransom ware".

6.7.2.ETSI/EP eHealth

General information			
Committee	**ETSI/EP eHealth**	**Title**	**ETSI Project (EP) eHEALTH**
Creation date	2007	**MEMBERS** 	25 member organizations of ETSI
Chairperson	Mr. Suno Wood		
Organizations in liaison	CEN, CENELEC, CEPT, Contuinua Health Alliance, ECC, TIA, TTA		
Web site	https://portal.etsi.org/ehealth		
Scope	EP eHEALTH shall have primary responsibility: - To collect and define the Health ICT related requirements from relevant stakeholders and to input the requirements to the concerned ETSI Technical Bodies; - To identify gaps, where existing ETSI standards do not fulfil the Health ICT requirements, and suggest further standardization activities to fill those gaps; - To develop Health ICT related deliverables in all areas not covered by existing system specific and horizontal Technical Bodies or other SDO; - To ensure the co-ordination of Health ICT related activities with the relevant ETSI Technical Bodies in order to avoid duplication of effort and deliverables; - To ensure that activities within EP eHEALTH are coordinated with other European and International Standards making bodies to avoid duplication of effort and deliverables; - To co-ordinate ETSI positions on Health ICT related issues and represent ETSI externally.		
Structure	/		
Standardization work			
Published standards	2		
Standards under development	2		
Involvement of Luxembourg			
NO (no registered Luxembourgish organization)			
Comments			

EP eHEALTH should form the 'horizontal' nucleus for the co-ordination of ETSI's activities in the Health ICT domain. EP eHEALTH will work in close co-operation with all relevant TCs, EPs and SCs within ETSI, 3GPP, and others. Vital aspects to be considered by EP eHealth are: security of systems and data, quality of services, interoperability and validation by testing, usability.

As well as making standards, EP eHEALTH performs other valuable roles. It gathers analyses and disseminates information. For example, from time to time it makes its work available to a wider audience at workshops which are open to both members and non-members of ETSI.

EP eHEALTH coordinates ETSI's activities in the health information and communications technologies domain and works in close co-operation with relevant ETSI committees, as well as with the Third Generation

Partnership Project (3GPP™) and other organizations outside ETSI. In this way it helps to reduce the possibility of conflict or duplication of effort.

EP eHEALTH is developing use cases for eHealth standards with a view to identifying gaps in standardization (project TR 103 477). It is looking at eHealth in relation to the IoT and M2M, and it is addressing wider societal issues including security and privacy. It is also compiling a glossary of terms to clarify the vocabulary used for eHealth (project DEG/eHEALTH-006).

6.7.3.CEN/TC 251

General information			
Committee	**CEN/TC 251**	**Title**	**Health Informatics**
Creation date	1990	**MEMBERS** 	34 members of CEN/CENELEC
Secretariat	NEN (Netherlands)		
Secretary	Mrs. Shirin Golyardi		
Chairperson	Mr. Robert Stegwee		
Organizations in liaison	COCIR, EC, GS1, HL7, EN13606 Association		
Web site	http://standards.cen.eu/dyn/www/f?p=204:7:0::::FSP_ORG_ID:6232&cs=18CA078392807EDD402B798AAEF1644E1		
Scope	Standardization in the field of Health Information and Communications Technology (ICT) to achieve compatibility and interoperability between independent systems and to enable modularity. This includes requirements on health information structure to support clinical and administrative procedures, technical methods to support interoperable systems, as well as requirements regarding safety, security and quality.		
Structure	CEN/TC 251/WG 1 Enterprise and Information CEN/TC 251/WG 2 Technology and Applications		
Standardization work			
Published standards	106		
Standards under development	27		
Involvement of Luxembourg			
NO (no registered delegate)			
Comments			

The CEN/TC 251 Health Informatics participates in the development of ISO standards (transposing them into European Standards) in areas where there is specific need and in doing so ensure they meet European requirements. Where necessary it may develop European standards to address regional legislative demands. For example, the existing success which has seen Identification of Medicinal Products (IDMP) be adopted after the EU initiative, and seed-corn resource; which has shown active collaboration between regulators, industry and other SDO's such as HL7 on the 'Individual case safety reporting' and the input to the EU OpenMedicine project.

Specifically, CEN/ TC 251 works in and around EU Directives as there is great need for this in European healthcare enterprises, and these Directives differentiate CEN/TC 251 work and should characterize its contribution to the member states.

6.8. FINTECH

Fintech, or Financial Technologies, can be defined as "finance at the crossroads with IT", as stated by Mr. Pierre Gramegna, Luxembourg Finance Minister, during the 2015 ALFI Global Distribution conference. For the Wharton Business School, it represents "an economic industry composed of companies that use technology to make financial systems more efficient"

Whatever the definition, it is currently a topic at the top of the agenda in Luxembourg since Fintech are foreseen to rethink the traditional financial sector by exploiting the potential of new technologies. In the standards analysis, this subsector encompasses standardization aspects of both "traditional" financial technologies and more disrupted ones like with the recently created technical committee on Blockchains and Distributed Ledger Technologies.

6.8.1.ISO/TC 68

General information			
Committee	**ISO/TC 68**	**Title**	**Financial services**
Creation date	1948	**MEMBERS** 	**Participating Countries (29):** United States, Australia, Austria, Bahamas, Barbados, Brazil, Bulgaria, Canada, China, Denmark, Finland, France, Germany, India, Italy, Japan, Republic of Korea, Netherlands, Nigeria, Norway, Russian Federation, Singapore, South Africa, Sweden, Switzerland, Thailand, Tunisia, Turkey, United Kingdom **Observing Countries (52):** Algeria, Angola, Argentina, Armenia, Belarus, Belgium, Botswana, Chile, Colombia, The Democratic Republic of Congo, Croatia, Cuba, Cyprus, Czech Republic, Côte d'Ivoire, Egypt Hong Kong, Hungary, Iceland, Islamic Republic of Iran, Ireland, Kazakhstan, Kenya, Lithuania, **Luxembourg**, Malawi, Malaysia, Malta, Mauritania, Mauritius, Republic of Moldova, Mongolia, Montenegro, Mozambique, Namibia, Pakistan, Philippines, Poland, Portugal, Romania, Serbia, Seychelles, Slovakia, Spain, Sri Lanka, Swaziland, United Republic of Tanzania, Ukraine, Zambia, Zimbabwe
Secretariat	ANSI (United States)		
Secretary	Ms. Janet Busch		
Chairperson	Ms. Karla McKenna		
Organizations in liaison	ANNA, ECB, EPC, GLEIF, MasterCard, SWIFT, UN/ECE CEFACT, VISA, EDM Council, BIAN		
Web site	https://www.iso.org/committee/49650.html		
Scope	Standardization in the field of banking, securities and other financial services.		
Structure	ISO/TC 68/CAG — Chairman's advisory group ISO/TC 68/AHG 1 — Industry engagement ISO/TC 68/TAG 1 — Fintech Technical Advisory Group ISO/TC 68/AG 2 — Standards Advisory Group ISO/TC 68/SG 4 — Communications ISO/TC 68/WG 5 — ISO 20022 Semantic Models ISO/TC 68/WG 8 — Entity Legal Forms ISO/TC 68/SC 2 — Financial Services, security ISO/TC 68/SC 4 — Securities and related financial instruments ISO/TC 68/SC 7 — Core banking		
Standardization work			
Published standards	Number of published ISO/IEC standards under the direct responsibility of ISO/TC 68 (number includes updates): 9		
Standards under development	2		
Involvement of Luxembourg			
NO (no registered delegate)			

Comments

ISO/TC 68 is the ISO committee primarily designated to develop standards and technical reports for the financial services businesses and their transactions. Financial services include depository institutions (which traditionally are recognized as financial institutions), non-depository institutions (or finance companies), consumer and commercial lenders that raise funds in the capital markets, the buy and sell side of the securities markets, private equity firms, mutual fund complexes, central banks, electronic clearing networks and other financial intermediaries, as well as mortgage and insurance companies.

TC 68 standards encompass a variety of financial products and services. Generally these services fall into the following categories:

- Banking (Retail, Commercial and Wholesale) or depository and financial transaction based services and Consumer credit products and services (both addressed through the work of TC 68/SC 7);
- Securities and other financial instruments (addressed through the work of TC 68/SC 4);
- The standardized protection and development of security tools for transacting financial services business (addressed through the work of TC 68/SC 2);
- Additionally, at the TC 68 level, covering the broader scope of financial services, the further development and maintenance of the ISO 20022 Universal Financial Industry Message Scheme standard is managed, as well as the ISO 17442 Legal Entity Identifier– (LEI) standard.

6.8.2.ISO/TC 68/SC 2

General information			
Committee	**ISO/TC 68/SC 2**	**Title**	**Financial Services, security**
Creation date	1981	**MEMBERS** 	**Participating Countries (18):** United Kingdom, Australia, Bulgaria, Canada, China, Denmark, France, Germany, India, Italy, Japan, Republic of Korea, Netherlands, Norway, South Africa, Sweden, Switzerland, United States **Observing Countries (21):** Argentina, Austria, Belgium, Brazil, Colombia, Cyprus, Czech Republic, Finland, Ireland, Kenya, Lithuania, Mauritania, Poland, Portugal, Romania, Russian Federation, Serbia, Singapore, Slovakia, Spain, Ukraine
Secretariat	BSI (United Kingdom)		
Secretary	Ms. Sarah Horsfield		
Chairperson	Mr. Kim Wagner		
Organizations in liaison	EPC, MasterCard, SWIFT, VISA, ETSI		
Web site	https://www.iso.org/committee/49670.html		
Scope	TC 68/SC 2 develops and maintains standards for the protection of financial services transactions, systems and data. It is an important resource to ISO TC 68, providing security input on other TC68 standards.		
Structure	ISO/TC 68/SC 2/SG 1 Third party providers (TPPs) ISO/TC 68/SC 2/AHG 4 Security aspects of digital currencies ISO/TC 68/SC 2/WG 8 Public key infrastructure management for financial services ISO/TC 68/SC 2/WG 11 Encryption algorithms used in banking applications ISO/TC 68/SC 2/WG 13 Security in retail banking		
Standardization work			
Published standards	Number of published ISO/IEC standards under the direct responsibility of ISO/TC 68/SC 2 (number includes updates): 18		
Standards under development	9		
Involvement of Luxembourg			
1 delegate - Mr. Enrico Ozzano BIL S.A.			
Comments			
Areas of focus for TC 68/SC 2 are: - Data security; - Data privacy; - Access and entitlement; - Requirements for cloud computing.			

6.8.3.ISO/TC 68/SC 4

General information			
Committee	**ISO/TC 68/SC 4**	**Title**	**Securities and related financial instruments**
Creation date	1980	**MEMBERS** 	**Participating Countries (23):** Switzerland, Australia, Belgium, Brazil, Canada, China, Denmark, France, Germany, India, Italy, Japan, Republic of Korea, **Luxembourg**, Netherlands, Norway, Russian Federation, South Africa, Spain, Sweden, Turkey, United Kingdom, United States **Observing Countries (16):** Argentina, Austria, Belarus, Bulgaria, Colombia, Cyprus, Czech Republic, Finland, Iceland, Kenya, Poland, Romania, Serbia, Singapore, Slovakia, Ukraine
Secretariat	SNV (Switzerland)		
Secretary	Mrs. Marie-Josée Fahrni		
Chairperson	Mr. Arno Wilhelm		
Organizations in liaison	ANNA, CLEARSTREAM, EC, ECB, EUROCLEAR, FIX Trading Community, ISDA, ISITC, SWIFT		
Web site	https://www.iso.org/committee/49690.html		
Scope	The mission of TC 68/SC 4 is to support securities industry processes by developing new standards or adapting the existing standards to new requirements.		
Structure	ISO/TC 68/SC 4/CAG Chairman Advisory Group ISO/TC 68/SC 4/SG 1 Identification of financial instruments ISO/TC 68/SC 4/WG 6 Classification of financial instruments ISO/TC 68/SC 4/WG 14 Financial Instrument Short Name and Abbreviations		
Standardization work			
Published standards	Number of published ISO/IEC standards under the direct responsibility of ISO/TC 68/SC 4 (number includes updates): 12		
Standards under development	2		
Involvement of Luxembourg			
1 delegate - Mr. Bernard Lenelle Clearstream Banking S.A.			
Comments			
A key standardization area for TC 68/SC 4 is identification of counterparties, securities, trading venues, etc. in securities transactions. It is currently developing two standards: - ISO/AWI 10962 (revision), Securities and related financial instruments -- Classification of financial instruments (CFI code); - ISO/CD TR 21797, Securities and related financial instruments -- Landscape of identification of financial instruments.			

6.8.4.ISO/TC 68/SC 7

General information			
Committee	**ISO/TC 68/SC 7**	**Title**	**Core banking**
Creation date	2004	**MEMBERS** 	**Participating Countries (24):** France, Australia, Austria, Brazil, Bulgaria, Canada, China, Denmark, Ecuador, Finland, Germany, India, Italy, Japan, Republic of Korea, Netherlands, Norway, Russian Federation, South Africa, Spain, Sweden, Switzerland, United Kingdom, United States **Observing Countries (18):** Argentina, Belgium, Colombia, Croatia, Cyprus, Czech Republic, Hungary, Iceland, Ireland, Kenya, Lithuania, **Luxembourg**, Malta, Poland, Romania, Serbia, Slovakia, Ukraine
Secretariat	AFNOR (France)		
Secretary	Mr. Clément Chevauché		
Chairperson	Mr. Patrice Hertzog		
Organizations in liaison	ECB, EPC, IFX, ITU, MasterCard, SWIFT, VISA, W3C, Nexo, CI		
Web site	https://www.iso.org/committee/365812.html		
Scope	SC7 is responsible for standardization in the field of core banking including banking functions, customer to bank interfaces, deposit taking, lending, account maintenance and payments. Standards relative to payment instruments address operations from payment initiation through clearing of payment instructions and reporting. They include the financial operations via card and other digital media used for electronic financial services.		
Structure	ISO/TC 68/SC 7/TG 1 Cards standards ISO/TC 68/SC 7/SG 2 Third party providers ISO/TC 68/SC 7/WG 10 Mobile Banking / Payments ISO/TC 68/SC 7/WG 12 Currency codes ISO/TC 68/SC 7/WG 13 Second tier registry for digital currency codes ISO/TC 68/SC 7/WG 14 Description of banking products		
Standardization work			
Published standards	Number of published ISO/IEC standards under the direct responsibility of ISO/TC 68/SC 7 (number includes updates): 12		
Standards under development	6		
Involvement of Luxembourg			
2 delegates - Mr. Enrico Ozzano BIL S.A. - Mr. Jean-Pierre Borsa ABBL A.s.b.l.			
Comments			
Areas of focus for TC 68/SC 7 are: - Card Payments: In the framework of ISO 8583 series (Financial transaction card originated messages -			

- Interchange message specifications), TC 68/SC 7 has created a technical group (TG 1) on Cards Standards. This group ensures a liaison between existing standards and ISO 20022 implementation (managed under TC68).
- Mobile Financial Services: TC 68/SC 7 is addressing the following areas for Mobile Financial Services to produce standards that will enable implementations on mobile devices: security and data protection, provisioning and life cycle management of financial applications, person-to-person payments, person-to-business payments and banking services.
- Consumer data and privacy issues: TC 68/SC 7 has developed ISO 22307:2008 Financial services – Privacy impact assessment which provides normative requirements and informative guidance for developing a PIA for either a new financial information system or changes to an existing financial information system.

TC 68/SC 7 is currently developing:

- The series of standards ISO 12812 (5 parts) for Mobile financial services;
- The standard ISO 21586, Specification of description for banking product.

6.8.5.ISO/TC 307

General information			
Committee	**ISO/TC 307**	**Title**	**Blockchain and electronic distributed ledger technologies**
Creation date	2016	**MEMBERS** 	**Participating Countries (16):** Australia, Austria, Canada, China, Denmark, Finland, France, Germany, Italy, Japan, Republic of Korea, Malaysia, Norway, Russian Federation, United Kingdom, United States **Observing Countries (17):** Argentina, Belgium, Czech Republic, Hong Kong, Indonesia, Islamic Republic of Iran, Ireland, Israel, **Luxembourg**, Netherlands, Singapore, Slovakia, South Africa, Spain, Sweden, Switzerland, Thailand
Secretariat	SA (Australia)		
Secretary	Ms. Jo-Ellen Courtney		
Chairperson	Vacant		
Organizations in liaison	/		
Web site	https://www.iso.org/committee/6266604.html		
Scope	Standardization of blockchains and distributed ledger technologies to support interoperability and data interchange among users, applications and systems.		
Structure	/		
Standardization work			
Published standards	0		
Standards under development	0		
Involvement of Luxembourg			

3 delegates

- Mr. Christophe Delogne — KPMG Luxembourg S.à r.l.
- Mr. Sankalp Ghatpande — itrust consulting S.à r.l.
- Mr. Benoit Bertholon — COINPLUS S.A.

Comments

ISO/TC 307 has been established by the ISO Technical Management Board in September 2016 and is still under construction. The first meeting of the committee will take place in April 2017.

The provisional program of work of ISO/TC 307 considers the following key areas:

- Terminology - Developing a common language and terminology to define the interoperability of blockchain.
- Process and Methods - Developing the mechanisms and messaging standards around interblockchain communication including routing.
- Trust and Interoperability - Developing standards that incorporate messaging protocols and methods to route, trust and connect to different blockchains. Establishing a standard API (Application Programming Interface) and set of routines and tools for building blockchain software and applications.
- Privacy and Security - Developing standards to ensure that the confidentiality, integrity and availability

of users and entities are maintained. Embed compliance to money laundering and Know Your Customer (KYC) requirements.

- Authentication - Mechanisms to map blockchain transactions to individual users and entities in a secure manner. Store credentials on the blockchain or align/federate to a sidechain (off blockchain).

6.9. GREEN ICT & DATA CENTERS

Green ICT focuses from one side on the ability to reduce the environmental impact of IT (hardware and software) throughout its life cycle. It addresses waste associated with the use of hardware and software and energy consumption. From the other side, it concerns the development and use of information systems to reduce the environmental impact (e.g. energy savings) of products and services that require IT.

The standards analysis particularly addresses Green ICT related to Data Centers, in relation with the great position of Luxembourg in this area. Indeed, the country boasts one of the most modern data center parks in Europe and has around 20 data centers in operation and is now a leading data center marketplace with one of the highest data center densities in Europe and the world[111]. In the frame of the report, Data center is defined as "a structure, or group of structures, dedicated to the centralized accommodation, interconnection and operation of information technology and network telecommunications equipment providing data storage, processing and transport services together with all the facilities and infrastructures for power distribution and environmental control together with the necessary levels of resilience and security required to provide the desired service availability"[112].

[111] https://ict.investinluxembourg.lu/why-luxembourg/ict-luxembourg/data-centres-ecosystems
[112] International Standard ISO/IEC 30134-1:2016, Information Technology -- Data Centres -- Key performance indicators -- Part 1: Overview and general requirements [developed by ISO/IEC JTC 1/SC 39]

6.9.1.ISO/IEC JTC 1/SC 39

<table>
<tr><th colspan="4">General information</th></tr>
<tr><td>Committee</td><td>ISO/IEC JTC 1/SC 39</td><td>Title</td><td>Sustainability for and by Information Technology</td></tr>
<tr><td>Creation date</td><td>2012</td><td rowspan="5">MEMBERS
  </td><td rowspan="5">Participating Countries (17):
United States, Belgium, Canada, China, Finland, France, Germany, Italy, Japan, Republic of Korea, Luxembourg, Netherlands, Norway, Russian Federation, Singapore, South Africa, United Kingdom

Observing Countries (10):
Argentina, Australia, Austria, Czech Republic, Islamic Republic of Iran, Ireland, Kenya, Poland, Spain, Switzerland</td></tr>
<tr><td>Secretariat</td><td>ANSI (USA)</td></tr>
<tr><td>Secretary</td><td>Ms. Michelle Deane</td></tr>
<tr><td>Chairperson</td><td>Mr. Jay Taylor</td></tr>
<tr><td>Organizations in liaison</td><td>Ecma International, ITU, TGG, ETSI</td></tr>
<tr><td>Web site</td><td colspan="3">https://www.iso.org/committee/654019.html</td></tr>
<tr><td>Scope</td><td colspan="3">Standardization related to the intersection of resource efficiency and IT which supports environmentally and economically viable development, application, operation and management aspects. To avoid any duplication of work and to support innovation, SC 39 will engage in active liaison and collaboration with:

- Other JTC 1 entities;
- ISO/TC 207, ISO/TC 242, ISO/TC 257;
- IEC/TC 100, IEC/TC 108, IEC/TC 111, SMB/SG 4, IEC/PC 118, IEC/TC 57/WG 21, IEC/TC 9 and SMB/SG 3;
- ITU-T/SG 5; and
- Any other appropriate body including external organizations (e.g. consortia).</td></tr>
<tr><td>Structure</td><td colspan="3">JTC 1/SC 39/WG 1 Resource Efficient Data Centres
JTC 1/SC 39/WG 2 Green ICT</td></tr>
<tr><th colspan="4">Standardization work</th></tr>
<tr><td>Published standards</td><td colspan="3">Number of published ISO/IEC standards under the direct responsibility of JTC 1/SC 39 (number includes updates): 6</td></tr>
<tr><td>Standards under development</td><td colspan="3">12</td></tr>
<tr><th colspan="4">Involvement of Luxembourg</th></tr>
<tr><td colspan="4">9 delegates

- Mr. Didier Monestes (Chairman) Systemic Area Network S.à r.l.
- Mr. Bruno Fery EBRC S.A.
- Mr. Antoine François EBRC S.A.
- Mr. Sébastien Renauld EBRC S.A.
- Mr. Sébastien Richard EBRC S.A.
- Mr. Francis Gillard LOW ENERGY CONSULTING S.à.r.l.
- Mr. Valentin Plugaru University of Luxembourg
- Mr. Johnatan Pecero ANEC GIE
- Mr. Nicolas Domenjoud ANEC GIE</td></tr>
</table>

Comments

ISO/IEC JTC 1/SC 39 is focusing on the development of International Standards to use IT technology in a more sustainable manner. The subcommittee is particularly working on the optimization of data centers efficiency and on the development of solutions for the steady reduction of energy consumption of IT equipment. The SC has already published several standards:

- ISO/IEC 19395:2015, Information technology -- Sustainability for and by information technology -- Smart data centre resource monitoring and control. This International Standard provides Messages that facilitate integrated or "smart" monitoring and control of Resources in those islands;
- ISO/IEC TR 20913:2016, Information technology -- Data centres -- Guidelines on holistic investigation methodology for data centre key performance indicators;
- ISO/IEC TR 30132-1:2016, Information technology -- Information technology sustainability -- Energy efficient computing models -- Part 1: Guidelines for energy effectiveness evaluation;
- ISO/IEC 30134-1:2016, Information technology -- Data centres -- Key performance indicators -- Part 1: Overview and general requirements;
- ISO/IEC 30134-2:2016, Information Technology -- Data Centres -- Key performance indicators -- Part 2: Power usage effectiveness (PUE);
- ISO/IEC 30134-3:2016, Information Technology -- Data Centres -- Key Performance Indicators -- Part 3: Renewable Energy Factor (REF).

The current work program includes:

- ISO/AWI 21836, Information Technology -- Data Centres -- Server Energy Effectiveness Metric;
- ISO/AWI TR 21897, Information Technology -- Data Centres-- Methods and tools to assess and express energy production, storage and consumption at data centre level in reference to primary energy;
- ISO/IEC AWI TR 30131, Information technology -- Data Centres -- Taxonomy and Maturity Model;
- ISO/IEC WD TR 30132-2, Information technology -- Information technology sustainability -- Energy efficient computing models -- Part 2: Application guidelines of energy efficient evaluation methodology;
- ISO/IEC NP TR 30132-3, Information technology -- Information technology sustainability -- Energy efficient computing models -- Part 3: Development guidelines of energy efficiency evaluation;
- ISO/IEC PDTR 30133, Information technology -- Data Centres -- Guidelines for resource efficient data centres
- ISO/IEC DIS 30134-4, Information Technology -- Data Centres -- Key performance indicators – Part 4: IT Equipment Energy Efficiency for Servers (ITEE);
- ISO/IEC DIS 30134-5, Information Technology -- Data Centres -- Key Performance Indicators -- Part 5: IT Equipment Utilization for Servers (ITEU_SV);
- ISO/IEC WD 30134-6, Information technology -- Data centers -- Key performance indicators -- Part 6: Energy Reuse Factor – ERF.

Moreover, JTC 1/SC 39 has recently launched new projects proposals concerning the transposition of the EN 50600 series on "Data centre facilities and infrastructures" as International Standards.

6.9.2.ETSI/TC EE

General information			
Committee	**ETSI/TC EE**	**Title**	**Environmental Engineering**
Creation date	1997	**MEMBERS** 	50 member organizations of ETSI
Chairperson	Mr. Beniamino Gorini		
Organizations in liaison	ATIS, Broadband Forum, CCSA, CEN, CENELEC, CRIP, GISFI, GSM Association, IEC, ISOC/IETF, ITU TTA		
Web site	https://portal.etsi.org/ee		
Scope	The Technical Committee EE is responsible for defining the environmental and infrastructural aspects for all telecommunication equipment and its environment, including equipment installed in subscriber premises. Wherever possible this will be achieved by references to existing international standards. The field includes: - Environmental Conditions (WG-EE1); - Power Supply, Bonding and related topics (WG-EE2); - Mechanical Structure and Physical design of equipment and structures; - Environmental affairs (WG-EEPS); - Environmental matters associated with Mobile ICT devices (WG M-ICT).		
Structure	ETSI TC EE/WG EE 1 ETSI TC EE/WG EE2 ETSI TC EE/WG EE M-ICT ETSI TC EE/WG EEPS	Environmental Condition Power supply Environmental matters associated with Mobile ICT Devices Eco Environmental Product Standards Group	
Standardization work			
Published standards	176		
Standards under development	32		
Involvement of Luxembourg			
NO (no registered Luxembourgish organization)			
Comments			
The main standards produced and maintained by EE are: - EN 300 019 series: Environmental conditions and Environmental tests for telecommunications equipment; - EN 300 132 series; Power supply interface at the input to telecommunications equipment; - EN 300 119 series: European telecommunication standard for equipment practice; - EN 300 253: Earthing and bonding configuration inside telecommunications centres. For the Mandate M/544, ETSI/TC EE plans to complete quickly a new EN on networked standby mode for household and office equipment (Project EN 303 423). It will also define the standardization program on material efficiency in support of M/543, with the aim of publishing all the required standards by 2018.			

6.9.3.CENELEC/TC 215

General information			
Committee	**CLC/TC 215**	**Title**	**Electrotechnical aspects of telecommunication equipment**
Creation date	1991	**MEMBERS** 	34 members of CEN/CENELEC
Secretariat	Germany		
Secretary	Dipl. Ing. Thomas Wegmann		
Chairperson	Mr. Mike Gilmore		
Organizations in liaison	EC, EURALARM		
Web site	http://www.cenelec.eu/dyn/www/f?p=104:7:127814256114401::::FSP_ORG_ID:1258297		
Scope	The priorities of CLC/TC 215 are: - To address standardization in the field of electrotechnical aspects of telecommunication equipment and associated infrastructures and liaise with other standardization bodies as appropriate; - To prepare harmonized standards (EN, TS or TR) covering all aspects of generic and application-specific telecommunications cabling (e.g. ISDN, LAN and others) within all types of premises; - These documents also cover the requirements and recommendations for building infrastructures related to the effective installation and operation of associated telecommunication equipment by reference to the existing or forthcoming standards provided by the relevant committees or using technical inputs from them; - To provide contributions to ETSI standards (EN and/or other deliverables) in areas related to those detailed above; - To serve as a mediator in those cases where in accordance with the CENELEC-ETSI-Agreement ETSI indicates to CENELEC the need of standardization activities (EN/TS/TR or contributions to ETSI deliverables) of electrotechnical aspects related to its work; - Identification of the appropriate TC within CENELEC, thereby providing proper assignment of the technical work to the responsible group of experts; - Where an appropriate TC within CENELEC cannot be identified, TC 215 may decide to establish a Working Group to resolve a specific task; - To review international standardization results of ISO/IEC JTC 1 as far as telecommunication equipment with respect to Customer Premises Cabling and Energy Efficient Data Centers are concerned. This includes coordination of harmonization and assignment to the responsible organization in close cooperation with CEN bearing in mind JTC 1 being a joint ISO/IEC-Committee.		
Structure	CLC/TC 215/WG 01 Cabling design CLC/TC 215/WG 01-04 Testing of installed cabling CLC/TC 215/WG 02 Cabling installation – Quality assurance and installation practices CLC/TC 215/WG 03 Facilities and infrastructures		
Standardization work			
Published standards	52		
Standards under development	2		

Involvement of Luxembourg

6 delegates

- Mr. Didier Monestes (Chairman)	Systemic Area Network S.à r.l.
- Mr. Bruno Fery	EBRC S.A.
- Mr. Antoine François	EBRC S.A.
- Mr. Sébastien Renauld	EBRC S.A.
- Mr. Sébastien Richard	EBRC S.A.
- Mr. Francis Gillard	LOW ENERGY CONSULTING S.à.r.l.

Comments

CENELEC/TC 215/WG 3 is working on energy efficient data centres in the framework mandate M/462, a specific requests from the of the European Commission in the context of the Directive 2009/125/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for the setting of ecodesign requirements for energy-related products.

CENELEC/TC 215 Working Group 3 is the competent European body to prepare European Standards in the field data centers. A liaison between CLC/TC 215 and ISO/IEC JTC 1/SC 39 was established to transpose the international standardization at the European level.

In response to expressed European market needs for a holistic set of standards addressing a variety of subjects including energy efficiency enablement, TC 215/WG 3 currently focuses on the development of series EN 50600 "Information technology - Data center facilities and infrastructures".

Series EN 50600 specifies requirements and recommendations to support the various parties involved in the design, planning, procurement, integration, installation, operation and maintenance of facilities and infrastructures within data centers. The following parts have already been published:

- EN 50600-1:2012, Information technology - Data centre facilities and infrastructures - Part 1: General concepts;
- EN 50600-2-1:2014, Information technology - Data centre facilities and infrastructures - Part 2-1: Building construction;
- EN 50600-2-2:2014, Information technology - Data centre facilities and infrastructures - Part 2-2: Power distribution;
- EN 50600-2-3:2014, Information technology - Data centre facilities and infrastructures - Part 2-3: Environmental control;
- EN 50600-2-4:2015, Information technology - Data centre facilities and infrastructures - Part 2-4: Telecommunications Cabling Infrastructure;
- EN 50600-2-5:2016, Information technology - Data centre facilities and infrastructures - Part 2-5: Security systems;
- EN 50600-3-1:2016, Information technology - Data centre facilities and infrastructures - Part 3-1: Management and operational information;
- EN 50600-4-1:2016, Information technology - Data centre facilities and infrastructures - Part 4-1: Overview and general requirements for key performance indicators (transposition from JTC 1/SC 39);
- EN 50600-4-2:2016, Information technology - Data centre facilities and infrastructures - Part 4-2: Key performance indicator PUE (transposition from JTC 1/SC 39);
- EN 50600-4-3:2016, Information technology - Data centre facilities and infrastructures - Part 4-3: Key performance indicator REF (transposition from JTC 1/SC 39);
- CLC/TR 50600-99-1:2016, Information technology - Data centre facilities and infrastructures - Part 99-1: Recommended practices for energy management.

CLC/TC 215 is currently revising EN TR 50600-99-1:2016. Moreover, ISO/IEC JTC 1/SC 39 is studying the possibility to adopt the seven first parts of EN 50600 as International Standards.

6.10. INTELLIGENT TRANSPORT SYSTEMS (ITS)

Intelligent Transport Systems (ITS) are "transport systems in which advanced information, communication, sensor, and control technologies, including the Internet, are applied to increase safety, sustainability, efficiency, and comfort"[113].

Intelligent Transport Systems (ITS) can significantly contribute to a cleaner, safer and more efficient transport system. The most important benefits from ITS are: minimize the impact of traffic on the environment, improve energy efficiency and decrease dependency on fossil fuels; reduce congestion and optimize the use of existing infrastructure; increase the use of environmental friendly transport modes; increase traffic safety and security; increase convenience of transport[114].

[113] International Standard ISO 17465-1:2014, Intelligent transport systems -- Cooperative ITS -- Part 1: Terms and definitions (developed by ISO/TC 204)
[114] CEN/TC 278 Website (http://www.itsstandards.eu/)

6.10.1. ISO/TC 204

<table>
<tr><th colspan="4">General information</th></tr>
<tr><td>Committee</td><td>ISO/TC 204</td><td>Title</td><td>Intelligent Transport Systems</td></tr>
<tr><td>Creation date</td><td>1992</td><td rowspan="5">MEMBERS
  </td><td rowspan="5">Participating Countries (29):
United States, Australia, Austria, Belarus, Belgium, Canada, China, Czech Republic, Ethiopia, France, Germany, Hungary, India, Islamic Republic of Iran, Italy, Japan, Republic of Korea, Malaysia, Netherlands, New Zealand, Norway, Russian Federation, Sierra Leone, South Africa, Spain, Sweden, Switzerland, The Former Yugoslav Republic of Macedonia, United Kingdom

Observing Countries (29):
Algeria, Bulgaria, Chile, Colombia, The Democratic Republic of the Congo, Croatia, Cuba, Cyprus, Denmark, Egypt, Finland, Greece, Hong Kong, Indonesia, Ireland, Israel, Mexico, Mongolia, Montenegro, Pakistan, Philippines, Poland, Portugal, Romania, Serbia, Singapore, Slovakia, Thailand, Turkey</td></tr>
<tr><td>Secretariat</td><td>ANSI (United States)</td></tr>
<tr><td>Secretary</td><td>Mr. Adrian Guan</td></tr>
<tr><td>Chairperson</td><td>Mr. Dick Schnacke</td></tr>
<tr><td>Organizations in liaison</td><td>APEC, ETSI, IEEE, ISOC, ITU, OGC, TISA, SAE</td></tr>
<tr><td>Web site</td><td colspan="3">https://www.iso.org/committee/54706.html</td></tr>
<tr><td>Scope</td><td colspan="3">Standardization 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.</td></tr>
<tr><td>Structure</td><td colspan="3">ISO/TC 204/WG 1 Architecture
ISO/TC 204/WG 3 ITS database technology
ISO/TC 204/WG 4 Automatic vehicle and equipment identification
ISO/TC 204/WG 5 Fee and toll collection
ISO/TC 204/WG 7 General fleet management and commercial/freight
ISO/TC 204/WG 8 Public transport/emergency
ISO/TC 204/WG 9 Integrated transport information, management and control
ISO/TC 204/WG 10 Traveller information systems
ISO/TC 204/WG 14 Vehicle/roadway warning and control systems
ISO/TC 204/WG 16 Communications
ISO/TC 204/WG 17 Nomadic Devices in ITS Systems
ISO/TC 204/WG 18 Cooperative systems</td></tr>
<tr><th colspan="4">Standardization work</th></tr>
<tr><td>Published standards</td><td colspan="3">229</td></tr>
<tr><td>Standards under development</td><td colspan="3">103</td></tr>
<tr><th colspan="4">Involvement of Luxembourg</th></tr>
<tr><td colspan="4">NO (no registered delegate)</td></tr>
</table>

Comments

ISO/TC 204 is responsible for the overall system aspects and infrastructure aspects of intelligent transport systems (ITS), as well as the coordination of the overall ISO work program in this field including the schedule for standards development, taking into account the work of existing international standardization bodies.

ISO/TC 204's objectives are:

- Elaboration of standards deliverables to provide architecture, taxonomy, terminology, data and general technology support framework for ITS development and integration;
- Elaboration of standards enabling the interchangeability and interoperability of media-specific map databases and other location-related information; and for consistent location referencing across systems and databases;
- Elaboration of standards for automatic vehicle and equipment identification;
- Elaboration of standards for secure interoperable transactions and money flow management in multioperator services (road toll collection, public transport fare collection, other paying services);
- Elaboration of standards to facilitate the movement of people and freights across national boundaries and across multiple transport modes;
- Elaboration of standards for commercial (freight and public transport) in-vehicle information exchange with multiple types of onboard equipment;
- Elaboration of standards addressing the intermodal handling of freight;
- Elaboration of standards for message sets and protocols for the connection of traffic management centers with field equipment and other traffic management centers; and for the connection of multiple kinds of centers (traffic management, public transport management, emergency response, rail operations, etc.) with one another;
- Elaboration of standards for Reference Data Models to allow easy exchange of information between different applications (for example for Public transport Management applications);
- Elaboration of standards for message sets and protocols for the delivery of traffic and other travel related information from public and private information gathering facilities to public and private information dissemination facilities;
- Elaboration of standards for the performance of driver assistance systems which interact with the vehicle's environment; for related sensing devices; and for the reliable integration of multiple driver assistance functions;
- Elaboration of standards for message sets and protocols for wireless communications to and from vehicles and portable devices for:
    - Traffic and traveler information and other wireless ITS services to vehicles,
    - Fleet management,
    - Emergency notification and response,
    - Electronic toll collection / road use charging,
    - Commercial vehicle border crossing, load monitoring (especially hazardous cargo), safety monitoring, and credentials verification;
- Elaboration of standards for the operating characteristics and human-machine interfaces of ITS systems that are not entirely self-contained in road vehicles[115].

A detailed summary of ITS Standardization Activities of ISO/TC 204 has recently been published by the committee and is available on http://isotc.iso.org/livelink/livelink/Open/17874359.

[115] Source: ISO/TC 204 Business Plan

6.10.2. ETSI/TC ITS

General information			
Committee	**ETSI/TC ITS**	**Title**	**Intelligent Transport Systems**
Creation date	2007	**MEMBERS** 	117 member organizations of ETSI
Chairperson	Mr. Andersen Niels Peter Skov		
Organizations in liaison	APT, ARIB, CCC, CCSA, CEN, CENELEC, CEPT, ECC, ENISA, ERA, ERTICO, IEEE, IPv6 Forum, ISO, ISOC/IETF, ITU, OST-R, SAE International, TISA, TTA, TTC, UNECE		
Web site	http://portal.etsi.org/portal/server.pt/community/ITS		
Scope	TC ITS is responsible for the development and maintenance of Standards, Specifications and other deliverables to support the development and implementation of ITS Service provision across the network, for transport networks, vehicles and transport users, including interface aspects and multiple modes of transport and interoperability between systems, but not including ITS application standards, radio matters, and EMC. Scope includes communication media, and associated physical layer, transport layer, network layer, security, lawful intercept and the provision of generic web services.		
Structure	ETSI/TC ITS/WG 1 Application Requirements and Services ETSI/TC ITS/WG 2 Architecture and Cross Layer ETSI/TC ITS/WG 3 Transport and Network ETSI/TC ITS/WG 4 Media and Medium Related ETSI/TC ITS/WG 5 Security		
Standardization work			
Published standards	182		
Standards under development	58		
Involvement of Luxembourg			
1 company - FBConsulting S.A.R.L.			
Comments			
ETSI produces globally-applicable standards for ICT. In the area of ITS, these standards are complementary to the ones produced by CEN/TC 278; together they form a coherent set of ITS standards for Europe. ETSI/TC ITS is playing a leading role at the global level, accelerating the introduction of ITS services and applications. The current key focus is on Co-operative ITS (C-ITS), which enable vehicles made by different manufacturers to communicate with each other and with road infrastructure systems to help prevent traffic accidents.			

6.10.3. CEN/TC 278

General information			
Committee	**CEN/TC 278**	**Title**	**Intelligent transport systems**
Creation date	1991	**MEMBERS** 	34 members of CEN/CENELEC
Secretariat	NEN (Netherlands)		
Secretary	Mr. Maarten Peelen		
Chairperson	Mr. Lex Eggink		
Organizations in liaison	ETSI, ISO		
Web site	http://standards.cen.eu/dyn/www/f?p=204:7:0::::FSP_ORG_ID:6259&cs=1EA16FFFE1883E02CD366E9E7EADFA6F7		
Scope	Standardization in the field of telematics to be applied to road traffic and transport, including those elements that need technical harmonization for intermodal operation in the case of other means of transport. It shall support amongst others: vehicle, container, swap body and goods wagon identification; communication between vehicles and road infrastructure; communication between vehicles; vehicle man machine interfacing as far as telematics; traffic and parking management; user fee collection; public transport management; user information.		
Structure	CEN/TC 278/WG 1 — Electronic fee collection and access control (EFC) CEN/TC 278/WG 2 — Freight, Logistics and Commercial Vehicle Operations CEN/TC 278/WG 3 — Public transport (PT) CEN/TC 278/WG 4 — Traffic and traveller information (TTI) CEN/TC 278/WG 5 — Traffic control (TC) CEN/TC 278/WG 7 — ITS spatial data CEN/TC 278/WG 8 — Road traffic data (RTD) CEN/TC 278/WG 9 — Dedicated Short Range Communication (DSRC) CEN/TC 278/WG 10 — Man-machine interfaces (MMI) CEN/TC 278/WG 12 — Automatic Vehicle Identification and Automatic Equipment Identification (AVI/AEI) CEN/TC 278/WG 13 — Architecture and terminology CEN/TC 278/WG 14 — After theft systems for the recovery of stolen vehicles CEN/TC 278/WG 15 — eSafety CEN/TC 278/WG 16 — Cooperative ITS CEN/TC 278/WG 17 — Urban ITS		
Standardization work			
Published standards	146		
Standards under development	51		
Involvement of Luxembourg			
NO (no registered delegate)			
Comments			
CEN/TC 278's vision statement for ITS standardization in Europe in the first quarter of the twenty-first century			

is: "To provide a family of Standards and related specifications, interoperable on a pan-European basis, that will enable services to be provided to travelers (be they drivers, pedestrians or users of public transport); to provide services to transport and highway managers and operators; to commercial fleet managers and commercial service providers, utilizing information technology to maximize efficiency, safety and the quality of service provided. To ensure that by co-operating in international standardization, International Standards provide the best solutions for European stakeholders."

Based on the considerations above, CEN/TC 278 proposes the following objectives and strategic directions for its future work:

- Electronic fee collection and access control;
- Automatic vehicle and equipment identification;
- Freight and fleet management;
- Telematics in public transport;
- Road and traffic data;
- Parking systems;
- Human-machine interfaces;
- Architecture and terminology;
- Recovery of stolen vehicles;
- eSafety;
- Cooperative ITS.

CEN/TC 278 is notably developing standards in support of M/453. This work covers a variety of aspects including Cooperative systems, travel and traffic information, route guidance and navigation, public transport and emergency vehicles. Standards for electronic fee collection are developed in response to M/338.

In 2017, CEN will update its existing standards on eCall, the in-vehicle emergency call service, and will develop a Technical Specification to include heavy goods vehicles. Other work will include revision of the European/ISO standard on electronic fee collection. In addition, in response to M/546, CEN and CENELEC will address location referencing harmonization, the status of mixed vendor environments traffic management systems, fault and quality standards, emissions management in urban areas and traffic management data models and infrastructure[116].

[116] Source: CEN and CENELEC Work Programme 2017

6.11. SMART CITIES

There are many definitions of a smart city and many designations that rely to the same concept. ISO/TC 268 prefers the expression "smart community infrastructure". It proposes the following definition of this concept: "a community infrastructure with enhanced technological performance that is designed, operated, and maintained to contribute to sustainable development and resilience of the community"[117].

Smart Cities have many dimensions and encompass many economic sectors and technologies. Different dimensions are proposed for a smart city (e.g.: smart economy, smart mobility, smart environment, smart people, smart living, smart governance, etc.). In this frame we can consider a smart city as a system of systems, meaning it is a complex construction that requires the development of many other technologies (e.g.: Internet of Things, Big Data, Intelligent Transport Systems, etc.).

The standardization issues are thus numerous and do not only concern ICT, which can be seen as a facilitator to help the city to become smart.

[117] *Definition available in ISO/TS 37151:2015, Smart community infrastructures -- Principles and requirements for performance metrics*

6.11.1. ISO/IEC JTC 1/WG 11

General information			
Committee	**ISO/IEC JTC 1/WG 11**	**Title**	**Smart Cities**
Creation date	2016	**MEMBERS** 	**Participating countries (23):** China, Australia, Austria, Canada, Denmark, Finland, France, Germany, India, Italy, Japan, Republic of Korea, **Luxembourg**, Mexico, Netherlands, Norway, Russian Federation, Singapore, Slovenia, Spain, Sweden, United Kingdom, United States
Secretariat	SAC (China)		
Secretary	Ms. Tangli Liu		
Chairperson	Mr. Heng Qian		
Organizations in liaison	ITU-T, OGC, TM Forum, CEN/CENELEC/ETSI SSCC-CG, International TC on IoT and Smart City Framework, IEEE, INCOSE		
Web site	http://isotc.iso.org/livelink/livelink/open/jtc1wg11		
Scope	ISO/IEC JTC 1/WG 11 has the following terms of reference: - Serve as the focus of and proponent for JTC 1's Smart Cities standardization program; - Develop foundational standards for the use of ICT in Smart Cities - including the Smart City ICT Reference Framework and an Upper Level Ontology for Smart Cities - for guiding Smart Cities efforts throughout JTC 1 upon which other standards can be developed; - Develop a set of ICT related indicators for Smart Cities in collaboration with ISO/TC 268; - Develop additional Smart Cities' standards and other deliverables that build on these foundational standards; - Identify JTC 1 (and other organization) subgroups that are developing standards and related material that contribute to Smart Cities, and where appropriate, investigate ongoing and potential new work that contributes to Smart Cities; - Develop and maintain liaisons with all relevant JTC 1 subgroups; - Engage with the community outside of JTC 1 to grow the awareness of, and encourage engagement in, JTC 1 Smart Cities standardization efforts within JTC 1, forming liaisons as is needed; - Ensure a strong relationship with Smart Cities activities in ISO and IEC.		
Structure	/		
Standardization work			
Published standards	Number of published ISO/IEC standards under the direct responsibility of JTC 1/WG 11 (number includes updates): 0		
Standards under development	4		
Involvement of Luxembourg			
3 delegates - Mr. Johnatan Pecero ANEC GIE - Mr. Nicolas Domenjoud ANEC GIE - Mr. José Garcia Saez Wizata S.A.			

Comments

The creation of ISO/IEC JTC 1/WG 11 "Smart Cities" was decided in 2015 during the ISO/IEC JTC 1 Plenary Meeting and approved in March 2016.

The working group has already approved two first projects of International Standards:

- ISO/IEC AWI 30145, Smart city ICT reference framework. This project divided into three parts would help in the management of a smart city from the viewpoint of a city CIO:
    - ISO/IEC 30145-1, Smart City ICT Reference Framework- Part 1: Smart City Business Process Framework,
    - ISO/IEC 30145-2, Smart City ICT Reference Framework- Part 2:Smart City Knowledge Management Framework,
    - ISO/IEC 30145-3, Smart City ICT Reference Framework- Part 3: Smart City Engineering Framework;
- ISO/IEC AWI 30146, Smart city ICT indicators. This project is to develop an evaluation indicator system and an evaluation model of Smart City from the ICT perspective to help the stakeholders to measure the process and outcome of Smart City construction.

Moreover, another project under the direct responsibility of ISO/IEC JTC 1 is currently under development: ISO/IEC FDIS 30182, Smart city concept model -- Guidance for establishing a model for data interoperability.

6.11.2. ISO/TC 268

General information			
Committee	**ISO/TC 268**	**Title**	**Sustainable Cities and communities**
Creation date	2012	**MEMBERS** 	**Participating countries (29):** France, Austria, Barbados, Canada, Chile, China, Czech Republic, Denmark, Ecuador, Egypt, Germany, India, Israel, Japan, Kazakhstan, Kenya, Mauritius, Mexico, Netherlands, Norway, Russian Federation, Serbia, South Africa, Spain, Sri Lanka, Sweden, United Kingdom, United States, Viet Nam **Observing Countries (22):** Argentina, Belgium, Brazil, Colombia, Cyprus, Finland, Islamic Republic of Iran, Republic of Korea, Lebanon, **Luxembourg**, Macao, Malaysia, Mongolia, Poland, Portugal, Senegal, Singapore, Switzerland, Thailand, Trinidad and Tobago, Turkey, United Arab Emirates
Secretariat	AFNOR (France)		
Secretary	Mr. Etienne Cailleau		
Chairperson	Mr. Bernard Gindroz		
Organizations in liaison	FIDIC, GCIF, ICLEI, UNEP, UNISDR, APEC		
Web site	https://www.iso.org/committee/656906.html		
Scope	Standardization in the field of Sustainable Cities and Communities will include the development of requirements, frameworks, guidance and supporting techniques and tools related to the achievement of sustainable development considering smartness and resilience, to help all Cities and Communities and their interested parties in both rural and urban areas become more sustainable. Note: TC 268 will contribute to the UN Sustainable Development Goals through its standardization work The proposed series of International Standards will encourage the development and implementation of holistic and integrated approaches to sustainable development and sustainability.		
Structure	ISO/TC 268/CAG 1 Chairman Advisory Group ISO/TC 268/TG 1 Awareness-raising, communication and promotion ISO/TC 268/WG 1 Management System Standards ISO/TC 268/WG 2 City indicators ISO/TC 268/WG 3 Vocabulary ISO/TC 268/WG 4 Strategies for smart cities and communities ISO/TC 268/SC 1 Smart community infrastructures		
Standardization work			
Published standards	Number of published ISO/IEC standards under the direct responsibility of ISO/TC 268 (number includes updates): 6		
Standards under development	7		

Involvement of Luxembourg

3 delegates

- Mr. Claudio Fiandrino University of Luxembourg
- Mr. Falk Fernbach Sustain S.A.
- Ms. Sahra Rezgui Sustain S.A.

Comments

ISO/TC 268 proposed series of International Standards and deliverables will make it easier to develop area-based, holistic and integrated approaches to sustainable development and resilience in communities to meet their needs and foster communication and collaboration between all interested parties at their respective levels of responsibility.

ISO/TC 268 has already published six standards:

- ISO 37100:2016, Sustainable cities and communities -- Vocabulary;
- ISO 37101:2016, Sustainable development in communities -- Management system for sustainable development -- Requirements with guidance for use;
- ISO 37120:2014, Sustainable development of communities -- Indicators for city services and quality of life;
- ISO/TR 37121:2017, Sustainable development in communities -- Inventory and review of existing indicators on sustainable development and resilience in cities;
- ISO/TR 37150:2014, Smart community infrastructures -- Review of existing activities relevant to metrics;
- ISO/TS 37151:2015, Smart community infrastructures -- Principles and requirements for performance metrics;
- ISO/TR 37152:2016, Smart community infrastructures -- Common framework for development and operation.

Standards under development:

- ISO/AWI 37104, Sustainable development in communities -- Guide to establishing strategies for smart cities and communities;
- ISO/NP 37105, Sustainable development in communities -- Descriptive framework for cities and communities;
- ISO/CP 37106, Sustainable development in communities -- Guide to establishing strategies for smart cities and communities;
- ISO/CD 37120 (revision), Sustainable development of communities -- Indicators for city services and quality of life;
- ISO/NP 37122, Sustainable development in communities -- Indicators for Smart Cities;
- ISO/NP 37123, Sustainable Development in Communities -- Indicators for Resilient Cities.

6.11.3. ISO/TC 268/SC 1

<table>
<tr><th colspan="4">General information</th></tr>
<tr><td>Committee</td><td>ISO/TC 268/SC 1</td><td>Title</td><td>Smart community infrastructures</td></tr>
<tr><td>Creation date</td><td>2012</td><td rowspan="5">MEMBERS
  </td><td rowspan="5">Participating countries (21):
Japan, Austria, Canada, Chile, China, Denmark, France, Germany, India, Republic of Korea, Mexico, Netherlands, Norway, Russian Federation, South Africa, Spain, Sri Lanka, Sweden, Ukraine, United Kingdom, United States

Observing Countries (12):
Argentina, Brazil, Czech Republic, Egypt, Finland, Islamic Republic of Iran, Malaysia, Poland, Singapore, Switzerland, Turkey, United Arab Emirates</td></tr>
<tr><td>Secretariat</td><td>JISC (Japan)</td></tr>
<tr><td>Secretary</td><td>Mr. Isao Endou</td></tr>
<tr><td>Chairperson</td><td>Dr. Yoshiaki Ichikawa</td></tr>
<tr><td>Organizations in liaison</td><td>GCIF, ITU, OECD, WBCSD</td></tr>
<tr><td>Web site</td><td colspan="3">https://www.iso.org/committee/656967.html</td></tr>
<tr><td>Scope</td><td colspan="3">Standardization in the field of smart community infrastructures, including basic concepts to define and describe smartness of community infrastructures as scalable and integrable systems, harmonized metrics for benchmarking, usage of the metrics for application to the diverse types of communities, and specifications for measurement, reporting and verification, ensuring avoidance of overlaps and contradictions with ISO/TC 268 deliverables.

The proposed standards will focus on technical aspects of community infrastructures including energy, water, transportation, waste and ICT that support the operations and activities of communities.

The concept of smartness is addressed in terms of performance relevant to technologically implementable solutions, in accordance with sustainable development in communities as elaborated in ISO/TC 268.</td></tr>
<tr><td>Structure</td><td colspan="3">ISO/TC 268/SC 1/TG 1 Roadmap
ISO/TC 268/SC 1/AHG 3 Data exchange and sharing for smart community infrastructures
ISO/TC 268/SC 1/WG 1 Infrastructure metrics
ISO/TC 268/SC 1/WG 2 Integration and interaction framework for smart community infrastructures
ISO/TC 268/SC 1/WG 3 Smart transportation</td></tr>
<tr><th colspan="4">Standardization work</th></tr>
<tr><td>Published standards</td><td colspan="3">Number of published ISO/IEC standards under the direct responsibility of ISO/TC 268/SC 1 (number includes updates): 3</td></tr>
<tr><td>Standards under development</td><td colspan="3">4</td></tr>
<tr><th colspan="4">Involvement of Luxembourg</th></tr>
<tr><td colspan="4">NO (no registered delegate)</td></tr>
</table>

Comments

ISO/TC 268/SC 1 is currently developing four International Standards related to Smart Community Infrastructures:

- ISO/DIS 37153, Smart communitiy infrastructures -- Maturity model for assessment and improvement;
- ISO/DIS 37154, Smart community infrastructures -- Best practice guidelines for transportation;
- ISO/CD 37157, Smart community infrastructures -- Smart transportation for compact cities;
- ISO/WD 37158, Smart community infrastructures -- Battery-powered bus transportation systems to solve environmental and safety issues in cities.

6.11.4. CEN/TC 247

General information			
Committee	**CEN/TC 247**	**Title**	**Building Automation, Controls and Building Management**
Creation date	1990	**MEMBERS** 	34 members of CEN/CENELEC
Secretariat	SNV (Switzerland)		
Secretary	Ms. Barbara Mullis		
Chairperson	Mr. Roland Ullmann		
Organizations in liaison	/		
Web site	http://standards.cen.eu/dyn/www/f?p=204:7:0::::FSP_ORG_ID:6228&cs=1B5974C9B3FD83E512BE27B1A4221DC20		
Scope	CEN/TC247 is responsible for the standardization of Building Automation and Controls (BAC) and Building Management (BM) including Open Data Communication for residential and non-residential buildings. These standards include the definitions, requirements, functionality and test methods of building automation products and systems for automatic control of building services installations. The primary integration measures include application interfaces, systems and services to ensure an efficient technical building management in cooperation with commercial and infrastructural building management. Excluded from this scope are areas of building automation which are under the responsibility of other CEN/CENELEC TC's.		
Structure	CEN/TC 247/WG 3 CEN/TC 247/WG 4 CEN/TC 247/WG 6	Building Automation and Control and Building Management Systems Open System Data Transmission Electronic control equipment for HVAC applications, integrated room automation, controls and management systems	
Standardization work			
Published standards	29		
Standards under development	11		
Involvement of Luxembourg			
NO (no registered delegate)			
Comments			

The structure of the CEN/TC 247 and its working group covers all the standardization needs and requirements in the field of Building Automation, Controls and Building Management.

The CEN/TC 247 has currently the following work program:

- At international level the standard series EN ISO 16484 is carried out by CEN/TC 247, ISO/TC205 "Building environment design" and ISO/TC 205/WG3 "Building control systems design". CEN/TC 247 has an efficient liaison with ISO/TC 205 and the work of both TCs is covered by the Vienna Agreement. The lead of most work items are taken by CEN;

- For standardizing in the field of Home Automation CEN/TC 247 has an efficient liaison with CENELEC/TC 205 "Home and Building Electronic Systems (HBES)" especially for Home and Building Control Networks;
- Standards for requirements of electromagnetic compatibility, electrical safety and environmental conditions in BACS and HBES have been developed by the Joint Working Group "General Technical Requirements" of CEN/TC 247 and CENELEC /TC205;
- The CEN/TC 247 standardization activities, reflecting the requirements and test set ups, especially for energy efficient products and systems, supports the European certification schema and quality assurance system of the Building Automation Industry;
- CEN/TC 247 is also strongly involved in the development of standards under the Mandate M/480 for the elaboration and adoption of standards for a methodology calculating the integrated energy performance of buildings and promoting the energy efficiency of buildings.

6.12. SMART ENERGY

The Smart Energy subsector primarily focuses on the use of ICT to automatize and optimize the production and distribution of energy, allowing from one side to better connect the demand and the supply between consumers and producers and from the other side to improve the stability and availability of energy. The main goal consists in energy savings. It covers in particular the standardization of Smart Meters and Smart Grids.

6.12.1. IEC/PC 118

General information			
Committee	**IEC/PC 118**	**Title**	**Smart grid user interface**
Creation date	2011	**MEMBERS** 	**Participating countries (18):** China, Australia, Denmark, Egypt, France, Germany, India, Italy, Japan, Republic of Korea, Norway, Poland, Russian Federation, Spain, Sweden, Switzerland, United Kingdom, United States **Observing Countries (10):** Austria, Belarus, Brazil, Canada, Czech Republic, Israel, **Luxembourg**, Malaysia, Netherlands, South Africa
Secretariat	SAC (China)		
Secretary	Mr. Like Wang		
Chairperson	Mr. Richard Schomberg		
Organizations in liaison	ITU-T		
Web site	http://www.iec.ch/dyn/www/f?p=103:7:9879105723333::::FSP_ORG_ID,FSP_LANG_ID:8701,25		
Scope	Standardization in the field of information exchange for demand response and in connecting demand side equipment and/or systems into the smart grid.		
Structure	IEC/PC 118/AG CAG Chairman's Advisory Group IEC/PC 118/WG 1 Exchange interface between demand-side smart equipment and the grid IEC/PC 118/WG 2 Power demand response		
Standardization work			
Published standards	2		
Standards under development	2		
Involvement of Luxembourg			
1 delegate - Mr. Johnatan Pecero ANEC GIE			
Comments			
IEC/PC 118 is currently developing two standards related to Smart Grids: - IEC 62746-10-1 ED1, Systems interface between customer energy management system and the power management system - Part 10-1: Open Automated Demand Response; - IEC 62939-3 ED1, Smart grid user interface - Part 3: Energy interoperation services.			

6.12.2. CEN/TC 294

General information			
Committee	**CEN/TC 294**	**Title**	**Communication systems for meters**
Creation date	1991	**MEMBERS** 	34 members of CEN/CENELEC
Secretariat	DIN (Germany)		
Secretary	Mr. Benjamin Hein		
Chairperson	Mr. Ortwin Pfaff		
Organizations in liaison	AQUA, ECOS, ETSI, Marcogaz, ZigBee Alliance		
Web site	http://standards.cen.eu/dyn/www/f?p=204:7:0::::FSP_ORG_ID:6275&cs=142047F7359698DA6A5B4BE4DE6571AF8		
Scope	Standardization of communication interfaces for systems with meters and remote reading of meters for all kind of fluids and energies distributed by network. Secure communication covering data privacy as an inherent property, providing a scalable mechanism for security services, data integrity, authentication and confidentiality. Cooperation with CENELEC and ETSI for consistent interface definitions as essential condition for achieving interoperability between entities in systems.		
Structure	CEN/TC 294/WG 2 CEN/TC 294/WG 4 CEN/TC 294/WG 5 CEN/TC 294/WG 6	Application layer for communication systems for and remote reading of all meters within the scope Data exchange for meters on bus-systems and interface Radio meter data exchange Wireless mesh networking - Communication systems for meter data exchange	
Standardization work			
Published standards	10		
Standards under development	5		
Involvement of Luxembourg			
NO (no registered delegate)			
Comments			

The suite of CEN/TC 294 standards shall guide Member States in the implementation of their national smart metering programs taking into account distinctions between battery and mains-powered meters and differences between architectures that are linked to the particularities regarding the distribution in Member States.

CEN/TC 294 is also responsible for the support of secure communication covering data privacy as an inherent property, providing a scalable mechanism for security services, data integrity, authentication and confidentiality. At the moment CEN/TC 294 responds in its work to the EC/EFTA mandate M/441 in the fields of measuring instruments for the development of an open architecture for utility meters involving communication

protocols enabling interoperability.

CEN/TC 294 is currently completing the EN 13757 series of standards with the development of prEN 13757-7 “Communication systems for meters - Part 7: Transport and security services”. Moreover, it is currently revising parts 2, 3 and 4 of this series.

6.13. SMART MANUFACTURING

Smart Manufacturing is an umbrella term including many technologies and domains. The idea behind this term is to create smart systems using modernization trends in the manufacturing environment. Smart Manufacturing corresponds to the use of smart ICT systems to transform the manufacturing environment, with the objective to maximize energy efficiency and productivity. It is an umbrella subsector, which includes, in the context of the standards analysis, additive manufacturing, robotics and automation systems in the industrial context.

6.13.1. ISO/TC 184

General information			
Committee	**ISO/TC 184**	**Title**	**Automation systems and integration**
Creation date	1983	**MEMBERS** 	**Participating Countries (20):** France, Belgium, Canada, China, Czech Republic, Germany, Hungary, Italy, Japan, Kazakhstan, Republic of Korea, Netherlands, Norway, Romania, Russian Federation, Spain, Sweden, Switzerland, United Kingdom, United States **Observing Countries (24):** Austria, Belarus, Denmark, Finland, Greece, Hong Kong, Iceland, India, Indonesia, Islamic Republic of Iran, Ireland, Israel, Lithuania, **Luxembourg**, Mexico, Mongolia, Poland, Portugal, Serbia, Singapore, Slovakia, South Africa, Tunisia, Ukraine
Secretariat	AFNOR (France)		
Secretary	Mrs. Laurence Douvillé		
Chairperson	Mr. Patrick Lamboley		
Organizations in liaison	ASAM, ASD-STAN, CIRP, EC, UNECE		
Web site	https://www.iso.org/committee/54110.html		
Scope	Standardization in the field of automation systems and their integration for design, sourcing, manufacturing, production and delivery, support, maintenance and disposal of products and their associated services. Areas of standardization include information systems, automation and control systems and integration technologies. Note: There will be active collaboration with the relevant technical committees responsible for areas such as machines, manufacturing resources and facilities, robotics, electrical and electronic equipment, PLC for general application, quality management, industrial safety, information technologies, multi-media capabilities, and multi-modal communication networks.		
Structure	ISO/TC 184/AG ISO/TC 184/WG 6 ISO/TC 184/SC 1 ISO/TC 184/SC 4 ISO/TC 184/SC 5	Advisory group OGI Physical device control Industrial data Interoperability, integration, and architectures for enterprise systems and automation applications	
Standardization work			
Published standards	810		
Standards under development	40 (including the projects of ISO/TC 184/SCs)		
Involvement of Luxembourg			
NO (no registered delegate)			
Comments			
ISO/TC 184 is in charge of the development of standards for industrial automation, including: - Enterprise modelling, integration services and system architectures;			

- Numerical control of machine tools;
- Product definition data through the entire lifecycle, including engineering analysis and component libraries;
- Manufacturing management information, including MES;
- Manufacturing communication systems;
- Manufacturing terminology;
- Integration and control of elements of manufacturing systems;
- Integration on manufacturing systems into the total enterprise;
- Interoperability of manufacturing processes;
- Neutral representation of manufacturing ontologies;
- Manufacturing application integration frameworks;
- Enterprise (domain)-control (domain) integration;
- Manufacturing software and its environment;
- Integration of industrial robots.

6.13.2. ISO/TC 261

General information			
Committee	**ISO/TC 261**	**Title**	**Additive manufacturing**
Creation date	2011	**MEMBERS** 	**Participating Countries (22):** Germany, Belgium, Canada, China, Czech Republic, Denmark, Finland, France, Germany, Ireland, Italy, Japan, Republic of Korea, Netherlands, Norway, Poland, Russian Federation, Singapore, Spain, Sweden, Switzerland, United Kingdom, United States **Observing Countries (6):** Austria, Islamic Republic of Iran, Israel, New Zealand, Romania, South Africa
Secretariat	DIN (Germany)		
Secretary	Mr. Lutz Wrede		
Chairperson	Vacant		
Organizations in liaison	/		
Web site	https://www.iso.org/committee/629086.html		
Scope	Standardization in the field of Additive Manufacturing (AM) concerning their processes, terms and definitions, process chains (Hard- and Software), test procedures, quality parameters, supply agreements and all kind of fundamentals.		
Structure	ISO/TC 261/JAG ISO/TC 261/AG 1 ISO/TC 261/AHG 1 ISO/TC 261/AHG 2 ISO/TC 261/AHG 3 ISO/TC 261/AHG 5 ISO/TC 261/WG 1 ISO/TC 261/WG 2 ISO/TC 261/WG 3 ISO/TC 261/WG 4 ISO/TC 261/JG 51 ISO/TC 261/JG 52 ISO/TC 261/JG 53 ISO/TC 261/JG 54 ISO/TC 261/JG 55 ISO/TC 261/JG 56 ISO/TC 261/JG 57 ISO/TC 261/JG 58 ISO/TC 261/JG 59 ISO/TC 261/JG 60 ISO/TC 261/JG 61 ISO/TC 261/JG 62 ISO/TC 261/JG 63 ISO/TC 261/JG 64	ISO/TC 261 - ASTM F42 Steering group on JWG activities Coordination Group on JG activities Naming of standards AM safety issues Monitoring of data representation standards Content for ISO/TC 261 homepage Terminology Methods, processes and materials Test methods Data and Design Joint ISO/TC 261-ASTM F 42 Group: Terminology Joint ISO/TC 261-ASTM F 42 Group: Standard test artifacts Joint ISO/TC 261-ASTM F 42 Group: Requirements for purchased AM parts Joint ISO/TC 261-ASTM F 42 Group: Design guidelines Joint ISO/TC 261-ASTM F 42 Group: Standard Specification for Extrusion Based Additive Manufacturing of Plastic Materials Joint ISO/TC 261-ASTM F 42 Group: Standard Practice for Metal Powder Bed Fusion to Meet Rigid Quality Requirements Joint ISO/TC 261-ASTM F 42 Group: Specific design guidelines on powder bed fusion Joint ISO/TC 261-ASTM F 42 Group: Qualification, quality assurance and post processing of powder bed fusion metallic parts Joint ISO/TC 261-ASTM F 42 Group: NDT for AM parts Joint ISO/TC 261-ASTM F 42 Group: Guide for intentionally seeding flaws in additively manufactured (AM) parts Joint ISO/TC 261-ASTM F 42 Group: Guide for anisotropy effects in mechanical properties of AM part Joint ISO/TC 261-ASTM F 42 Group: Guide for conducting round robin studies for additive manufacturing Joint ISO/TC 261-ASTM F 42 Group: Test methods for characterization of powder flow properties for AM applications Joint ISO/TC 261-ASTM F 42 Group: Specification for AMF support for solid modeling: voxel information, constructive solid geometry	

		representations and solid texturing
	ISO/TC 261/JG 65	Joint ISO/TC 261-ASTM F 42 Group: Specification for additive manufacturing stainless steel alloy with powder bed fusion
	ISO/TC 261/JG 66	Joint ISO/TC 261-ASTM F 42 Group: Technical specification on metal powders
	ISO/TC 261/JG 67	Technical report for the design of functionally graded additive manufactured parts
Standardization work		
Published standards	6	
Standards under development	7	
Involvement of Luxembourg		
NO (no registered delegate)		
Comments		

ISO/TC 261 is developing a series of standards to clearly establish the general principles of additive manufacturing (ISO 17296). The technical committee is also working in close cooperation with ASTM to publish common standards, notably regarding additive manufacturing file formats (AMF).

ISO/TC 261 work program includes the following projects:

- ISO/ASTM DIS 52901, Additive manufacturing -- General principles -- Requirements for purchased AM parts;
- ISO/ASTM NP 52902, Additive manufacturing -- General principles -- Standard test artifacts;
- ISO/ASTM DIS 52903-1, Additive Manufacturing -- Standard Specification for Material Extrusion Based Additive Manufacturing of Plastic Materials -- Part 1: Feedstock materials;
- ISO/ASTM CD 52903-2, Additive manufacturing -- Standard specification for material extrusion based additive manufacturing of plastic materials -- Part 2: Process – Equipment;
- ISO/ASTM NP 52905, Additive manufacturing -- General principles -- Non-destructive testing of additive manufactured products;
- ISO/ASTM DIS 52910, Standard Practice -- Guide for Design for Additive Manufacturing;
- ISO/NP TR 52912, Design of functionally graded additive manufactured parts.

6.13.3. ISO/TC 299

General information			
Committee	**ISO/TC 299**	**Title**	**Robots and robotic devices**
Creation date	2015	**MEMBERS** 	**Participating Countries (24):** Sweden, Austria, Canada, China, Czech Republic, Denmark, Finland, France, Germany, Hungary, Ireland, Italy, Japan, Republic of Korea, Mexico, Netherlands, Portugal, Romania, Russian Federation, Singapore, Spain, Switzerland, United Kingdom, United States **Observing Countries (8):** Belgium, India, Israel, Norway, Pakistan, Poland, Serbia, Slovakia
Secretariat	SIS (Sweden)		
Secretary	Mrs. Katarina Widström		
Chairperson	Mr. Henrik Jerregård		
Organizations in liaison	IEEE, IFR		
Web site	https://www.iso.org/committee/5915511.html		
Scope	Standardization in the field of robotics, excluding toys and military applications.		
Structure	ISO/TC 299/SG 1 Study group on gaps and structure ISO/TC 299/WG 1 Vocabulary and characteristics ISO/TC 299/WG 2 Personal care robot safety ISO/TC 299/WG 3 Industrial safety ISO/TC 299/WG 4 Service robots ISO/TC 299/JWG 5 Joint ISO/TC 299 - IEC/SC 62A - IEC/SC 62D: Medical robot safety ISO/TC 299/WG 6 Modularity for service robots		
Standardization work			
Published standards	14		
Standards under development	9		
Involvement of Luxembourg			
NO (no registered delegate)			
Comments			

ISO/TC 299 has replaced ISO/TC 184/SC 2 in 2015. The TC has notably recently published ISO/TS 15066, a new ISO technical specification for collaborative robot system safety. The work program of the technical committee includes the following projects:

- ISO/WD 18646-2, Robotics -- Performance criteria and related test methods for service robot -- Part 2: Navigation;
- ISO/FDIS 19649, Mobile robots --- Vocabulary;
- ISO/NP TR 20218-1, Robots and robotic devices -- Safety requirements for industrial robots -- Part 1: Industrial robot system end of arm tooling (end-effector);
- ISO/NP TR 20218-2, Robots and robotic devices -- Safety requirements for industrial robots -- Part 2: Industrial robot system manual load stations;
- ISO/CD TR 23482, Robotics -- Application of ISO 13482 -- Part 1: Safety-related test methods;

- ISO/CD TR 23482-2, Robotics -- Application of ISO 13482 -- Part 2: Application guide;
- IEC/DTR 60601-4-1, Medical electrical equipment -- Part 4-1: Guidance and interpretation -- Medical electrical equipment and medical electrical systems employing a degree of autonomy;
- IEC/NP 80601-2-77, Medical Electrical Equipment -- Part 2-77: Particular requirements for the basic safety and essential performance of medical robots for surgery;
- IEC/NP 80601-2-78, Medical Electrical Equipment -- Part 2-78: Particular requirements for the basic safety and essential performance of medical robots for rehabilitation, compensation or alleviation of disease, injury or disability.

6.13.4. IEC/TC 65

General information			
Committee	**IEC/TC 65**	**Title**	**Industrial-process measurement, control and automation**
Creation date	1968	**MEMBERS** 	**Participating Countries (30):** France, Australia, Austria, Belgium, Canada, China, Croatia, Denmark, Finland, Germany, India, Iran, Israel, Italy, Japan, Republic of Korea, Mexico, Netherlands, Norway, Pakistan, Poland, Romania, Russian Federation, Slovakia, Spain, Sweden, Switzerland, Thailand, United Kingdom, United States of America **Observing Countries (17):** Belarus, Brazil, Bulgaria, Czech Republic, Greece, Hungary, Indonesia, Ireland, **Luxembourg**, New Zealand, Portugal, Serbia, Singapore, Slovenia, South Africa, Turkey, Ukraine
Secretariat	AFNOR (France)		
Secretary	Mr. Rudy Belliardi		
Chairperson	Mr. Ingo Weber		
Organizations in liaison	ITU-T		
Web site	http://www.iec.ch/dyn/www/f?p=103:7:4047170087842::::FSP_ORG_ID,FSP_LANG_ID:1250,25		
Scope	To prepare international standards for systems and elements used for industrial-process measurement and control concerning continuous and batch processes. To co-ordinate the standardization of those features of related elements which affect suitability for integration into such systems. The work of standardization outlined above is to be carried out in the international fields for equipment and systems operating with electrical, pneumatic, hydraulic, mechanical or other systems of measurement and/or control.		
Structure	AG 14 Chairmen's advisory group AHG 2 Reliability of Automation Devices and Systems AHG 3 Smart Manufacturing Framework and System Architecture SC 65A System aspects SC 65B Measurement and control devices SC 65C Industrial networks SC 65E Devices and integration in enterprise systems WG 1 Terms and definitions WG 10 Security for industrial process measurement and control - Network and system security WG 12 P&I diagrams, P&ID tools and PCE-CAE tools WG 15 Documents for the Process Industry WG 16 Digital Factory WG 17 System interface between industrial facilities and the smart grid WG 18 Cause and Effect Table WG 19 Life-cycle management for systems and products used in industrial-process measurement, control and automation WG 20 Industrial-process measurement, control and automation– Framework to bridge the requirements for safety and security JWG 13 Safety requirements for industrial-process measurement, control and automation equipment, excluding functional safety JWG 14 Energy Efficiency in Industrial Automation (EEIA) JWG 21 Smart Manufacturing Reference Model(s)		

Standardization work	
Published standards	24
Standards under development	10
Involvement of Luxembourg	
NO (no registered delegate)	
Comments	
/	

6.13.5. CEN/TC 310

General information			
Committee	**CEN/TC 310**	**Title**	**Advanced automation technologies and their applications**
Creation date	1993	**MEMBERS** 	34 members of CEN/CENELEC
Secretariat	BSI (United Kingdom)		
Secretary	Dr. Mike Leggett		
Chairperson	Mr. Mason		
Organizations in liaison	/		
Web site	http://standards.cen.eu/dyn/www/f?p=204:7:0::::FSP_ORG_ID:6291&cs=1FB8DE3E2415169C5A629164496F80A52		
Scope	Standardization in the field of automation systems and technologies and their application and integration to ensure the availability of the standards required by industry for design, sourcing, manufacturing and delivery, support, maintenance and disposal of products and their associated services. Areas of standardization may include enterprise modelling and system architecture, information and its supporting systems, robotics for fixed and mobile robots in industrial and specific non-industrial environments, automation and control equipment and software, human and mechanical aspects, integration technologies and system operational aspects. These standards may utilize other standards and technologies beyond the scope of TC310, such as machines, equipment, information technologies, multi-media capabilities, and multi-modal communications networks.		
Structure	CEN/TC 310/WG 1 Systems architecture		
Standardization work			
Published standards	10		
Standards under development	0		
Involvement of Luxembourg			
1 delegate - Mrs. Wided Guedria Luxembourg Institute of Science and Technology (LIST)			
Comments			
The mission of CEN/TC 310 is to undertake standardization activities in the field of Advanced Manufacturing Technologies (AMT) to ensure the availability of the standards required by European industry for the operation and integration of the elements of AMT systems. The specific objectives of CEN/TC 310 are to: - Act as focal point within Europe for standardization in Advanced Manufacturing Technologies; - Undertake the leading technical responsibility for the general strategy for standardization in the field of AMT and to document an agreed upon European strategy in this Business Plan; - Develop standards for AMT systems and elements that are not included in the work program of other European TCs;		

- Support and accommodate the standardization needs of European industry, if different from, or with a higher priority than, international standards being developed;
- Create a wider understanding and awareness of the importance of AMT standardization driven by market needs for European industry, the European Commission and national Governments;
- Encourage the awareness of AMT standardization by improving the availability of information between interested parties.

6.13.6. CEN/TC 438

General information			
Committee	**CEN/TC 438**	**Title**	**Additive manufacturing**
Creation date	2015	**MEMBERS** 	34 members of CEN/CENELEC
Secretariat	AFNOR (France)		
Secretary	Mr. Olivier Coissac		
Chairperson	Mr. Eric Baustert		
Organizations in liaison	ASTM		
Web site	http://standards.cen.eu/dyn/www/f?p=204:22:0::::FSP_ORG_ID,FSP_LANG_ID:1961493,25&cs=1DBC499E4A879D8D3D3862EB0C6702EE4		
Scope	Standardization in the field of Additive Manufacturing (AM).		
Structure	/		
Standardization work			
Published standards	4		
Standards under development	5		
Involvement of Luxembourg			
NO (no registered delegate)			
Comments			

CEN/TC 438 has three main goals:

- To provide a complete set of European standards, part of which will be developed based on the international standardization work of ISO;
- To strengthen the link between European research programs and standardization in AM;
- To ensure transparency and visibility of the European standardization in AM.

The proposed work aims at standardizing the processes of Additive Manufacturing, their process chains (Hard- and Software), the test procedures, environmental issues, quality parameters, supply agreements, fundamentals and vocabularies. The CEN/TC 438 intends to develop European standards based, as far as possible, on international standardization work (from ISO/TC 261 'Additive Manufacturing' and ASTM F42) to ensure consistency and harmonization, to strengthen the link with European research programs and ensure European stakeholders needs are taken into account in standards development.

6.14. TECHNICAL COMMITTEES NOT RELATED TO SUBSECTORS

The standards watch has identified technical committees that are focused on ICT standardization but that are not related to any defined subsector. Although these committees are not related to the current subsectors, they might be of interest for the stakeholders.

6.14.1. ISO/IEC JTC 1

General information			
Committee	**ISO/IEC JTC 1**	**Title**	**Information technology**
Creation date	1987	**MEMBERS** 	**Participating countries (33):** United States, Australia, Austria, Belgium, Canada, China, Czech Republic, Côte d'Ivoire, Denmark, Finland, France, Germany, India, Ireland, Italy, Japan, Kazakhstan, Republic of Korea, Lebanon, Malaysia, Malta, Netherlands, Nigeria, Norway, Russian Federation, Singapore, South Africa, Spain, Sweden, Switzerland, Ukraine, United Arab Emirates, United Kingdom **Observing countries (62):** Algeria, Argentina, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Brazil, Bulgaria, Chile, Colombia, The Democratic Republic of Congo, Costa Rica, Croatia, Cuba, Cyprus, Egypt, El Salvador, Estonia, Ethiopia, Ghana, Greece, Hong Kong, Hungary, Iceland, Indonesia, Islamic Republic of Iran, Israel, Kenya, Democratic People's Republic of Korea, Libya, Lithuania, **Luxembourg**, Mauritius, Mexico, Republic of Moldova, Mongolia, Montenegro, Morocco, New Zealand, Pakistan, State of Palestine, Peru, Philippines, Poland, Portugal, Romania, Rwanda, Saudi Arabia, Serbia, Slovakia, Slovenia, Sri Lanka, Swaziland, Thailand, The former Yugoslav Republic of Macedonia, Tunisia, Turkey, Uganda, Uruguay, Uzbekistan, Viet Nam, Zimbabwe
Secretariat	ANSI (United States)		
Secretary	Ms. Lisa Rajchel		
Chairperson	Ms. Karen Higginbottom		
Organizations in liaison	EC, Ecma International, ITU, IIC, AIM Global, W3C, DEWI, OGC, OMG, GS1, IEEE, The Open Group		
Web site	https://www.iso.org/isoiec-jtc-1.html		
Scope	Standardization in the field of information technology		
Structure	ISO/IEC JTC 1/JAG — JTC 1 Advisory Group ISO/IEC JTC 1/SG 3 — 3D Printing and scanning ISO/IEC JTC 1/WG 7 — Sensor Networks ISO/IEC JTC 1/WG 9 — Big Data ISO/IEC JTC 1/WG 10 — Internet of Things (IoT) ISO/IEC JTC 1/WG 11 — Smart Cities ISO/IEC JTC 1/SC 2 — Coded character sets ISO/IEC JTC 1/SC 6 — Telecommunications and information exchange between systems ISO/IEC JTC 1/SC 7 — Software and systems engineering ISO/IEC JTC 1/SC 17 — Cards and personal identification ISO/IEC JTC 1/SC 22 — Programming languages, their environments, and system software interfaces ISO/IEC JTC 1/SC 23 — Digitally Recorded Media for Information Interchange and Storage ISO/IEC JTC 1/SC 24 — Computer graphics, image processing, and environmental data representation ISO/IEC JTC 1/SC 25 — Interconnection of information technology equipment		

	ISO/IEC JTC 1/SC 27	IT Security techniques
	ISO/IEC JTC 1/SC 28	Office equipment
	ISO/IEC JTC 1/SC 29	Coding of audio, picture, multimedia and hypermedia information
	ISO/IEC JTC 1/SC 31	Automatic identification and data capture techniques
	ISO/IEC JTC 1/SC 32	Data management and interchange
	ISO/IEC JTC 1/SC 34	Document description and processing languages
	ISO/IEC JTC 1/SC 35	User interfaces
	ISO/IEC JTC 1/SC 36	Information technology for learning, education and training
	ISO/IEC JTC 1/SC 37	Biometrics
	ISO/IEC JTC 1/SC 38	Cloud Computing and Distributed Platforms
	ISO/IEC JTC 1/SC 39	Sustainability for and by Information Technology
	ISO/IEC JTC 1/SC 40	IT Service Management and IT Governance
Standardization work		
Published standards	Total number of published ISO/IEC standards related to the technical committee and its SCs (number includes updates): 2989 Number of published ISO/IEC standards under the direct responsibility of JTC 1 (number includes updates): 448	
Standards under development	Total number of standards under development related to the technical committee and its SCs: 493 Number of standards under development under the direct responsibility of JTC 1: 64	
Involvement of Luxembourg		
5 delegates		
- Mr. Jean-Philippe Humbert	ILNAS	
- Mr. Nicolas Domenjoud	ANEC GIE	
- Mr. Johnatan Pecero	ANEC GIE	
Comments		

ISO/IEC JTC 1 is currently the main standardization committee in the information and communication technology domain, regarding the number of published standards and the number of standards users. Among the standards developed by ISO/IEC JTC 1, the following standards are the best-selling at the ISO level[118] (and at ILNAS level concerning the top 3) and therefore particularly relevant for the economic market:

- ISO/IEC 27001:2013, Information technology -- Security techniques -- Information security management systems – Requirements;
- ISO/IEC 27002:2013, Information technology -- Security techniques -- Code of practice for information security management;
- ISO/IEC 27005:2011, Information technology -- Security techniques -- Information security risk management;
- ISO/IEC 27018:2014, Information technology -- Security techniques -- Code of practice for protection of personally identifiable information (PII) in public clouds acting as PII processors;
- ISO/IEC 20000-1:2011, Information technology -- Service management -- Part 1: Service management system requirements;
- ISO/IEC 27000:2014, Information technology -- Security techniques -- Information security management systems – Overview and vocabulary;
- ISO/IEC 27003:2010, Information technology -- Security techniques -- Information security management system implementation guidance;
- ISO/IEC 27004:2009, Information technology -- Security techniques -- Information security management – Measurement;

[118] Source: ISO Customer Services

- ISO/IEC 25010:2011, Systems and software engineering -- Systems and software Quality Requirements and Evaluation (SQuaRE) -- System and software quality models;
- ISO/IEC 27035:2011, Information technology -- Security techniques -- Information security incident management.

ISO/IEC JTC 1 also benefits from the rapid, market-driven work of *de facto* standards-setting organizations and industry *consortia*. This is amplified by having many technical experts participating not only in national standardization bodies but also in key *de facto* standards-setting bodies and industrial *fora*. Liaising and cooperating extends the expertise of ISO/IEC JTC 1's subcommittees and provides feedback on how ISO/IEC JTC 1 standards are being used. It also helps identify any gaps or inconsistencies that need to be addressed. By working with other standards-setting organizations (SDOs), ISO/IEC JTC 1's ability to serve an integration function is enhanced[119].

Technical areas for strategic consideration[120]

JTC 1 has areas under strategic consideration for both technical pursuits as well as management activities.

- **Interest in Wearables** – JTC 1 is aware of the IEC activities for Wearables and has determined there are ICT components necessary for the development of Wearables. Based on a Technology Trend Report, JTC 1 will determine how best to serve this marketplace's requirements for ICT standards.
- **3D Printing and Scanning** – A Technology Trend report for 3D Printing and Scanning was developed in 2016 to identify where ICT standardization can impact the broader marketplace for this disruptive technology. The report documents the number of standards activities already underway and scopes out how the unique expertise within JTC 1 can positively contribute to the standardization work. A Study Group (SG 3) has been created at the end of 2016, based on the recommendations of the Technology Trend report.
- **Global Advanced Industrial Systems** – JTC 1 is analyzing the reports from ISO and IEC on Industry 4.0, Smart Manufacturing and Smart Machines. This year, an effort has been undertaken to investigate the ICT standards necessary to support the furthering of Advanced Industrial Manufacturing and Smart Machines and proposing mechanisms for coordination of the activities within JTC 1.
- **Emerging Technology and Innovations** – JTC 1 has established a group to annually assess technology opportunities to identify short term and long term ICT standardization priorities that warrant action. Beyond analysis of the ICT business landscape, special efforts will be taken to seek input from ISO and IEC committees. As a first effort, JTC 1 is meeting with ISO TC 215 Health Informatics to identify future ICT needs.

ISO/IEC JTC 1/SG 3 – 3D Printing and scanning

JTC 1 establishes a Study Group (SG) on 3D Printing and Scanning to understand the current state of standardization and to explore a possible role for JTC 1.

The Terms of Reference are as follows:

1. Provide a description of key concepts related to 3D Printing and Scanning, and describe relevant terminology.
2. Study and document the technological, market and related societal requirements for the future ICT standardization on 3D Printing and Scanning.
3. Study and document current technologies that are being deployed to enable 3D Printing and Scanning.
4. Promote the awareness of the importance of JTC 1 activities on 3D Printing and Scanning outside JTC 1.
5. Assess the current state of standardization activities relevant to 3D Printing and Scanning within JTC 1, in other relevant ISO and IEC TCs, in other SDOs and in consortia.
6. Identify and propose how JTC 1 should address the ICT standardization needs of 3D Printing and Scanning.
7. Provide progress reports to the JAG and a report with recommendations, and potentially one or more draft NWIPs, to the 2017 JTC 1 Plenary.

6.14.2. ISO/IEC JTC 1/SC 7

[119] JTC1 Vision, Mission and Principles, 2014
[120] Source: JTC 1 Business Plan 2016

General information			
Committee	**ISO/IEC JTC 1/SC 7**	**Title**	**Software and systems engineering**
Creation date	1987	**MEMBERS** 	**Participating Countries (38):** Canada, Argentina, Australia, Belgium, Brazil, China, Czech Republic, Denmark, Finland, France, Germany, India, Ireland, Israel, Italy, Japan, Kazakhstan, Republic of Korea, **Luxembourg,** Malaysia, Mexico, Netherlands, New Zealand, Panama, Peru, Poland, Portugal, Romania, Russian Federation, Slovakia, South Africa, Spain, Sweden, Switzerland, Thailand, Ukraine, United Kingdom, United States **Observing Countries (21):** Austria, Bosnia and Herzegovina, Chile, Colombia, Cuba, Cyprus, Estonia, Ghana, Hong Kong, Hungary, Iceland, Indonesia, Islamic Republic of Iran, Kenya, Morocco, Norway, Philippines, Serbia, The former Yugoslav Republic of Macedonia, Turkey, Uruguay
Secretariat	SCC (Canada)		
Secretary	Dr. Witold Suryn		
Chairperson	Mr. François Coallier		
Organizations in liaison	AES, Ecma International, IEEE, INCOSE, ISACA, ITU, PMI, WMO, itSMF, TCG, SAMAC, ESI software, IAITAM, VDA, LEADing Practice, The SPICE User Group, TMMi, BSA, The Open Group, ETSI		
Web site	https://www.iso.org/committee/45086.html		
Scope	SC7 delivers standards in the area of software and systems engineering that meet market and professional requirements. These standards convers the processes, supporting tools and supporting technologies for the engineering of software products and systems. Systems engineering, whose origin is traceable to industrial engineering, is defined as an interdisciplinary approach governing the total technical and managerial effort required to transform a set of customer needs, expectations, and constraints into a solution and to support that solution throughout its life. SC7, whose scope is Software and Systems Engineering, can thus be described as a horizontal committee who produce generic standards that are technology agnostics and independent of the application domain. These standards are principally focused on process models and good practices (Methods and techniques).		
Structure	JTC 1/SC 7/STTF	Spanish Translation Task Force	
	JTC 1/SC 7/AG 1	Life Cycle Processes Harmonization Advisory Group (LCPHAG)	
	JTC 1/SC 7/SWG 1	JTC 1/SC7 Business Planning Group (BPG)	
	JTC 1/SC 7/SWG 5	Standards management group	
	JTC 1/SC 7/SWG 22	Vocabulary validation	
	JTC 1/SC 7/WG 2	System software documentation	
	JTC 1/SC 7/WG 4	Tools and environment	
	JTC 1/SC 7/WG 6	Software Product and System Quality	
	JTC 1/SC 7/WG 7	Life cycle management	
	JTC 1/SC 7/WG 10	Process assessment	
	JTC 1/SC 7/WG 19	Techniques for Specifying IT Systems	
	JTC 1/SC 7/WG 20	Software and systems bodies of knowledge and professionalization	
	JTC 1/SC 7/WG 21	Information technology asset management	
	JTC 1/SC 7/WG 24	SLC Profile and guidelines for VSE	
	JTC 1/SC 7/WG 26	Software testing	
	JTC 1/SC 7/JWG 28	Joint between ISO/IEC JTC 1/SC 7 and ISO/TC 159/SC 4: Common Industry Formats for Usability Reports	
	JTC 1/SC 7/WG 42	Architecture	

Standardization work	
Published standards	Number of published ISO/IEC standards under the direct responsibility of JTC 1/SC 7 (number includes updates): 172
Standards under development	37

Involvement of Luxembourg

9 delegates

- Mr. Alain Renault (Chairman)	Luxembourg Institute of Science and Technology (LIST)
- Mrs. Béatrix Barafort (Vice-Chairwoman)	LIST
- Mr. Stéphane Cortina	LIST
- Mr. Michel Picard	LIST
- Mr. Christophe Feltus	LIST
- Mrs. Jeanette Ewen	EWEN Consult S.à.r.l.
- Mr. Dietmar Gehring	UBS Fund Services Luxembourg S.A.
- Mr. Armand Kouakou	Computer Task Group Luxembourg PSF S.A.
- Mr. Pierre-Olivier Portmann	

Comments

Some of the main standards published by the subcommittee are:

- ISO/IEC/IEEE 15288:2015, Systems and software engineering -- System life cycle processes;
- ISO/IEC 19759:2015, Software Engineering -- Guide to the Software Engineering Body of Knowledge (SWEBOK);
- ISO/IEC 20000-1:2011, Information technology -- Service management -- Part 1: Service management system requirements (under the ISO/IEC JTC 1/SC 40 responsibility since 2013);
- ISO/IEC 12207:2008, Systems and software engineering -- Software life cycle processes;
- ISO/IEC 38500:2008, Corporate governance of information technology (under the ISO/IEC JTC 1/SC 40 responsibility since 2013);
- ISO/IEC 25000 series of standards concerning Software Product Quality Requirements and Evaluation (also known as the SQuaRE series);
- ISO/IEC/IEEE 29119 parts 1, 2 and 3:2013, Systems and software engineering -- Software Testing (part 5 is under development);
- ISO/IEC 33000 series of standards on Process Assessment.

ISO/IEC 20000 and ISO/IEC 38500 series of standards, initially developed by ISO/IEC JTC 1/SC 7, are under the responsibility of the subcommittee ISO/IEC JTC 1/SC 40 since the 2013 JTC 1 Plenary Meeting. Indeed, SC 40 has been formed through a merger of working groups previously attached to SC 7 and JTC 1.

6.14.3. ISO/IEC JTC 1/SC 22

General information			
Committee	**ISO/IEC JTC 1/SC 22**	**Title**	**Programming languages, their environments and system software interfaces**
Creation date	1987	**MEMBERS** 	**Participating Countries (20):** United States, Austria, Canada, China, Denmark, Finland, France, Germany, Italy, Japan, Kazakhstan, Republic of Korea, Netherlands, Portugal, Russian Federation, Slovenia, Spain, Switzerland, Ukraine, United Kingdom **Observing Countries (24):** Argentina, Belgium, Bosnia and Herzegovina, Bulgaria, Cuba, Czech Republic, Egypt, Ghana, Greece, Hungary, Iceland, India, Indonesia, Islamic Republic of Iran, Ireland, Democratic People's Republic Korea, Malaysia, New Zealand, Norway, Poland, Romania, Serbia, Sweden, Thailand
Secretariat	ANSI (United States)		
Secretary	Ms. Sally Seitz		
Chairperson	Mr. Rex Jaeschke		
Organizations in liaison	Ecma International, Linux Foundation, ACM SIGAda, Ada-Europe, MISRA		
Web site	https://www.iso.org/committee/45202.html		
Scope	Standardization of programming languages (such as COBOL, Fortran, Ada, C, C++ and Prolog) and their environments (such as POSIX and Linux). SC 22 also produces common language-independent specifications to facilitate standardized bindings between programming languages and system services, as well as greater interaction between programs written in different languages. The most recently created WG has a project to document the vulnerabilities of various programming languages. Program portability between different implementations of the same language is a key goal.		
Structure	JTC 1/SC 22/WG 4 COBOL JTC 1/SC 22/WG 5 Fortran JTC 1/SC 22/WG 9 Ada JTC 1/SC 22/WG 14 C JTC 1/SC 22/WG 17 Prolog JTC 1/SC 22/WG 21 C++ JTC 1/SC 22/WG 23 Programming Language Vulnerabilities		
Standardization work			
Published standards	Number of published ISO/IEC standards under the direct responsibility of JTC 1/SC 22 (number includes updates): 109		
Standards under development	19		
Involvement of Luxembourg			
NO (no registered delegate)			

Comments

ISO/IEC JTC 1/SC 22 is responsible for the standardization of programming languages, their environments and systems software interfaces (specialized languages or environments assigned to the work program of another Subcommittee or Technical Committee are excluded).

The SC is currently working on the development of extensions for the programming language C++. It has also initiated the development of a series of technical reports (ISO/IEC TR 24772) that will offer guidance to avoid vulnerabilities in programming languages.

Examples of programming languages standardized through ISO/IEC JTC 1/SC 22 are:

- PLIP
- Pascal
- APL
- COBOL
- Fortran
- ALGOL
- PL/I
- Basic
- Ada
- C
- POSIX
- ISLisp
- Prolog
- FIMS
- C++
- PCTE
- Ruby
- C#

6.14.4. ISO/IEC JTC 1/SC 28

General information			
Committee	**ISO/IEC JTC 1/SC 28**	**Title**	**Office equipment**
Creation date	1990	**MEMBERS** 	**Participating Countries (12):** Japan, Austria, China, Germany, Italy, Kazakhstan, Republic of Korea, Netherlands, Philippines, Russian Federation, United Kingdom, United States **Observing Countries (20):** Argentina, Belgium, Bosnia and Herzegovina, Czech Republic, Finland, France, Ghana, Hungary, India, Indonesia, Islamic Republic of Iran, Kenya, Poland, Romania, Saudi Arabia, Serbia, South Africa, Switzerland, Thailand, Ukraine
Secretariat	JISC (Japan)		
Secretary	Mr. Takashi Ito		
Chairperson	Mr. Akira Saito		
Organizations in liaison	CIE, Ecma International, ICC, WMO		
Web site	https://www.iso.org/committee/45314.html		
Scope	Standardization of basic characteristics, test methods and other related items of products such as 2D and 3D Printers/Scanners, Copiers, Projectors, Fax and Systems composed of their combinations, excluding such interfaces as user system interfaces, communication interfaces and protocols.		
Structure	JTC 1/SC 28/AG Advisory Group JTC 1/SC 28/WG 2 Consumables JTC 1/SC 28/WG 3 Productivity JTC 1/SC 28/WG 4 Image quality assessment JTC 1/SC 28/WG 5 Office Colour		
Standardization work			
Published standards	Number of published ISO/IEC standards under the direct responsibility of JTC 1/SC 28 (number includes updates): 51		
Standards under development	5		
Involvement of Luxembourg			
NO (no registered delegate)			
Comments			

Inventory of published ISO/IEC JTC 1/SC 28 standards concerns specification sheets descriptors, productivity (throughput) measurement methods, printed image quality evaluation methods, toner/ink cartridges yield measurement methods, declaration of quality of product made of reused parts and accessibility guidelines for office equipment.

The fact that the frontier of ISO/IEC JTC 1/SC 28 is contiguous with scopes of ISO/TC 42, TC 130 necessitates tight liaisons with those technical committees among others. Also, ISO/IEC JTC 1/SC 28 is member of the ISO/TC 130/JWG 14 (Joint ISO/TC 130 - ISO/TC 42 - ISO/IEC JTC 1/SC 28 WG: Print quality measurement methods).

6.14.5. ISO/IEC JTC 1/SC 35

<table>
<tr><th colspan="4">General information</th></tr>
<tr><td>Committee</td><td>ISO/IEC JTC 1/SC 35</td><td>Title</td><td>User interfaces</td></tr>
<tr><td>Creation date</td><td>1998</td><td rowspan="5">MEMBERS
  </td><td rowspan="5">Participating Countries (18):
France, Canada, China, Denmark, Finland, Germany, Greece, India, Italy, Japan, Republic of Korea, Russian Federation, South Africa, Spain, Sweden, Switzerland, United Kingdom, United States

Observing Countries (17):
Austria, Belgium, Bosnia and Herzegovina, Bulgaria, Czech Republic, Ghana, Hungary, Indonesia, Islamic Republic of Iran, Ireland, Israel, Kenya, Netherlands, Poland, Romania, Serbia, Ukraine</td></tr>
<tr><td>Secretariat</td><td>AFNOR (France)</td></tr>
<tr><td>Secretary</td><td>Mrs. Laurence Douvillé</td></tr>
<tr><td>Chairperson</td><td>Dr. Khalid Choukri</td></tr>
<tr><td>Organizations in liaison</td><td>ETSI, ITU, W3C</td></tr>
<tr><td>Web site</td><td colspan="3">https://www.iso.org/committee/45382.html</td></tr>
<tr><td>Scope</td><td colspan="3">Standardization in the field of user-system interfaces in information and communication technology (ICT) environments and support for these interfaces to serve all users, including people having accessibility or other specific needs, with a priority of meeting the JTC 1 requirements for cultural and linguistic adaptability. This includes:
- User interface accessibility (requirements, needs, methods, techniques and enablers);
- Cultural and linguistic adaptability and accessibility (such as evaluation of cultural and linguistic adaptability of ICT products, harmonized human language equivalents, localization parameters, voice messaging menus, etc.);
- User interface objects, actions and attributes;
- Methods and technologies for controlling and navigating within systems, devices and applications in visual, auditory, tactile and other sensorial modalities (such as by voice, vision, movement, gestures, etc.);
- Symbols, functionality and interactions of user interfaces (such as graphical, tactile and auditory icons, graphical symbols and other user interface elements);
- Visual, auditory, tactile and other sensorial input and output devices and methods in ICT environments (for devices such as keyboards, displays, mice, etc.);
- User interfaces for mobile devices, hand-held devices and remote interactions.</td></tr>
<tr><td>Structure</td><td colspan="3">JTC 1/AHG 1 Internet of Thing (IoT) User Interfaces
JTC 1/SC 35/WG 1 Keyboards, methods and devices related to input and its feedback
JTC 1/SC 35/WG 2 Graphical user interface and interaction
JTC 1/SC 35/WG 4 User interfaces for mobile devices
JTC 1/SC 35/WG 5 Cultural and linguistic adaptability
JTC 1/SC 35/WG 6 User interfaces accessibility
JTC 1/SC 35/WG 7 User interfaces object, actions and attributes
JTC 1/SC 35/WG 8 User interfaces for remote interactions</td></tr>
<tr><th colspan="4">Standardization work</th></tr>
<tr><td>Published standards</td><td colspan="3">Number of published ISO/IEC standards under the direct responsibility of JTC 1/SC 35 (number includes updates): 64</td></tr>
<tr><td>Standards under development</td><td colspan="3">16</td></tr>
</table>

Involvement of Luxembourg
NO (no registered delegate)
Comments
SC 35 is currently increasing its activity in the field of Voice commands (ISO/IEC 30122 series) and Gesture-based interfaces (ISO/IEC 30113 series), while considering further development in the field of User interface components accessibility (ISO/IEC 20071 series). Examples of standards developed by ISO/IEC JTC 1/SC 35 are: - ISO/IEC 9995-1:2009, Information technology -- Keyboard layouts for text and office systems -- Part 1: General principles governing keyboard layouts; - ISO/IEC TR 11581-1:2011, Information technology -- User interface icons -- Part 1: Introduction to and overview of icon standards; - ISO/IEC 18036:2003, Information technology -- Icon symbols and functions for World Wide Web browser toolbars; - ISO/IEC 30113-1:2015, Information technology -- User interface -- Gesture-based interfaces across devices and methods -- Part 1: Framework.

6.14.6. ISO/IEC JTC 1/SC 36

<table>
<tr><th colspan="4">General information</th></tr>
<tr><td>Committee</td><td>ISO/IEC JTC 1/SC 36</td><td>Title</td><td>Information technology for learning, education, and training</td></tr>
<tr><td>Creation date</td><td>1999</td><td rowspan="5">MEMBERS
  </td><td rowspan="5">Participating Countries (26):
Republic of Korea, Algeria, Australia, Canada, China, Denmark, Finland, France, Germany, India, Italy, Japan, Kazakhstan, Kenya, Netherlands, Norway, Portugal, Russian Federation, Slovakia, South Africa, Spain, Sweden, Tunisia, Uganda, Ukraine, United Kingdom

Observing Countries (18):
Argentina, Belgium, Bosnia and Herzegovina, Colombia, Czech Republic, Ghana, Hong Kong, Hungary, Indonesia, Islamic Republic of Iran, Ireland, Luxembourg, New Zealand, Romania, Saudi Arabia, Serbia, Switzerland, Turkey</td></tr>
<tr><td>Secretariat</td><td>KATS (Republic of Korea)</td></tr>
<tr><td>Secretary</td><td>Ms. Eunsook Kim</td></tr>
<tr><td>Chairperson</td><td>Mr. Erlend Øverby</td></tr>
<tr><td>Organizations in liaison</td><td>ADL, AICC, AUF, IMS, Infoterm, LETSI, LTSC, Cartago Alliance, INLAC</td></tr>
<tr><td>Web site</td><td colspan="3">https://www.iso.org/committee/45392.html</td></tr>
<tr><td>Scope</td><td colspan="3">Standardization in the field of information technologies for learning, education, and training to support individuals, groups, or organizations, and to enable interoperability and reusability of resources and tools.

Excluded from this scope are:
- Standards or technical reports that define educational standards (competencies), cultural conventions, learning objectives, or specific learning content;
- Work done by other ISO or IEC TCs, SCs, or WGs with respect to their component, specialty, or domain. Instead, when appropriate, normative or informative references to other standards shall be included. Examples include documents on special topics such as multimedia, web content, cultural adaptation, and security.</td></tr>
<tr><td>Structure</td><td colspan="3">JTC 1/SC 36/AG 1 Business planning and communications
JTC 1/SC 36/WG 1 Vocabulary
JTC 1/SC 36/WG 2 Collaborative and intelligent technology
JTC 1/SC 36/WG 3 Learner information
JTC 1/SC 36/WG 4 Management and delivery
JTC 1/SC 36/WG 5 Quality assurance and descriptive frameworks
JTC 1/SC 36/WG 6 Platform, Services, and specification integration
JTC 1/SC 36/WG 7 ITLET - Culture, language and individual needs
JTC 1/SC 36/WG 8 Learning Analytics Interoperability</td></tr>
<tr><th colspan="4">Standardization work</th></tr>
<tr><td>Published standards</td><td colspan="3">Number of published ISO/IEC standards under the direct responsibility of JTC 1/SC 36 (number includes updates): 42</td></tr>
<tr><td>Standards under development</td><td colspan="3">12</td></tr>
</table>

Involvement of Luxembourg
NO (no registered delegate)
Comments

ISO/IEC JTC 1/SC 36 develops international standards for information technologies (IT) used in Learning, Education and Training (LET). A key goal of SC36 standards is to provide for interoperability among different and distributed IT systems, tools and services used in LET contexts.

ITLET data can be divided into four types each requiring a specific set(s) of specifications and standards. Below are some published standards developed within the SC36 sub-committee, addressing each type. More than 20 other standards, currently under development, are not listed here[121].

1. Content: learning resource description, referencing and packaging.
   - ISO/IEC 12785 series– Content Packaging
   - ISO/IEC 19788 series –Metadata for learning resources
   - ISO/IEC 29163 series – Sharable Content Object Reference Model

2. Programs and curriculum and competencies description to help tracking learner progress.
   - ISO/IEC 20006 series – Information model for competency

3. Technical data related to resource delivery (DRM, streaming and downloading,) and user data (identity, preferences, accessibility)
   - ISO/IEC 23988:2007 – A code of practice for the use of information technology (IT) in the delivery of assessments
   - ISO/IEC 24751 series – Individualized adaptability and accessibility in e-learning, education and training
   - ISO/IEC TS 29140 series – Nomadicity and mobile technologies
   - ISO/IEC 20016-1:2014 – Language accessibility and human interface equivalencies (HIEs) in elearning applications
   - ISO/IEC 29187 series -- Identification of privacy protection requirements pertaining to learning, education and training (LET)

4. Tracking data to collect learner output and support learning analytics
   - ISO/IEC 24703:2004 – Participant Identifiers
   - ISO/IEC 19778 series – Collaborative technology
   - ISO/IEC 19780 series – Collaborative learning communication
   - ISO/IEC 36000 series –Quality management, assurance and metrics

The current work program of ISO/IEC JTC 1/SC 36 notably includes:
   - ISO/IEC PDTR 20821, Learning environment components for automated contents adaptation;
   - ISO/IEC DIS 40180, Information technology -- Learning, education and training -- Quality for learning, education and training -- Fundamentals and reference framework;
   - ISO/IEC CD 40183, Information technology -- Learning, education and training -- Quality management, assurance and metrics.

[121] Source : SC 36 BUSINESS PLAN 2016

6.14.7. CEN/TC 287

General information			
Committee	**CEN/TC 287**	**Title**	**Geographic Information**
Creation date	1991	**MEMBERS** 	34 members of CEN/CENELEC
Secretariat	BSI (United Kingdom)		
Secretary	Ms. Jacky Duncan		
Chairperson	Dr. Robert Walker		
Organizations in liaison	EU INSPIRE, GEOSS, GMES, ISO, OGC		
Web site	http://standards.cen.eu/dyn/www/f?p=204:7:0::::FSP_ORG_ID:6268&cs=1463041AEB6C5E614A612D0C224DCB350		
Scope	Standardization in the field of digital geographic information for Europe: The committee will produce a structured framework of standards and guidelines, which specify a methodology to define, describe and transfer geographic data and services. This work will be carried out in close cooperation with ISO/TC 211 in order to avoid duplication of work. The standards will support the consistent use of geographic information throughout Europe in a manner that is compatible with international usage. They will support a spatial data infrastructure at all levels in Europe.		
Structure	CEN/TC 287/WG 5 Spatial Data Infrastructure		
Standardization work			
Published standards	47		
Standards under development	12		
Involvement of Luxembourg			
NO (no registered delegate)			
Comments			

The main objective is to facilitate the development and usage of geographical information in Europe by:

- Adopting, when appropriate, the ISO/TC 211 standards series as CEN standards since CEN/TC 287 is the European counterpart of ISO/TC 211 (Geographic information/Geomatics);
- Developing and maintaining standards, specifications and profiles of standards;
- Developing technical guidance and best practice documentation;
- Collaborating with other standards related initiatives;
- Educating the user community and promoting the use of standards for geographic information.

The current work program of CEN/TC 287 consists in the transposition of International Standards from ISO/TC 211 as European Standards.

6.14.8. CEN/TC 428

<table>
<tr><th colspan="4">General information</th></tr>
<tr><td>Committee</td><td>CEN/TC 428</td><td>Title</td><td>e-competences and ICT Professionalism</td></tr>
<tr><td>Creation date</td><td>2007</td><td rowspan="5">MEMBERS
  </td><td rowspan="5">34 members of CEN/CENELEC</td></tr>
<tr><td>Secretariat</td><td>UNI (Italy)</td></tr>
<tr><td>Secretary</td><td>Ms. Veronica Salsano</td></tr>
<tr><td>Chairperson</td><td>Mr. Fabio Massimo</td></tr>
<tr><td>Organizations in liaison</td><td>/</td></tr>
<tr><td>Web site</td><td colspan="3">http://standards.cen.eu/dyn/www/f?p=204:7:0::::FSP_ORG_ID:1218399&cs=1600F0DD849DA04F3E3B900863CB58F72</td></tr>
<tr><td>Scope</td><td colspan="3">CEN/TC 428 is responsible for the standardization of a common language of Professional Digital and ICT competences, skills and knowledge applied in all domains. A not exhaustive list of areas where CEN/TC 428 can develop its activity is the following:
- 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).</td></tr>
<tr><td>Structure</td><td colspan="3">/</td></tr>
<tr><th colspan="4">Standardization work</th></tr>
<tr><td>Published standards</td><td colspan="3">2</td></tr>
<tr><td>Standards under development</td><td colspan="3">1</td></tr>
<tr><th colspan="4">Involvement of Luxembourg</th></tr>
<tr><td colspan="4">NO (no registered delegate)</td></tr>
<tr><th colspan="4">Comments</th></tr>
<tr><td colspan="4">CEN/TC 428 has published its two first normative documents in 2016:
- EN 16234-1:2016, e-Competence Framework (e-CF) - A common European Framework for ICT Professionals in all industry sectors – Part 1: Framework. It provides a reference of 40 competences as required and applied at the ICT business related workplace, using a common language for competences, skills and proficiency levels that can be understood across Europe. It is the first sector-specific implementation of the European Qualifications Framework (EQF), a translation tool that helps communication and comparison between qualifications systems in Europe.
- CEN/TR 16234-2:2016, e-Competence Framework (e-CF) - A common European Framework for ICT Professionals in all industry sectors - Part 2: User Guide. This Technical Report supports understanding, adoption and use of EN 16234-1. It supports Information and Communication Technology (ICT) stakeholders to adopt, apply and use the framework in their environment.

It is currently developing the third part of EN 16234, E-Competence Framework (e-CF) - A common European Framework for ICT Professionals in all industry sectors - Part 3: Methodology, which describes the methodology grounding for the development of the e-Competence Framework published as EN 16234-1.</td></tr>
</table>

6.14.9. CEN/TC 434

General information			
Committee	**CEN/TC 434**	**Title**	**Electronic Invoicing**
Creation date	2014	**MEMBERS** 	34 members of CEN/CENELEC
Secretariat	NEN (Netherlands)		
Secretary	Mr. Jaap van der Marel		
Chairperson	Mr. Andrea Caccia		
Organizations in liaison	/		
Web site	http://standards.cen.eu/dyn/www/f?p=204:7:0::::FSP_ORG_ID:1883209&cs=1E81C9C833655EEDC7010C8D0A2FB786C		
Scope	CEN/TC 434 will develop the deliverables described in the standardization request (Mandate M/528) by the European Commission in support of the implementation of the Directive 2014/55/EU on electronic invoicing in public procurement. The request defines the following objectives: - To develop a European standard (EN) for the semantic data model of the core elements of an electronic invoice; - To identify a limited number of invoice syntaxes (formats) which fully comply with the European standard, to be given in a Technical Specification (TS); - To develop 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 (TS); - To develop guidelines on interoperability of electronic invoices at the transmission level, taking into account the need of ensuring the authenticity of the origin and the integrity of the electronic invoices' content, to be given in a Technical Report (TR); - To develop guidelines on the optional use of sector or country extensions (as described in the Recommendation of the European Multi-stakeholder Forum on e-Invoicing) in conjunction with the European standard, including a methodology to be applied in the real environment, to be given in a Technical Report (TR); - To carry 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)		
Structure	CEN/TC 434/WG 1 Core semantic data model CEN/TC 434/WG 2 List of syntaxes CEN/TC 434/WG 3 Syntax bindings CEN/TC 434/WG 4 Guidelines at transmission level CEN/TC 434/WG 5 Extension methodology CEN/TC 434/WG 6 Test methodology and test results		
Standardization work			
Published standards	0		
Standards under development	10		
Involvement of Luxembourg			
NO (no registered delegate)			

Comments

On 6 May 2014, the Directive 2014/55/EU[122] of the European Parliament and of the Council of 16 April 2014 on electronic invoicing in public procurement was published in the Official Journal, which "*request that the relevant European standardization organization draft a European standard for the semantic data model of the core elements of an electronic invoice (the 'European standard on electronic invoicing')*".

In this context, CEN/TC 434 has been created and has to complete the standardization request defined in the Mandate M/528[123] by the 31st of March 2017. At this end, it is currently developing the multi-part European Standard EN 16931 to answer the standardization request.

[122] http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32014L0055
[123] http://ec.europa.eu/growth/tools-databases/mandates/index.cfm?fuseaction=search.detail&id=549#

6.14.10. CEN/TC 440

General information			
Committee	**CEN/TC 440**	**Title**	**Electronic Public Procurement**
Creation date	2015	**MEMBERS** 	34 members of CEN/CENELEC
Secretariat	DS (Denmark)		
Secretary	Mr. Nielsen Søren		
Chairperson	Mr Jostein Fromyr		
Organizations in liaison	/		
Web site	https://standards.cen.eu/dyn/www/f?p=204:7:0::::FSP_ORG_ID:1976650&cs=175E298F320429229DD35C9E22F4E8F76		
Scope	Standardization in the field of e-procurement to support the electronic public procurement processes and their accompanying information flows in the physical and financial supply chain. This is to facilitate end-to-end e-procurement including both Pre-award and Post-award processes for public procurement		
Structure	CEN/TC 440/WG 1 Architecture CEN/TC 440/WG 2 Terminology CEN/TC 440/WG 3 e-Notification CEN/TC 440/WG 4 e-Tendering CEN/TC 440/WG 5 e-Catalogue CEN/TC 440/WG 6 e-Ordering CEN/TC 440/WG 7 e-Fulfillment		
Standardization work			
Published standards	0		
Standards under development	6		
Involvement of Luxembourg			
NO (no registered delegate)			
Comments			

The scope of CEN/TC 440 covers:

- e-notification - Publication of and access to notices related to procurement opportunities such as Prior information Notices, Contract Notices and Contract Award Notices.
- e-access - Electronic access to tender documents and specifications, including electronic access to supporting documents for suppliers in the preparation of a Tender response, e.g. clarifications, questions and answers.
- e-submission - Secure submission of tenders and/or catalogues in electronic format to the contracting body (contracting authority/ contracting entity), which is able to receive and process it in compliance with applicable legal requirements.
- e-evaluation - Evaluation of the electronic tenders and/or catalogues received by the contracting body following the closing deadline of a tender competition, including electronic exchange to support for evaluators to clarify the tender.

- e-awarding - Information exchange regarding award of the contract, including electronic exchange to support tenderers request for additional information about the result of the procedure.
- e-contract - Signing, enactment of a contract / agreement and possibly its related catalogue through electronic means between the contracting authority/entity and the winning tenderer(s), as well as signing of contract amendments and possibly their related catalogue.
- e-sourcing - Activities preparatory to issuing an order. It can consist in exchanging electronic messages with winning tenderers who have signed a framework agreement with the contracting body, a request for quotation and its response (quotation) (e.g. framework agreements with reopening competition), etc. e-ordering - Issuing of an electronic order by the contracting body and its acceptance by the supplier or conversely issuing of an electronic order agreement by the supplier.
- e-fulfilment - Electronic exchange of documents that enable monitoring the execution of the order or the contract.

Deliverables for these processes will support the electronic exchange of information in public procurement as well as in B2B transactions.

Attention will be given to the establishment of a semantic data model and at least one syntax data binding for the application of XML in both pre-award and post-award. The work of CEN/PC 440 will be developed from the deliverables of CEN/BII in alignment with the deliverables of CEN/PC 434. Other initiatives such as ISO/IEC/JTC 1/SC 32, OpenPEPPOL and eSENS will be taken into consideration as appropriate."

6.14.11. CEN/TC 445

General information			
Committee	**CEN/TC 445**	**Title**	**Digital information Interchange in the Insurance Industry**
Creation date	2015	**MEMBERS** 	34 members of CEN/CENELEC
Secretariat	DIN (Germany)		
Secretary	Mr. Martin Uhlherr		
Chairperson	Dr Manuel Reimer		
Organizations in liaison	ACORD, BIPAR		
Web site	https://standards.cen.eu/dyn/www/f?p=204:7:0::::FSP_ORG_ID:2066522&cs=12714B042258C461E8EC2FB7ACA873346		
Scope	Standardization in the field of digital information interchange in the European insurance industry. This applies to aspects of policy administration (quotation, offer, application, transfer of contract and premium data, premium and commission statement, party and contract changes, search and information services for party and contract) and of claims handling (notification, verification, assessment, authorization, settlement and reimbursement, recovery, status information). Standardization will focus on the digital information interchange among insurance companies, intermediaries, sales organizations, portals, service providers and customers. All lines of business in the insurance industry may be considered, such as life, health, property and casualty.		
Structure	/		
Standardization work			
Published standards	0		
Standards under development	0		
Involvement of Luxembourg			
NO (no registered delegate)			
Comments			
The standardization objectives for CEN/TC 445 are[124]: - Transfer of electronic documents; - Electronic premium invoice; - Motor accident notification; - Interface to automotive insurance databases; - Reimbursement in health insurance; - Key Information Document (KID) for Packaged Retails and Insurance-based Investment Products (PRIIPs).			

[124] Source : CEN/TC 445 Business Plan

7. OPPORTUNITIES FOR THE NATIONAL MARKET

The purpose of the sector-based standards analysis is to involve identified national stakeholders in a standardization approach to support and stimulate the ICT sector in terms of competitiveness, visibility and performance.

Based on the standards analysis of the ICT sector, and especially the potential interests for the stakeholders (see Section 4.4), there are many opportunities for the national market. Convinced that national actors have a real interest to seize these opportunities, ILNAS and ANEC GIE jointly and actively contribute to inform them and support their normative steps. The identified opportunities should be seen by national stakeholders as a series of proposals which could lead to go further and to engage in future actions in order to more rapidly take advantage of standardization.

The opportunities listed below are available at the national level, according to the interests of the stakeholders in the ICT sector.

❖ Participation in ICT technical committees

The ICT sector is, at national level, the most mature standardization sector. Luxembourg is notably registered as "O-member" of ISO/IEC JTC 1, and 69 delegates from Luxembourg are currently involved in international and European technical committees from the ICT sector.

Participating in ICT standardization technical committees offers a broad set of opportunities and benefits:

- Giving your opinion during the standardization process (comments and positions of vote on the draft standards);
- Valuing your know-how and good practices;
- Accessing draft standards;
- Anticipating future evolutions;
- Collaborating with strategic partners and international experts;
- Valuing your organization at national and international level;
- Identifying development opportunities;
- Placing your organization in the competition.

❖ Stronger commitment as a national delegate (chairman, head of delegation, editor of European or international standards)

Registration as a national delegate offers the possibility to assume different levels of involvement:

- Chairman of a national mirror committee: each national mirror committee has to nominate a chairman who will be in charge of the organization of the national community of delegates registered in this committee. Indeed, the chairman has to vote on the draft standards on the basis of the consensual position agreed between the economic entities represented within the national mirror committee;
- Head of delegation: national delegates can be nominated by the national mirror committee to represent its position during the plenary meetings of the corresponding international or European technical committees;
- Editor or co-editor of standards documents: each standards project is subject to a call for participation. In this frame, a national delegate can choose to actively participate in the project as editor or coeditor. He will then take the responsibility to ensure the successful conduct of the project until its publication.

Some national delegates from the ICT sector have already been (co-)editors of standards documents such as technical reports (ISO/IEC TR 20000-4, ISO/IEC TR 20000-5 and ISO/IEC TR 27015:2012, ISO/IEC TR 14516-3), international standards (ISO/IEC 27010, ISO/IEC 27034-4, ISO/IEC 33050-4) or other various standards documents (ISO/IEC JTC 1/SC 27/WG 5 Standing Document 2 – Part 1).

❖ **Proposal of new standards projects**

National stakeholders can propose new standardization projects both at international and national levels through ILNAS. The national standards body offers its support to ensure the good implementation of the process and the project's compliance with the related rules and legislation.

This opportunity can allow national stakeholders to take a leading role in the standardization of a domain and to benefit from the definition of the future market rules.

❖ **Participation in the training "New delegates in standardization"**

Newcomers in technical standardization, who have registered in a technical committee, are encouraged to participate in the dedicated training offered by ILNAS. It allows them, from one side, to better understand the roles and missions of delegates in standardization, and from the other side, to appropriate the tools and services at their disposal for this work.

❖ **Free consultation of the national, European and international standards**

ILNAS offer the free consultation of its entire standards' database (including more than 150 000 normative documents from ILNAS, DIN, CEN, CENELEC, ETSI, ISO and IEC) through lecture stations located in six different places in Luxembourg:

- University of Luxembourg (Luxembourg Kirchberg);
- House of Entrepreneurship (Luxembourg Kirchberg);
- National library of Luxembourg (Luxembourg);
- ILNAS (Esch-Belval);
- LIST (House of Innovation – Esch-Belval);
- LIST (Belvaux).

This service allows, for example, interested organizations or individuals to peruse a standard before its purchase. The ILNAS e-Shop[125] offers then the possibility to buy the relevant standards in electronic format under at competitive prices.

❖ **Submission of comments on draft standards under public enquiry**

ILNAS proposes, through its e-Shop, the opportunity to submit comments on the standards under public enquiry. Every interested national stakeholder can propose changes in the draft standard, regardless of whether such stakeholder is officially registered in the technical committee responsible for the development of this standard.

❖ **Benefit from the support offered by the national standards body**

As the national standards body, ILNAS has to provide support to national delegates and to coordinate the activities of the different committees at the national level. These duties are of primary importance and well stated in the "Luxembourg's Policy on ICT technical standardization 2015-2020" which aims

[125] https://ilnas.services-publics.lu/

to enhance the organization and development of the ICT technical standardization representation at the national level.

Particularly in the ICT sector, ILNAS, with the support of ANEC GIE, proposes a dedicated coaching service that is available for any registered national delegate, who requires assistance for the achievement of his standardization work.

❖ Participation in national Smart ICT workshops

In order to share the ICT standardization knowledge with the related community in Luxembourg (ISO/IEC JTC 1, ETSI, ICT *fora* and *consortia*, etc.), ILNAS organizes, at national level in collaboration with ANEC GIE, workshops in the framework of ICT prospective and, more specifically in the domain of "Smart ICT".

For instance, the organization of a series of breakfasts dedicated to the promotion of Smart ICT standardization and Digital Trust in 2016 and 2017. Indeed, in relation with the publication of the White Paper "Digital Trust for Smart ICT", described later in this chapter, four workshops are being organized from October 2016 to March 2017 in order to discuss the role of Digital Trust topic in the adoption and widespread use of Smart ICT. Beyond the technical aspects, last related standardization developments are presented to highlight their importance for the establishment of a trusted digital environment. This series of breakfasts reviews various Smart technologies, focusing on the Internet of Things, Cloud Computing and Big Data, the three topics developed in the White Paper, through the prisms of Digital Trust and Standardization. They are being organized to bring together national stakeholders of dedicated Smart ICT subsectors and to provide them with the relevant standardization knowledge and facilitate their engagement in the standards development process. In this manner, ILNAS organizes one or two hour sessions dedicated to technical standardization of a specific Smart ICT subsector, on a regular basis.

Moreover, ILNAS aims at managing and reinforcing the National Mirror Committees dedicated to Smart ICT (e.g.: ISO/IEC JTC 1/WG 9 for Big Data, ISO/IEC JTC 1/SC 38 for Cloud Computing, ISO/IEC JTC 1/SC 41 for IoT, etc.). In this frame, the institute will organize meetings of these NMC, which represent a good opportunity for interested national stakeholders to strengthen their commitment into the process of technical standardization.

❖ Benefit from a dedicated awareness session

Another way to get the relevant standardization knowledge is to contact ILNAS and ANEC GIE in order to program a dedicated awareness session. This kind of meeting aims at providing the basics about standardization as well as the information that meets the standards-related interests of the requesting organization. In this way, ILNAS provides a detailed overview of relevant technical committees and standards project under development to allow the organization to take advantage of standardization, for example by registering in the identified technical committees.

To facilitate the organization of such awareness, interested stakeholders can fill a declaration of interest in ICT standardization[126] to be contacted by ILNAS and ANEC GIE.

[126] https://portail-qualite.public.lu/content/dam/qualite/fr/documentations/normes-normalisation/declarations-interet/declaration-interet-normalisation-tic/declaration-interest-standardization-it.pdf

❖ **Identify the most relevant ICT standardization technical committees and standards projects**

The primary objective of the current report is to facilitate the identification of technical committees that meet organizations' potential interests. In this way, the standards analysis of the ICT sector represents the most appropriate document to quickly get an overview of the ICT standardization landscape and select the technical committees to be followed.

Moreover, ILNAS, with the support of ANEC GIE, can execute, on demand, a focused standards watch to answer the needs of a national organization. This service consists in the analysis of relevant standards (both published and under development) and technical committees related to a specific problematic of a requesting organization. A standards watch report is delivered at the end of the process as a final result and some additional steps can be proposed by ILNAS and ANEC GIE, like the registration in a technical committee to allow the follow-up of the relevant standardization developments by the requesting organization.

❖ **Following the standardization work performed by the European multi-stakeholder platform on ICT standardization (MSP)**

Since January 2012, ILNAS - Digital trust department, is the Luxembourg's representative within the European Multi-Stakeholder Platform on ICT Standardization (see Section 3.2.2). In this frame, ILNAS is the official national contact point dedicated to exchange information between the market and the European multi-stakeholder platform on ICT standardization.

In this context, interested stakeholders can contact the Digital trust department of ILNAS to join this initiative. It offers the possibility to receive and comment, through ILNAS, documents published by the MSP in different ICT areas.

❖ **Participation in trainings dedicated to standardization**

ILNAS, with the support of ANEC GIE, proposes trainings dedicated to standardization. In particular, a half-a-day training on ICT standardization [127] can be delivered with the objective to offer the participants an overview of the functioning as well as main issues of standardization in this field.

❖ **Participation in the university certificate *Smart ICT for Business Innovation***

ILNAS, in collaboration with the University of Luxembourg, has developed the university Certificate *Smart ICT for Business Innovation*, which represent an innovative way to better understand ICT standardization and develop new related skills.

This diploma will allow the students to take a broad view of the cutting-edge Smart ICT concepts and tools at their disposal in order to develop their sense of innovation. Overall, the Certificate will focus on important aspects of Smart ICT and their applications, such as the development of Smart Cities, Big Data and Analytics, Internet of Things and Cloud Computing. The programme will also propose an overview of some challenges to fully exploit the potential of Smart ICT:

- Digital Trust: Technologies must offer security, privacy and trust guarantees to ensure their adoption and proper implementation;
- Governance of IT: Economic actors must take ownership and support these technologies to benefit from their advantages;

[127] https://portail-qualite.public.lu/fr/formations/normes-normalisation/2017/f02-normalisation-tic.html

- Green ICT: The massive digitalization of our society has important repercussions on our environment and our quality of life. It has become necessary to take into account the environmental impact of the Smart ICT but also to take advantage of the solutions provided by Smart ICT.

All of these technologies and challenges are now being considered by international and European standardization organizations. Technical standardization will therefore be at the core of the curriculum as it is a key source of knowledge in constant evolution. Standardization committees can indeed be considered as the only platforms gathering all interest groups of manufacturers, researchers, business innovators and other stakeholders, making them the beating heart of ICT progress.

❖ Participation in research projects involving standardization at European level

Research in the ICT sector is important in Luxembourg, with several actors active in this field. Moreover, as mentioned by the CEN-CENELEC[128], the role of standardization is recognized as a bridge between research activities and the market, both by EU institutions and R&D stakeholders. Indeed, standardization is identified in Horizon 2020 as one of the measures that will support the market take-up of research results and innovation.

The Luxembourg's standards body can inform national stakeholders about ICT research projects involving standardization to make them able to seize opportunities to be involved in such research projects.

❖ Benefit from the ICT standardization research results at national level

ILNAS is currently developing a joint research program with the University of Luxembourg (Interdisciplinary Centre for Security, Reliability and Trust – SnT). It will be dedicated to reinforce the collaboration in the domain of Smart ICT for Business Innovation through Technical Standardization and will focus on Digital Trust for Smart ICT. From one side, through the results of the research, this program will support the evolution of the academic program of the Certificate *Smart ICT for Business Innovation*. From the other side, it will serve as a basis for a future Master Program *Smart Secure ICT for Business Innovation* (expected in 2019). In this context, three PhD students will be involved to work on dedicated Smart ICT topics: Cloud Computing, Big Data and Analytics and Internet of Things.

As a first step, ILNAS published, with the support of the Ministry of the Economy, the White Paper "Digital Trust for Smart ICT" at the end of 2016[129] to bring into perspective, through technical, economic, prospective and standard analysis, the market needs in terms of Digital Trust in order to facilitate the adoption and widespread use of Smart ICT, and more specifically the Internet of Things (IoT), Cloud Computing and Big Data. It aims to provide national market with relevant knowledge to make easier the establishment of a trusted digital environment and, as a corollary, create value and foster technological development. The appropriation of these concepts will provide a framework to encourage the adoption and the generalization of Smart ICT and their uses.

Moreover, two additional White Papers concerning Smart ICT concepts have been published by ILNAS in 2016:

[128] http://www.cencenelec.eu/research/Pages/default.aspx

[129] https://portail-qualite.public.lu/content/dam/qualite/fr/publications/confiance-numerique/etudes-nationales/white-paper-digital-trust-october-2016/White-Paper-Digital-Trust-October-2016.pdf

- The White Paper "Green Computing"[130]

This White Paper surveys, from a holistic perspective, various topics and technologies in the area of sustainability and Information Technology (IT), also known as Green Computing or Green ICT. An investigation is made regarding questions on the environmental impact of current IT usage, energy efficiency of IT products and how IT can contribute to business sustainability. The aim of the document is therefore to present a comprehensive review of the state-of-the-art approaches to help companies in developing sustainable and environmental friendly products and services which are supported or enabled by IT. In this context, standardization is presented as the cornerstone to guide and support organizations to achieve sustainability. A thorough review is conducted on the most relevant standards related to the topic of Green Computing from different standardization bodies such as ISO, IEC, CENELEC, ETSI, and ITU and *consortia* such as ECMA and IEEE. Finally, the Eco-management and Audit Scheme (EMAS) is surveyed as an environmental management system which enables organizations to assess, manage, and continuously improve their environmental performance. Because the requirements of ISO 14001 "Environmental management systems" are an integral part of EMAS, organizations that comply with EMAS automatically comply with the requirements of such standard.

- The White Paper "Big Data"[131]

This document aims at surveying current advances in Big Data and Big Data Analytics from two complementary points of view: a technical analysis perspective and a business and economic prospective analysis. Therefore, the document is intended for those professionals seeking guidance in one or both domains and can be used in its whole as a compendium where technical and IT governance aspects of Big Data are equally treated. Standards and technical standardization is also presented as an essential tool to improve the interoperability between various applications and prevent vendor lock-in, to provide interfaces between relational and non-relational data stores and to support the large diversity of current data types and structures. Finally, some conclusions on Big Data are presented with an outlook on how to integrate them in the business environment to create value.

❖ Contribution to the improvement of Luxembourg's status in the standardization field

By enhancing the participation in standardization activities and by implementing the opportunities listed previously, Luxembourg will strengthen its presence in the standardization field and significantly improve its image at European and international level, which will benefit the entire national market.

[130] https://portail-qualite.public.lu/content/dam/qualite/fr/publications/normes-normalisation/information-sensibilisation/white-paper-green-computing/white-paper-green-computing.pdf
[131] https://portail-qualite.public.lu/content/dam/qualite/fr/publications/normes-normalisation/information-sensibilisation/white-paper-big-data-1-2/wp-bigdata-v1-2.pdf

❖ SUMMARY

To summarize, the opportunities identified for the national market and available at the national level for the different ICT stakeholders are:

- Participation in ICT technical committees;
- Stronger commitment as a national delegate (chairman, head of delegation, editor of European or international standards);
- Proposal of new standards projects;
- Participation in the training "New delegates in standardization";
- Free consultation of the national, European and international standards;
- Submission of comments on draft standards under public enquiry;
- Benefit from the support offered by the national standards body;
- Participation in national Smart ICT workshops;
- Benefit from a dedicated awareness session;
- Identify the most relevant ICT standardization technical committees and standards projects;
- Following the standardization work performed by the European multi-stakeholder platform on ICT standardization (MSP);
- Participation in trainings dedicated to standardization;
- Participation in the university certificate Smart ICT for Business Innovation;
- Participation in research projects involving standardization at European level;
- Benefit from the ICT standardization research results at national level;
- Contribution to the improvement of Luxembourg's status in the standardization.

As long as the stakeholders of the sector wish to seize these opportunities ILNAS, supported by ANEC GIE, can provide an active contribution and support.

As the national standards body, ILNAS offers national stakeholders the possibility to follow specific standardization activities of technical committees, either at European or international level. It supports those who are interested to participate in standardization activities, namely by providing information and delivering trainings. Therefore, resources from ILNAS and ANEC GIE are specifically dedicated to these aspects and are able to efficiently support and inform the future national delegates[132].

To reinforce this support, a person is appointed as the specific point of contact for delegates of the ICT sector. As such, the information and support provided would also stay as close as possible to the issues related to this sector.

[132] Declaration of interest in ICT standardization

8. CONCLUSION

Today, ICT is already one of the most active sector, both at national and international level. It is evolving towards smarter technological products and services. Through the development of new and innovative digital products and services, Smart ICT constitutes a major source of economic development and it directly participates in the resolution of current environmental and social concerns. Maybe more importantly, Smart ICT is a horizontal sector and key enabler of development in all sectors (vertical) of the global and national economy, being a source of progress and providing added value to these sectors.

In this context, standards are essential not only to develop ICT, but also to support its interoperability with other sectors. Smart ICT building blocks, like Cloud Computing, Big Data or Internet of Things (see Section 5.2), play a crucial role to support innovation and foster the development of related subsectors where Smart ICT applications and services offer new opportunities (e.g.: Smart Cities, eHealth, Intelligent Transport Systems, etc.). Therefore, there is an increasing interest of standards in these areas. Technical standardization plays an important role not only giving a first-hand insight into latest developments, thus supporting innovation, but also contributing to harmonization of systems and procedures, opening access to external markets and ensuring constant progress.

Moreover, standards contribute to promote and share good practices and techniques available in the ICT sector. They ensure the quality and performance of products, systems and services. They also facilitate dialogue and exchange between various stakeholders. In this sense, standardization represents an important economic lever to improve business productivity. In a nutshell, standards play a key role by facilitating trades and guaranteeing some fundamental characteristics such as interoperability, quality, security and risk management.

As described in the national standardization strategy 2014-2020 [133], ICT is a horizontal sector supporting many innovative or smart developments. ANEC GIE, under the supervision of ILNAS, will therefore constantly analyze these developments and support national stakeholders according to "Luxembourg's Policy on ICT technical standardization 2015-2020"[134]. ICT is indeed one of the most competitive economic sectors in the Grand Duchy of Luxembourg, having communication infrastructures of high quality, hosting European headquarters of several world-leading ICT companies [135] and with a market composed of many companies, associations, administrations and experts.

ILNAS has already undertaken concrete developments, through its standardization and digital trust departments, to participate in the development of the digital economy in Luxembourg. It includes the launch of a University Certificate dedicated to Smart ICT, focusing on the Internet of Things and Digital Trust. This educational program, supported by the Ministry of the Economy, ETSI and the CEN-CENELEC, is the first step towards a more ambitious project of creating a Research Program and a Master dedicated to (Secure) Smart ICT (Cloud Computing, IoT and Big Data) and Digital Trust.

In this framework, this analysis constitutes a complementary tool to foster the positioning of Luxembourg in the ICT standardization landscape. It highlights the potential interest for the national

[133] https://portail-qualite.public.lu/content/dam/qualite/fr/publications/normes-normalisation/orientations-strategiques/strategie-normative-2014-2020/luxembourg-standardization-strategy-2014-2020.pdf
[134] https://portail-qualite.public.lu/content/dam/qualite/fr/publications/normes-normalisation/orientations-strategiques/politique-luxembourgeoise-pour-la-normalisation-technique-des-tic-2015-2020/policy-ict-technical-standardization-2015-2020.pdf
[135] https://ict.investinluxembourg.lu/sectors/media-entertainment-e-gaming

stakeholders (Section 4.4) and the opportunities for the national market to participate in the standardization process (Chapter 7). However, standardization is performed on a voluntary basis and each stakeholder is free to get involved and to define his/her level of commitment. Proper understanding of the stakes associated to ICT standardization is necessary to adopt the appropriate position across the standardization landscape and benefit from all the related opportunities.

Driven by the motto of the national standardization strategy 2014-2020: "*Technical standardization as a service*", ILNAS and ANEC GIE stand ready to encourage and assist each initiative in this process.

9. APPENDIX

9.1. PARTICIPATION IN THE STANDARDIZATION PROCESS

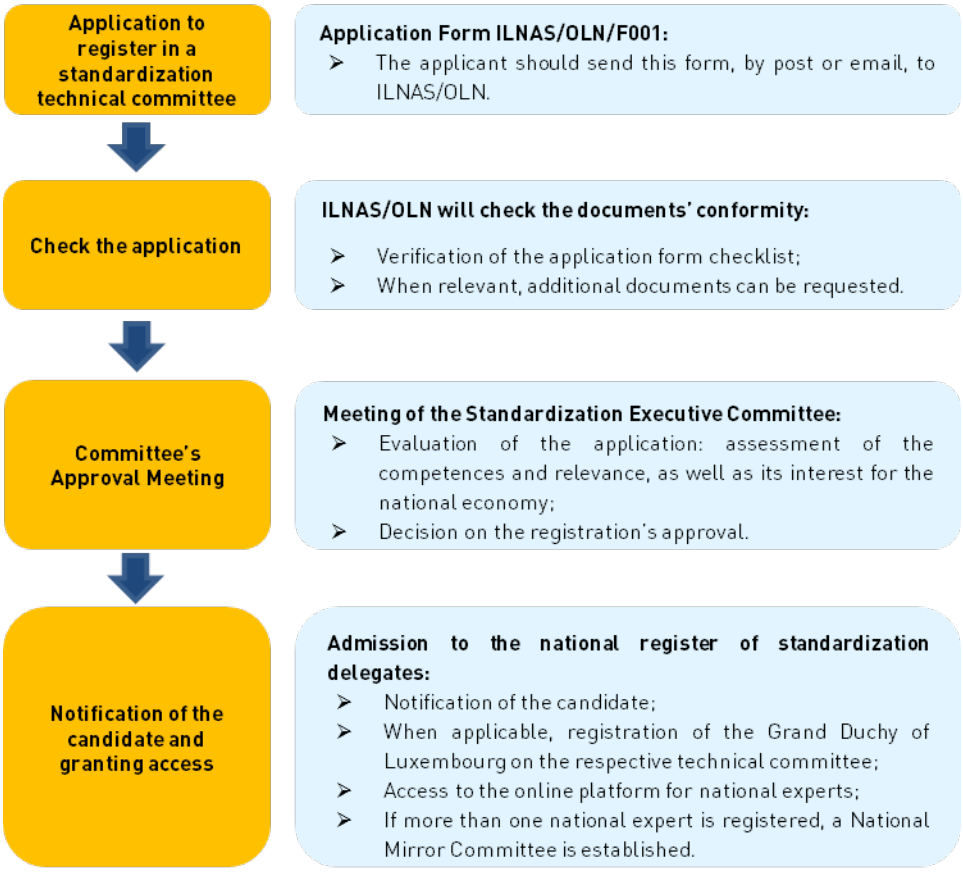
ILNAS, as the national standards body, is a member of European and international standardization organizations. In this frame, ILNAS *via* OLN can count on experts from administrations, public services, professional organizations, groups, associations or institutions interested in standardization, as well as all persons or legal entities interested in participating in standardization. In order to provide all national socio-economic stakeholders access to standardization processes, the registration as national delegate is entirely free of charge in Luxembourg.

To propose a framework for the standardization work of the national delegates and their participation in standardization technical committees, ILNAS has released a policy giving the main specifications and requirements to the delegates regarding standardization processes and activities. This document, entitled "Policy on participation in technical standards committees" is referenced as ILNAS/OLN/P001[136].

❖ Registration process to participate in standardization technical committees

Figure 5 summarizes the process for registering as a national delegate to participate in a standardization technical committee.

Figure 5: Registration process to participate in standardization technical committees



[136] https://portail-qualite.public.lu/content/dam/qualite/fr/documentations/normes-normalisation/delegue-normalisation/ilnas-oln-P001-politique-participation-comite-technique/ilnas-oln-P001-politique-participation-comite-technique-en.pdf

Detailed information on the registration process is available through the following link:

https://portail-qualite.public.lu/fr/normes-normalisation/participer-normalisation/experts-normalisation.html

❖ Registration of national delegates in standardization

ILNAS publishes regularly the list of the national delegates in standardization. The comprehensive list is available on the following link:

https://portail-qualite.public.lu/content/dam/qualite/fr/publications/normes-normalisation/information-sensibilisation/ilnas-oln-registre-national-delegues-normalisation/ilnas-oln-registre-national-delegues-normalisation.pdf

❖ Rights and duties of a national delegate in standardization

National delegates in standardization have the right to:

- Access any documents of the technical committee through a collaborative platform;
- Work on standards under development of a technical committee;
- Take a position during the validation or approval process;
- Participate in European and/or international meetings;
- Give suggestions for improvement to the OLN;
- Use the logo "Member of the ILNAS Network" in technical contributions.

In return, national delegates have to respect some duties, such as:

- Respect of the policy ILNAS/OLN/P001 and the logo charters "Member of the ILNAS Network" (ILNAS/OLN/A003[137]);
- Commitment of nondisclosure of the technical committee's documents to third parties;
- Participating actively in the standardization process is required;
- Inform OLN of the organization of European or international meetings in Luxembourg;
- Provide a periodic activities report to the OLN (personal activities, active participation, comments, etc.).

In conclusion, all the experts in the ICT domain that want to anticipate future requirements and influence the market are welcome to join the standardization process. A simple registration form[138] has to be completed and sent to ILNAS. After the application is approved, ILNAS will grant full access to standardization works and the delegate will become a full member of the standards network.

ILNAS, supported by ANEC GIE, provides assistance to new delegates in order to give them all the necessary information to efficiently participate in the standardization process.

[137] https://portail-qualite.public.lu/content/dam/qualite/fr/documentations/normes-normalisation/delegue-normalisation/ilnas-oln-A003-charte-utilisation-logo-ilnas-network/ilnas-oln-A003-charte-utilisation-logo-ilnas-network.pdf
[138] https://portail-qualite.public.lu/content/dam/qualite/fr/publications/normes-normalisation/information-sensibilisation/ilnas-oln-registre-national-delegues-normalisation/ilnas-oln-registre-national-delegues-normalisation.pdf

9.2. LIST OF ACRONYMS

ACRONYM	TITLE
3GPP	3rd Generation Partnership Project
ADL	Advanced Distributed Learning
AEI	Automatic Equipment Identification
AENOR	*Asociación Española de Normalización y Certificación*
AFNOR	*Association Française de Normalisation*
AGICOA	The Association for the International Collective Management of Audiovisual Works
AHG	Ad Hoc Group
AICC	Aviation Industry CBT Committee
AIDC	Automatic Identification and Data Capture
AM	Additive Manufacturing
AMEX	American Express
AMT	Advanced Manufacturing Technologies
ANEC	European Association for the Co-ordination of Consumer Representation in Standardization
ANEC GIE	*Agence pour la Normalisation et l'Economie de la Connaissance*
ANSI	American National Standards Institute
API	Application programming interface
ASN.1	Abstract Syntax Notation One
ASTM	American Society for Testing and Materials
ATIS	Alliance for Telecommunications Industry Solutions
ATM	Automated Teller Machine
ATSC	The Advanced Television System Committee
AUF	*Agence Universitaire de la Francophonie*
AVI	Automatic Vehicle Identification
AWI	Approved Work Item
BAC	Building Automation and Controls
BM	Building Management
BSI	British Standards Institute
CAB	Conformity Assessment Body
CCETT	Common Study Center of Telediffusion and Telecommunication
CCSDS	Consultative Committee for Space Data Systems
CD	Committee Draft
CEN	European Committee for Standardization
CENELEC (CLC)	European Committee for Electrotechnical Standardization
CEPT	European Conference of Postal and Telecommunications Administrations
CERN	European Organization for Nuclear Research
CIE	International Commission on Illumination
CISAC	International Confederation of Societies of Authors and Composers
COCIR	European Coordination Committee of the Radiological, Electromedical and Healthcare IT Industry
CSCC	Cloud Standards Customer Council
DICOM	Digital Imaging and Communication in Medicine
DIN	*Deutsches Institut für Normung*
DIS	Draft International Standard

ACRONYM	TITLE
DMTF	Distributed Management Task Force
DSRC	Dedicated Short Range Communication
DSSSL	Document Style Semantics and Specification Language
DVD	Digital Versatile Disc
EC	European Commission
ECBS	European Committee for Banking Standards
ECISS	European Committee for Iron and Steel Standardization
ECOS	European Environmental Citizens Organisation for Standardisation
EDCS	Environmental Data Coding Specifications
EDMA	European Diagnostic Manufacturers Association
EETS	European Electronic Toll Services
EFC	Electronic Fee Collection
EFPIA	European Federation of Pharmaceutical Industries and Associations
EFTA	European Free Trade Association
EHIBCC	European Health Industry Business Communications Council
EMC	ElectroMagnetic Compatibility
EMF	ElectroMagnetic field
EN	European Standard
ENISA	European Network and Information Security Agency
EPC	*Conseil Européen des Paiements*
EPUB	Electronic Publication
ESI	Electronic Signatures and Infrastructures
ESMIG	European Smart Metering Industry Group
ESO	European Standardization Organizations
ETSI	European Telecommunications Standards Institute
EU	European Union
EUCOMED	The European Medical Technology Industry Association
FG	Focus Group
FIAPF	International Federation of Film Producers Associations
GDP	Gross Domestic Product
GIE	*Groupement d'Intérêt Economique*
GSM	Global System for Mobile Communications
HBES	Home and Building Electronic Systems
HVAC	Heating, Ventilation and Air-Conditioning
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
ICC	International Color Consortium
ICMA	International Card Manufacturers Association
ICS	International Classification for Standards
ICT	Information and Communication Technology
IDC	International Data Corporation
ID-Cards	Identification Cards
IEC	International Electrotechnical Commission
IEEE	Institute for Electrical and Electronics Engineers
IETF	Internet Engineering Task Force
ILNAS	*Institut Luxembourgeois de la Normalisation, de l'Accréditation, de la Sécurité et qualité des produits et services*

ACRONYM	TITLE
ILO	International Labour Organization
ILR	*Institut Luxembourgeois de Régulation*
INCOSE	International Council on Systems Engineering
INLAC	Latinoamerican Institute for Quality Assurance
IoT	Internet of Things
IP	Internet Protocol
ISACA	Information Systems Audit and Control Association
ISDN	Integrated Services Digital Network
ISMS	Information Security Management System
ISO	International Organization for Standardization
ISOC	Internet Society
ISSEA	International Systems Security Engineering Association
IT	Information Technology
ITLET	Information Technology for Learning Education and Training
ITS	Intelligent Transport Systems
ITSO	International Telecommunications Satellite Organization
ITU	International Telecommunication Union
ITU-T	International Telecommunication Union's Telecommunication Standardization Sector
JFIF	JPEG File Interchange Format
JISC	Japanese Industrial Standards Committee
JTC	Joint Technical Committee
JWG	Joint Working Group
KATS	Korean Agency for Technology and Standards
LAN	Local Architecture Network
LETSI	International Federation for Learning-Education-Training Systems Interoperability
LTSC	IEEE Learning Technology Standards Committee
M2M	Machine-to-Machine communication
MDR	Metadata Registries
MFI	Metadata Framework for Interoperability
MMI	Man-Machine Interface
MoU	Memorandum of Understanding
MSP	European Multi-Stakeholder Platform on ICT Standardization
NB	National Body
NEN	Netherlands Standardization Institute
NFC	Near field communication
NIST	National Institute of Standards and Technology
NP	New Proposal
NWIP	New Work Item Proposal
OASIS	Organization for the Advancement of Structured Information Standards
ODR	Online Dispute Resolution
OGC	Open Geospatial Consortium
OGF	Open Grid Forum
OLN	*Organisme luxembourgeois de normalisation*
OMA	The Open Mobile Alliance
O-member	Observing member

ACRONYM	TITLE
OMG	Open Management Group
OSI	Open systems interconnection
PAS	Public Available Specification
PC	Project Committee
PKI	Public Key Infrastructures
PIA	Privacy Impact Assessment
PLC	Programmable Logic Controller
P-member	Participating member
PMI	Project Management Institute
PSF	*Prestataire de Services Financiers*
PUE	Power Usage Effectiveness
R&D	Research and Development
REF	Renewable Energy Factor
RFID	Radio-Frequency Identification
RMG	Registration Management Group
RTLS	Real-Time Locating Systems
SA	Standards Australia
SC	Subcommittee
SCC	Standards Council of Canada
SCSI	Small Computer System Interface
SDO	Standards Developing Organizations
SEDRIS	The Source for Environmental Data Representation & Interchange
SG	Strategic Group/Study Group
SGML	Standard Generalized Markup Language
SLA	Service Level Agreement
SMB	Standardization Management Board
SMPTE	Society of Motion Picture and Television Engineers
SNIA	Storage Networking Industry Association
SNRA	Sensor Network Reference Architecture
SOA	Service Oriented Architecture
SQL	Structured Query Language
SSCD	Secure Signature-Creation Device
SWEBOK	Software Engineering Body of Knowledge
SWG	Special Working Group
SWIFT	Society for Worldwide Interbank Financial Telecommunication
TC	Technical Committee
TCG	Trusted Computing Group
TGG	The Green Grid
TIA	Telecommunications Industry Association
TOG	The Open Group
TR	Technical Report
TS	Technical Specification
TTA	Telecommunications Technology Association
TTC	Telecommunication Technology Committee
UCS	Universal Character Set
UIC	International Union of Railways
UN	United Nations

ACRONYM	TITLE
UNCTAD	United Nations Conference on Trade and Development
UNECE	United Nations Economic Commission for Europe
UNI	*Ente Nazionale Italiano di Unificazione*
UPnP	Universal Plug and Play
UPU	Universal Postal Union
VSE	Virtual Storage Extended
W3C	World Wide Web Consortium
WD	Working Draft
WG	Working Group
WHO	World Health Organization
WIPO	World Intellectual Property Organization
WMO	World Meteorological Organization
XBRL	eXtensible Business Reporting Language
XMI	XML Metadata Interchange
XML	Extensible Markup Language

9.3. ADDITIONNAL TECHNICAL COMMITTEES & STANDARDS DEVELOPMENT ORGANIZATIONS

SUBSECTOR	REFERENCE / ACRONYM	TITLE	CREAT-ION DATE	SCOPE	PUBLISHED STANDARDS	STANDARDS UNDER DEVELOPMENT	STRUCTURE
DIGITAL TRUST	ETSI/SC SAGE	Security Algorithms Group of Experts	/	The Security Algorithms Group of Experts (SAGE) is responsible for creating ETSI reports (containing confidential specifications) in the area of cryptographic algorithms and protocols specific to fraud prevention/unauthorized access to public/private telecommunications networks and user data privacy.	14	0	/
DIGITAL TRUST	ETSI/ISG ISI	Information Security Indicators	2011	The Information Security Indicators ISG ("ISG ISI") will develop ETSI Group Specifications for Information Security Indicators. The activities carried out within ETSI ISG ISI aim to: - Summarize the existing results on similar activities related to measurement and metrics, - Develop and build up a full set of Information Security Indicators (with the goal to become an ETSI Group Specification), that will be the basis for further state-of-the-art figures, - Select the relevant Priority One Indicators (with a detailed description in compliance with the ISO 27004 standard), - Develop an underlying Security Event Classification Model (with the goal to become an ETSI Group Specification), linked and consistent with the set of IS Indicators, - Disseminate the results outside the ETSI community, - Define a possible implementation of a subset of Indicators, with definition of the relevant monitoring tools and/or methods (with the goal to become an ETSI Group Specification). - Encourage the innovation and pragmatism in inviting for contributions from the circles of both users companies and providers, towards developing common reference draft	10	4	/
DIGITAL TRUST	ETSI/ISG QKD	Quantum Key Distribution	2008	To develop GSs (ETSI Group Specifications) describing quantum cryptography for ICT networks. Quantum Key Distribution is the essential credential in order to use quantum cryptography on a broad basis. It is the main task of the QKD ISG to specify a system for Quantum Key Distribution and its environment.	6	4	/

SUBSECTOR	REFERENCE / ACRONYM	TITLE	CREAT-ION DATE	SCOPE	PUBLISHED STANDARDS	STANDARDS UNDER DEVELOPMENT	STRUCTURE
				The activities of the QKD ISG will be performed in close co-operation with relevant standards activities within and outside ETSI. External relationships will be established where and when ever needed, Formal relationships will be established using the normal ETSI processes via the ETSI Secretariat.			
DIGITAL TRUST	ETSI/ISG QSC	Quantum-Safe Cryptography	2015	The QSC ISG will aim to make recommendations on core cryptographic primitives and develop ETSI Group Specifications (GSs) for quantum-safe ICT applications highlighted by industry. It will also aim to offer practical advice and guidance to industry on real-world deployment issues, such as transition timescales, generic requirements from operators or vendors, assessment of threats and risks, etc. The activities of the QSC ISG will be performed in close co-operation with relevant standards activities within and outside ETSI, including QKD ISG and TC CYBER. It is not the intention of the ISG to work on items already covered by the QKD ISG. The work of the QSC ISG will include: - Identification of proposals from industry and academia for quantum safe cryptographic primitives, and the development of a framework for quantum safe algorithms. - High-level characterization of these primitives in term of computational complexity, security assumptions against classical and quantum threats, efficiency and agility. - Assessment of the suitability of the cryptographic primitives with respect to the quantum safe requirements and applications. - Threat and risk assessment for real-world use cases. - Providing evidence of the need for new standards and technological guidance, along with a development roadmap, including performance standards and verification techniques for quantum safe algorithms. - Dissemination of guidance and standards documents, and later maintenance of the standardized algorithms under the custodianship of the ETSI SC Security Algorithms Group of Experts (SAGE). - Defining criteria for, and assessment of, the suitability of cryptographic primitives.	1	5	/

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DIGITAL TRUST	CEN/TC Project Committee 365	Internet Filtering	2007	Standardization in the area of 'Internet Filtering' with the objective to define a set of standards in the form of a European Technical Specification that will give internet users more confidence in choosing a suitable filtering product or service.	1	0	/
DIGITAL TRUST	CEN/CLC CSCG	Focus Group on Cybersecurity	2011	- Analyze strategic developments and issues in cyberspace (new and advanced technologies, overlaps with other sectors that may transcend the digital sector etc.); - Systematically assess how standards can support regulations and policies related to cyber security and data protection; - Examine the possibility for a common terminology and the building blocks for strengthening cyber security capacities in Europe as a first step toward greater EU cooperation in the cyber security domains of application; - Prepare a mapping of current European and international initiatives aiming to increase online trust and propose its parent organizations to liaise with other European initiatives and standardization requests; - Prepare an overview on suitable standards already publicly available to meet specific needs for IT products, systems and services; - Give recommendations to parent organizations regarding positions in the international standards setting environment (e.g. ISO/IEC JTC 1); - Propose actions to raise awareness of the parent organizations on the importance of standards as a key element in improving cyber security across Europe (including organization and participation in relevant external meetings).	/	/	/
GREEN ICT & DATA CENTERS	ETSI/ISG OEU	Operational energy Efficiency for Users	2012	The ETSI ISG 'Operational energy Efficiency for Users' ("ISG OEU") will develop ETSI Group Specifications for environmentally efficient ICT, e.g. infrastructure, equipment and software within data centres and networks taking into account at least power consumption and greenhouse gas emission. The activities carried out within the ISG OEU aim to issue two types of Group Specifications: - Position Papers to define Users' requirements to be provided to ETSI TCs for development of needed standards. Users' requirements will define Users' needs in	13	10	/

SUBSECTOR	REFERENCE / ACRONYM	TITLE	CREAT-ION DATE	SCOPE	PUBLISHED STANDARDS	STANDARDS UNDER DEVELOPMENT	STRUCTURE
				order to develop sustainable standards. - Referential specifications to define sustainable levels of ICT elements (e.g. sites, parts of network). These deliverables will enable meaningful global comparison of operational efficiency.			
SMART CITIES	IEC/SyC Smart Cities	Electrotechnical aspects of Smart Cities	2016	To foster the development of standards in the field of electrotechnology to help with the integration, interoperability and effectiveness of city systems. Note 1 This will be done: - By promoting the collaboration and systems thinking between IEC/TCs, the SyC and other SDOs in relation to city system standards; - By undertaking systems analysis to understand the needs for standards and assess new work item proposals (NWIPs) related to city systems; - By developing systems standards where needed and by providing recommendations to existing SyCs, TCs/SCs and other SDOs. Note 2: Overall common city goals include, for example, sustainable development, efficiency, resilience, safety and support for citizens' engagement and participation. However, an individual city will follow its own approach. Note 3: "Cities" refers to any geographically located population.	0	0	- CAG 1 Strategy - CAG 2 Coordination - WG 1 Terminology - WG 2 Market Relationship - WG 3 Reference Architecture
SMART CITIES	CEN/CLC/ETSI SSCC-CG	Coordination group on Smart and Sustainable cities and communities	2012	The SSCC-CG advises on European interests and needs relating to standardization on Smart and Sustainable cities and communities. Note: Interests and needs relating to standardization on resilient cities and communities will be considered and taken into account as well. These European interests and needs shall fit within the overall smart and sustainable cities approach that is to be developed by the SSCC-CG, taking into account existing ISO/IEC/ITU deliverables and activities in view of consistency at the international level. The SSCC-CG will also receive and provide inputs from the European Commission, in particular through the European Innovation Partnership on Smart Cities and Communities. The group will also have an overview, if relevant, of the progress of ongoing work in other standardization organizations and forums related to smart and sustainable	/	/	/

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				cities and communities. The SSCC-CG will not elaborate standards itself but will deliver a report to the CEN and CENELEC (Technical) and ETSI Boards. In addition to a strategic and technical coordination, SSCC-CG has the task of encouraging participation of stakeholders.			
SMART ENERGY	IEC/SyC Smart Energy	System Committee Smart Energy	2014	Standardization in the field of Smart Energy in order to provide systems level standardization, coordination and guidance in the areas of Smart Grid and Smart Energy, including interaction in the areas of Heat and Gas. To widely consult within the IEC community and the broader stakeholder community to provide overall systems level value, support and guidance to the TCs and other standard development groups, both inside and outside the IEC. To liaise and cooperate with the SEG Smart Cities and future SEGs, as well as the future Systems Resource Group.	0	9	- CAG 7 Chairman's Advisory Group - WG 2 IEC Smart Energy Development Plan - WG 3 IEC Smart Energy Roadmap - WG 5 Methodology and Tools - WG 6 Generic Smart Grid Requirements
SMART ENERGY	CEN/CLC/ETSI SEG-CG	Smart Energy Grids Coordination Group	2011	Coordination of the standardization activities of the European Standardization Organizations in relation to Smart Energy Grids.	/	/	/
SMART ENERGY	CEN/CLC/ETSI SM-CG	Smart Meters Co-ordination Group	2009	The Smart Meters Co-ordination Group (SM-CG) is a joint advisory group of the European Standards Organizations (ESOs) with the participation of the various organizations mentioned under "Membership" below. The Group provides a focal point concerning smart meter standardization issues in respect to Mandate M/441 to CEN, CENELEC and ETSI in the field of measuring instruments for the development of an open architecture for utility meters involving communication protocols enabling interoperability. Having completed the work carried out in the framework of Mandate M/441, Smart Meters - Coordination Group still gives input to the development and maintenance of new and existing standards for advanced metering infrastructures in support of the European roll-out of Smart Meters.	1	0	/

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SMART MANUFA-CTURING	IEC/SEG 7	Smart Manufacturing	2016	- Expand on the market relevance and business drivers, identified in the SG 8 report, taking into account other SDO initiatives and national programs; - Provide an inventory of existing standards and current standardization projects under the management of IEC, ISO and other SDO; - Invite the cooperation of ISO, JTC1/WG10, IEEE, consortia, and other organizations to assist in mapping smart manufacturing activities that are closely related, and to participate in the activities of the proposed SyC; - Expand on the definition of common value chains within a smart manufacturing enterprise, as identified in SG 8, and identify associated use cases which will assist in determining the state of the art in the industry, and the identification of potential gaps where IEC standardization is needed with respect to smart manufacturing; - Establish an initial roadmap of smart manufacturing standardization, architecture and prospective standardization and conformity assessment projects to be conducted by the SyC member TCs and partners; - Deliver 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; - Make a recommendation to the SMB on the proposed SEG's transition into a Systems Committee (SyC) outlining the proposed SyC structure, membership, principles of operation and deliverables of the SyC which are supportive of the individual goals and deliverables of the participating stakeholder Technical Committees.	0	0	/
SMART MANUFACTU RING	IEC/ACART	Advisory Committee on Applications of Robot Technology	2016	The task of ACART includes: - Coordinating common aspects of robotic technology such as vocabulary and symbols. - Preparing a guideline that outlines the critical aspects (as described in the report) of preparing a standard for products that incorporate robotic technology. - Promoting collaboration between IEC and ISO as it relates to robotic technologies. - Resolving current overlaps and developing a process to prevent future overlaps, both within the IEC and between IEC and ISO.	0	0	/

SUBSECTOR	REFERENCE / ACRONYM	TITLE	CREAT-ION DATE	SCOPE	PUBLISHED STANDARDS	STANDARDS UNDER DEVELOPMENT	STRUCTURE
				- Strong collaboration with the IEC CAB.			
NOT RELATED TO SUBSECTORS	ISO/IEC JTC 1/JAG	JTC 1 Advisory Group	2016	The JTC 1/JAG is responsible for several activities related to JTC 1: - Strategic activities; - Managerial and steering activities; - Operational efficiency activities; Communications, outreach and marketing activities.	/	/	- JAG Group on JTC 1 Emerging Technology and Innovations - JAG Group on Systems Integration Facilitation (JAG-SIF) - JAG Press Committee and Press Officer
FOR A / CONSORTIA	DMTF	Distributed Management Task Force	1992	The DMTF is an industry standards organization working to simplify the manageability of network-accessible technologies through open and collaborative efforts by leading technology companies. DMTF creates and drives the international adoption of interoperable management standards, supporting implementations that enable the management of diverse traditional and emerging technologies including cloud, virtualization, network and infrastructure.	484	54	- Architecture Working Group - Cloud Auditing Data Federation Working Group (CADFWG) - Cloud Management Working Group (CMWG) - CIM Profiles for Platforms and Services Working Group(CPPSWG) - Platform Management Components Intercommunication (PMCI) - Scalable Platforms Management Forum (SPMF) - System Management Forum (SMF) - Schema Working Group - SMBIOS Working Group
FOR A / CONSORTIA	Ecma International	Ecma International	1961	Standardization of Information and Communication Technology (ICT) and Consumer Electronics (CE).	276	Unknown	- TC 12 Product Safety - TC 20 Electromagnetic Compatibility and Electromagnetic Fields (EMC and EMF) - TC 26 Acoustics - TC 31 Information Storage - TC 32 Multimedia Coding and Communications - TC 38 Product-related environmental attributes - TC 39 ECMAScript - TC 43 Universal 3D (U3D) - TC 45 Office Open XML Formats - TC 46 Open XML Paper Specification (OpenXPS) - TC 47 Near Field Communications - TC 48 High Rate Wireless Communications - TC 49 Programming Languages

SUBSECTOR	REFERENCE / ACRONYM	TITLE	CREAT-ION DATE	SCOPE	PUBLISHED STANDARDS	STANDARDS UNDER DEVELOPMENT	STRUCTURE
							- TC 50 Close Proximity Electric Induction Data Transfer - TC 51 Access Systems - TC 52 Dart - Wearable Ad hoc Group
FOR A / CONSORTIA	GS1	Global Standards	1973	GS1 is dedicated to the design and implementation of global standards and solutions to improve the efficiency and visibility of supply and demand chains globally and across sectors. The GS1 system of standards is the most widely used supply chain standards system in the world.	Unknown	Unknown	Mission-specific Working Groups (MSWGs) - GSMP Application Standard for MRO (Maintenance, Repair and Overhaul) Objects in Rail - GSMP EPC Information Service (EPCIS) 1.1 and Core Business Vocabulary (CBV) - GSMP High-speed Barcode Printing - GSMP Tagged Item Performance Protocol (TIPP) Standards Maintenance Groups (SMGs) - GSMP Barcodes - GSMP Data Accuracy - GSMP EDI - GSMP Global Master Data (GMD) - GSMP Global Product Classification (GPC) - GSMP Identification - GSMP Traceability and Event Sharing
FOR A / CONSORTIA	IEEE-SA	Institute of Electrical and Electronics Engineers Standards Association	1963	IEEE's core purpose is to foster technological innovation and excellence for the benefit of humanity. The IEEE-SA is an organization within IEEE that develops global standards in a broad range of industries, including: power and energy, biomedical and health care, information technology, telecommunication, transportation, nanotechnology, information assurance, and many more.	3269	647	1141 Working Groups covering 20 topics
FOR A / CONSORTIA	IETF	Internet Engineering Task Force	1986	The mission of the IETF is to make the Internet work better by producing high quality, relevant technical documents that influence the way people design, use, and manage the Internet.	Unknown	Unknown	Areas: - Applications and Real-Time Area (art) - General Area (gen) - Internet Area (int) - Operations and Management Area

SUBSECTOR	REFERENCE / ACRONYM	TITLE	CREAT-ION DATE	SCOPE	PUBLISHED STANDARDS	STANDARDS UNDER DEVELOPMENT	STRUCTURE
							(ops) - Routing Area (rtg) - Security Area (sec) - Transport Area (tsv)
FOR A / CONSORTIA	ISOC	The Internet Society	1992	To promote the open development, evolution, and use of the Internet for the benefit of all people throughout the world. To help achieve its mission, the Internet Society: - Facilitates open development of standards, protocols, administration, and the technical infrastructure of the Internet; - Supports education in developing countries specifically, and wherever the need exists; - Promotes professional development and builds community to foster participation and leadership in areas important to the evolution of the Internet; - Provides reliable information about the Internet; - Provides forums for discussion of issues that affect Internet evolution, development and use in technical, commercial, societal, and other contexts; - Fosters an environment for international cooperation, community, and a culture that enables self-governance to work; - Serves as a focal point for cooperative efforts to promote the Internet as a positive tool to benefit all people throughout the world; - Provides management and coordination for on-strategy initiatives and outreach efforts in humanitarian, educational, societal, and other contexts.	/	/	/
FOR A / CONSORTIA	NESMA	Netherlands Software Metrics users Association	1989	Nesma wishes to provide objective and independent information on the use of software metrics in business areas like software project estimation, software benchmarking, outsourcing based on software metrics, productivity measurement and management, project control and sizing methods.	10	Unknown	- Counting Practices Committee - Contract metrics committee - Early sizing committee - Benchmarking committee - COSMIC committee - Estimating packaged software committee - Estimation maturity committee - Basis of Estimate (BoE) committee - Documentation measurability committee - Measurement standards and definitions

SUBSECTOR	REFERENCE / ACRONYM	TITLE	CREAT-ION DATE	SCOPE	PUBLISHED STANDARDS	STANDARDS UNDER DEVELOPMENT	STRUCTURE
							- Experienced FPA Analysts round-table
FOR A / CONSORTIA	OASIS	Organization for the Advancement of Structured Information Standards	1993	OASIS promotes industry consensus and produces worldwide standards for security, Internet of Things, Cloud computing, energy, content technologies, emergency management and other areas. OASIS is a not-for-profit consortium that drives the development, convergence and adoption of open standards for the global information society. OASIS open standards offer the potential to lower cost, stimulate innovation, grow global markets and protect the right of free choice of technology. OASIS is distinguished by its transparent governance and operating procedures. Members themselves set the OASIS technical agenda, using a lightweight process expressly designed to promote industry consensus and unite disparate efforts. Completed work is ratified by open ballot. Governance is accountable and unrestricted.	135	Unknown	Committee categories: - Big Data - Cloud - Conformance - Content Technologies - e-Commerce - e-Invoicing - eGov/Legal - Emergency Management - Healthcare - IoT/M2M - Lifecycle Integration - Localization - Messaging - Privacy/Identity - Security - SOA - Standards Adoption - Supply Chain - Sustainability - Web Services
FOR A / CONSORTIA	OCF	Open Connectivity Foundation	2016	The OCF is: - Defining the specification, certification & branding to deliver reliable interoperability -- a connectivity framework that abstracts complexity; - Our open specification allows anyone to implement and it is easy for developers to use; - It includes predictable IP protection & branding for certified devices (via compliance testing) and service-level interoperability; - There is also an Open Source implementation of our specification - IoTivity Project; - This Open Source implementation is designed to enable application developers and device manufacturers to deliver interoperable products across Android, iOS, Windows, Linux, Tizen, and more.	Unknown	Unknown	- Certification Work Group - Core Technology Work Group - Data Model Review Board Work Group - Marketing Communications Work Group - Membership Work Group - Open Source Work Group - Security Work Group - Strategy Work Group - UPnP Work Group
FOR A / CONSORTIA	OGC	The Open Geospatial	1994	The OGC provides a consensus process that communities of interest use to solve problems related to the creation,	51	Unknown	Domains: - Aviation

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		Consortium		communication and use of spatial information. A community of interest might be those people who are interested in ocean observation, or those who are interested in 3D modeling of urban environments, or those who are interested in volunteered location information during disasters. These communities sort roughly into ten domains: Aviation, Built Environment & 3D, Defence & Intelligence (D&I), Business Intelligence, Emergency Response & Disaster Management, Energy & Utilities, Geosciences & Environment, Government & Spatial Data Infrastructure, Mobile Internet & Location Services, Sensor Webs.			- Built Environment & 3D - Business Intelligence - Defence & Intelligence (D&I) - Emergency Response & Disaster Management - Energy & Utilities - Geosciences & Environment - Government & Spatial Data - Infrastructure - Mobile Internet & Location Services - Sensor Webs
FOR A / CONSORTIA	OMG	Object Management Group	1989	OMG Task Forces develop enterprise integration standards for a wide range of technologies: Real-time, Embedded and Specialized Systems, Analysis & Design, Architecture-Driven Modernization and Middleware. This also includes an even wider range of industries: Business Modeling and Integration, C4I, Finance, Government, Healthcare, Life Sciences Research, Robotics, Software-Based Communications and Space.	239	Unknown	Domain Technology Committee: - Business Modeling and Integration DTF - Consultation, Command, Control, Communications & Intelligence (C4I) DTF - Finance DTF - Government Information Sharing and Services DTF - Healthcare DTF - Manufacturing Technology and Industrial Systems DTF - Robotics DTF - Space DTF - Mathematical Formalism SIG - Regulatory Compliance DSIG - Systems Engineering DSIG
FOR A / CONSORTIA	oneM2M	oneM2M	2012	oneM2M shall prepare, approve and maintain the necessary set of Technical Specifications and Technical Reports for: - Use cases and requirements for a common set of Service Layer capabilities - Service Layer aspects with high level and detailed service architecture, in light of an access independent view of end-to-end services - Protocols/APIs/standard objects based on this architecture (open interfaces & protocols) - Security and privacy aspects (authentication, encryption, integrity verification);	26	37	Work Groups: - Use Cases & Requirements (REQ) - Architecture (ARC) - Protocols (PRO) - Security (SEC) - Management & Abstraction Semantics (MAS) - Testing (TST)

SUBSECTOR	REFERENCE / ACRONYM	TITLE	CREAT-ION DATE	SCOPE	PUBLISHED STANDARDS	STANDARDS UNDER DEVELOPMENT	STRUCTURE
				- Reachability and discovery of applications - Interoperability, including test and conformance specifications - Collection of data for charging records (to be used for billing and statistical purposes) - Identification and naming of devices and applications - Information models and data management (including store and subscribe/notify functionality) - Management aspects (including remote management of entities); - Common use cases, terminal/module aspects, including Service Layer interfaces/APIs.			
FOR A / CONSORTIA	SMTPE	Society of Motion Picture and Television Engineers	1916	SMPTE is an internationally recognized standards development body. As such we abide by the ANSI and ISO due process for initiating, approving, revising and removing standards. For nearly 100 years, SMPTE has been the leader in standards for the motion imaging industry, facilitating interoperability and therefore business. Published documents include standards, recommended practices and engineering guidelines, all of which integrate to describe a particular process.	786	Unknown	Content Creation Committees - Essence-10E Applications Committees - Film 20F - D-Cinema 21DC - Television and Broadband Media 24TB - Cinema Sound Systems 25CSS Infrastructure and Media Management Committees - Metadata/Registries 30MR - File Formats and Systems 31FS - Network/Facilities Infrastructure 32NF - Media Systems, Control and Services 34CS - Media Packaging and Interchange 35PM
FOR A / CONSORTIA	SNIA	Storage Networking Industry Association	1997	SNIA lead the storage industry worldwide in developing and promoting standards, technologies and educational services to empower organizations in the management of information. Underlying the mission are four supporting vision statements that will help the association deliver value back to the industry: - Be the trusted advisor across all business segments and the recognized authority in storage technologies in support of information management; - Be a catalyst for the development and adoption of	19	13	Technical Work Groups (TWG): - Cloud Storage TWG - Green Storage TWG - I/O Traces, Tools & Analysis TWG - Linear Tape File Systems (LTFS) TWG - Long Term Retention TWG - NVM Programming TWG - Object Drive TWG - Scalable Storage Management (SSM) TWG

SUBSECTOR	REFERENCE / ACRONYM	TITLE	CREAT-ION DATE	SCOPE	PUBLISHED STANDARDS	STANDARDS UNDER DEVELOPMENT	STRUCTURE
				standards for storage and information technology; - Continue to grow a strong international presence to address the needs and requirements of the local storage and information management marketplaces; - Address the storage and information management needs of the new community of consumers and providers created by the increasing trend towards Cloud.			- Security TWG - Storage Management Initiative(SMI) TWG - Solid State Storage TWG - Solid State Storage System TWG
FOR A / CONSORTIA	SPICE User Group	Software Process Improvement and Capability dEtermination User Group	1993	The SPICE User Group: - Acts as a leadership forum for users of ISO/IEC 15504 & 330xx; - Promotes the practical and beneficial use of ISO/IEC 15504 & 330xx; - Contributes to the development of and provides user feedback on the use of ISO/IEC 15504 & 330xx; - Provides an active program of networking, information exchange, conferences, events and support for users of ISO/IEC 15504 & 330xx; - Provides user confidence in claims of compliance and conformance to requirements of ISO/IEC 15504 & 330xx.	/	/	Sector initiatives: - Enterprise SPICE - Banking SPICE - Automotive SPICE - Medi SPICE
FOR A / CONSORTIA	TCG	Trusted Computing Group	2003	TCG develops standards to solve today's enterprise security challenges: - Authentication; - Cloud Security; - Data Protection; - Mobile Security; - Network Access & Identity.	98	Unknown	Workgroups: - Embedded Systems - Infrastructure - Mobile Platform - PC Client - Server Specific - Software Stack (TSS) - Storage - Trusted Mobility Solutions (TMS) - Trusted Multi-tenant Infrastructure (TMI) - Trusted Network Communications (TNC) - Trusted Platform Module (TPM - Virtualized Platform
FOR A / CONSORTIA	TOG	The Open Group	1996	The Open Group works with customers and suppliers of IT products and services as well as with consortia and other standards organizations to capture, clarify and integrate current and emerging requirements, establish standards and policies, and share best practices. TOG standards ensure openness, interoperability and consensus.	223	Unknown	Work Groups: - Service-Oriented Architecture (SOA) Work Group - Certified Architect (Open CA) Work Group - Certified IT Specialist (Open CITS)

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							Work Group - Cloud Computing Work Group - Internet of Things (IoT) Work Group - Semantic Interoperability Work Group
FOR A / CONSORTIA	W3C	World Wide Web Consortium	1994	The W3C is an international community which mission is to lead the World Wide Web to its full potential by developing open standards (protocols and guidelines) that ensure the long-term growth of the Web.	262	288	More than 40 Working Groups in the Web area

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