



STANDARDS ANALYSIS ICT SECTOR LUXEMBOURG

Executive summary

The “*Institut Luxembourgeois de la Normalisation, de l’Accréditation, de la Sécurité et qualité des produits et services*” (ILNAS) has initiated in 2012 an analysis of European and international standards in the Information and Communication Technology (ICT) sector. This analysis intends 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 an active sector at the national standardization level with 53 national delegates currently registered by ILNAS. These delegates are involved in standardization technical committees to participate actively and follow closely the work performed at international level and have the task of ensuring that the views and positions of the country are understood and known by the technical committees. ILNAS is convinced that this sector could be even more active, especially since some ICT subsectors do not yet have national delegates (e.g.: Sensor Networks, Internet of Things). 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 involve them into an integrated and innovative approach of standardization.

Conducted in several steps, this survey is basically built on a standards watch that allows the identification of standardization technical committees related to the ICT sector at the European and international level. 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 the standardization point of view. Lastly, the connections between the ICT sector and other economic sectors active in the Grand Duchy of Luxembourg are pointed out.

Conceived as a practical tool, this report is evolving and should be used 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 fifth version of this analysis which will continue to be updated according to national market needs.

¹ http://www.portail-qualite.public.lu/fr/publications/normes-normalisation/orientations-strategiques/politique-luxembourgaise-pour-la-normalisation-technique-des-TIC-2015-2020/Policy-on-ICT-technical-standardization-2015-2020_.pdf

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 based on 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”², which is more in line with the needs of the national market and the priorities identified after three years of active promotion of technical standardization in Luxembourg. The new position 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:

- Constant support and development of the standardization field dedicated to ICT (including in terms of education and *ad hoc* promotion) according to the “Luxembourg’s policy on ICT technical standardization” (which was published in 2013 and last updated in 2015)³ is provided;
- Detection of niche opportunities for national economic developments is carried out.

2. National influence and compliance with legal attributions

In order to increase the influence of Luxembourg:

² <http://www.portail-qualite.public.lu/fr/publications/normes-normalisation/orientations-strategiques/strategie-normative-2014-2020/luxembourg-standardization-strategy-2014-2020.pdf>

³ <http://www.portail-qualite.public.lu/fr/publications/normes-normalisation/orientations-strategiques/politique-luxembourgaise-pour-la-normalisation-technique-des-TIC-2015-2020/Policy-on-ICT-technical-standardization-2015-2020.pdf>

- Support to the influence of the Grand-Duchy of Luxembourg within European and international standards organizations is scheduled;
- An active contribution to respect legal attributions in terms of European standardization is guaranteed;
- Detection of opportunities for the national market is provided.

3. Products and services

- Support in terms of implementation of current products and services⁴ in the field of standardization (diagnostic, awareness/training sessions, targeted watch, sector-based analysis, etc.), mainly upon requests of the national market is provided.

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 lead 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 field of standardization. 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. 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.

⁴ <http://www.portail-qualite.public.lu/fr/normes-normalisation/produits-et-services/index.html>

Training catalogue: http://www.portail-qualite.public.lu/fr/publications/normes-normalisation/information-sensibilisation/catalogue-formation-2015/Catalogue_de_formation_2015_WEB.pdf

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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. 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 are the very center of 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 53 national delegates, meaning national experts registered and involved in a standardization committee. Driven by ILNAS, several activities have been set up⁵ in order to develop education about ICT standardization to national stakeholders, and strengthen their participation in related technical committees. To reach these objectives, ILNAS, in collaboration with the University of Luxembourg, has launched a new university certificate “*Smart ICT for Business Innovation*” in 2015, to provide at national level a standards-based knowledge on the main emerging and/or current smart ICT domains.

Initiated by ILNAS in 2012, this analysis of European and international standards is based on several years of experience in ICT standardization and contributes directly to raise awareness, interest and to educate national stakeholders about ICT standardization. This is the fifth version of the report, which will continue to be updated on a regular basis according to market interests. The main value 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.

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

- Execution of a watch of technical standardization committees and related standards (both published and under development), at the European and international levels;
- Identification of national stakeholders and potential interests;
- Identification of most relevant *fora/consortia* related to the ICT sector and technical committees dealing with ICT as a supporting sector;
- Preparation of a final report of analysis and opportunities.

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. This chapter offers an overview of the different subsectors and the technical committees identified for the ICT sector. Then, the main advantages for stakeholders to take part in the standardization process are highlighted. Based on these results, **Chapter 6** presents opportunities related to standardization for national stakeholders, providing a general perspective about all the benefits of standardization.

⁵ [Policy on ICT technical standardization \(2015-2020\)](#)

Based on the results of the standards watch, **Chapter 7** is dedicated to a detailed presentation of each Standards Developing Organization (SDO) at European and international level. Thus, this chapter describes the formal standards bodies developing *de jure* (or formal) standards, as well as other technical committees analyzed through investigation of non-formal standards organizations (ICT *fora/consortia* developing *de facto* standards). It is organized by subsector (i.e., Cloud Computing, Data Center, Telecommunications, etc.), providing a prompt access to someone looking for a specific technical committee.

To complete the standards analysis, **Chapter 8** presents the university certificate *Smart ICT for Business Innovation* and describes more deeply the standards landscape of selected smart ICT domains (cloud computing, big data and green ICT) that are part of this innovative diploma. To go further, **Chapter 9** analyzes the prospective and innovative role of standardization through the analysis performed by the ISO/IEC JTC 1 Special Working Group on Planning, and **Chapter 10** describes some standardization activities for recent or emerging technologies, which could have the potential to significantly and deeply change our economy and society: additive manufacturing (3D printing), intelligent transport systems, unmanned aircraft systems (drones) and robotics. **Chapter 11** highlights ICT as a sector that supports other economic sectors through standards. Technical committees that have drawn such a link are identified.

Finally, the **Conclusion** chapter sums it up and reiterates the commitment of ILNAS and ANEC GIE to assist national entities with their involvement in standardization.

Note:

In this report, the term “standardization technical committee” is generic and covers “technical committees”, “subcommittees”, “working groups”, etc.

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, an administration under the authority of the Minister of the Economy, 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*”, an ILNAS department and which, according to the law of July 4, 2014, fulfills the ILNAS missions as the national standards body. It is a member of the European and international standardization organizations.

❖ ANEC GIE:

This acronym designates the “*Agence pour la Normalisation et l’Economie de la Connaissance*”. Created in October 2010, the role 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 process⁶.

❖ 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*”⁷.

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.

❖ 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).

⁶ Based on: [Regulation \(EU\) N°1025/2012](#) of the Parliament and of the Council

⁷ ISO/IEC Guide 2:2004, ISO/IEC Guide 2:2004, *Standardization and Related Activities -- General Vocabulary* (definition 3.2)

❖ **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 plan⁸.

❖ **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.

⁸Based on the information available on the [CEN website/BOSS](#).

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)⁹, 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.

- **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.

⁹ 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](#)

2.3. STANDARDIZATION LANDSCAPE

In Europe, the three recognized European Standardization Organizations (ESO) are¹⁰:

- 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:

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

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

Table 1: Characteristics of European and International Standardization Organizations¹¹

European and International Standardization Bodies	Date of Creation	Number of Members	Number of Published Standards	
ISO	International Organization for Standardization	1946	162	20493
IEC	International Electrotechnical Commission	1906	83	6933
ITU-T	International Telecommunication Union's Telecommunication Standardization Sector	1865	269 ¹²	4937
CEN	European Committee for Standardization	1961	33	15615
CENELEC	European Committee for Electrotechnical Standardization	1973	33	6755
ETSI	European Telecommunications Standards Institute	1988	802 ¹² (66 countries)	35584

¹⁰ Regulation (EU) No 1025/2012 of The European Parliament And of The Council : <http://eur-lex.europa.eu/LexUriServ/LexUriSrv.do?uri=OJ:L:2012:316:0012:0033:EN:PDF>

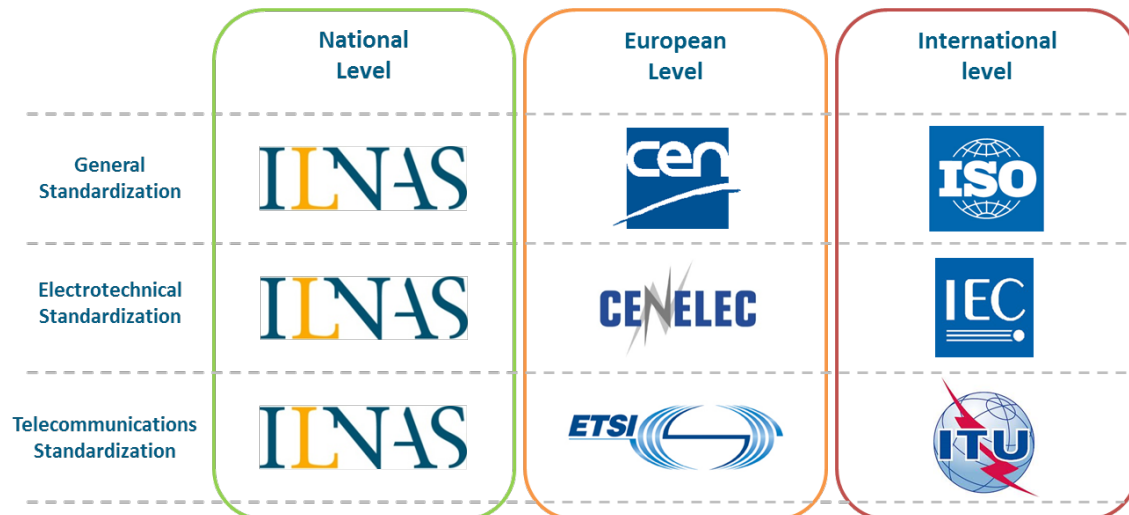
¹¹ Source: Websites of organizations - August 2015

¹² 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

From a national perspective, one or several standards bodies protect national interests 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).

Figure 1: Interactions between the Standardization Organizations



A strong collaboration exists between the European and international standardization organizations. In this context, and in order to ensure transparency in the work and avoid the duplication of standards, in 1991 ISO and CEN signed the Vienna Agreement, 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, the Dresden Agreement was concluded in 1996 between IEC and CENELEC with the aim of developing intensive consultations in the electrotechnical field. This agreement is based on 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.

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

Under both agreements, approximately 31% of all European standards ratified by CEN, as well as about 71% of those ratified by CENELEC, are now technically equivalent or identical to ISO or IEC standards¹³; in that respect, the European and international organizations do not duplicate work.

Agreements also exist between the standards organizations to facilitate their cooperation. The two conventions established between ISO and IEC allow the creation of Joint Technical Committees. Similarly, the cooperation between CEN and CENELEC aims to create a European standardization system that is open, flexible and dynamic.

¹³ Source: [CEN and CENELEC Quarterly Statistical Pack \(2015 Q2\)](#)

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 level 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 (162) and IEC (83)	1 country = 1 voice	Voluntary
European CEN and CENELEC	National bodies complying with membership criteria of CEN and CENELEC ¹⁴ (33)	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”¹⁵, which fixes the distribution of the voices for the CEN/CENELEC national members as showed in Table 3.

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

Country	Weighting of votes
Germany, France, Italy, United Kingdom, Turkey	29
Spain, Poland	27
Romania	14
Netherlands	13
Belgium, Greece, Hungary, Portugal, Czech Republic	12
Austria, Bulgaria, Sweden, Switzerland	10
Croatia, Denmark, Finland, Ireland, Lithuania, Norway, Slovakia	7
Cyprus, Estonia, Latvia, Luxembourg, Slovenia, Former Yugoslav Republic of Macedonia	4
Iceland, Malta	3

¹⁴ CEN-CENELEC Guide 20 “Guide on membership criteria of CEN & CENELEC”

¹⁵ Source: [Internal regulation CEN/CENELEC – Part 2 – Annex D](#)

Another particularity at the European level is that the 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 list of new national standards is regularly published by ILNAS in the "*Mémorial A*"¹⁶.

¹⁶ <http://www.legilux.public.lu/leg/a/index.php>

3. CONTEXT OF THE ICT SECTOR

3.1. DEFINITION AND ISSUES OF THE ICT SECTOR

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*”¹⁷.

Regarding current trends and the future of ICT at a global level, this sector remains promising. Dynamism in the ICT base technologies is driving innovation processes. Some companies will redesign their operating models to exploit the advantage of digital technologies. The ability to create digitally based business models could allow to lower the barrier to make new and innovative ventures for entrepreneurs.

In terms of economy impact, R&D investment in the ICT sector is still very important, for example, it has increased in 2014 (e.g. Technology Hardware & Equipment: 3.3%, Software & Computer Services: 11.4%)¹⁸. Moreover, the coming trends show that the sector is still innovating with the development of technologies such as Computing Everywhere, Cloud/Client Computing, Internet of Things, Smart Machines, 3D printing, Big Data, etc.¹⁹.

At the European level, the ICT sector has been directly responsible for 4.5% of GVA²⁰ (Gross Value Added), with a market value of EUR 529 billion in 2013²¹, but it contributes far more to the overall productivity growth, which is due to the high levels of dynamism and innovation inherent of this sector but also to the enabling role this sector plays in changing how other sectors do business. At the same time, the social impact of ICT has become significant – for example, the fact that in the EU 81% of households have a broadband connection in 2014 (this figure rises to 96% in Luxembourg)²², that 75% of individuals in the EU use the Internet on a regular basis in 2014 (this figure rises to 93% in Luxembourg)²³ and that virtually all Europeans own mobile phones have changed lifestyles.

In 2010, the European Commission published “A Digital Agenda for Europe”²⁴. The overall aim of the Digital Agenda is to deliver sustainable economic and social benefits from a digital single market based on fast/ultra-fast Internet and interoperable applications. The Digital Agenda for Europe is one of the seven flagship initiatives of the Europe 2020 Strategy²⁵, set out to reboot Europe's economy and help Europe's citizens and businesses to get the most out of digital technologies.

According to the European Commission²⁶, digital technologies have enormous potential to benefit daily lives and tackle social challenges. The Digital Agenda focuses on ICT capabilities to reduce energy consumption, support ageing citizens' lives, revolutionizes health services and deliver better

¹⁷ [ISO/IEC JTC 1, Information technology - Business Plan 2014](#)

¹⁸ <http://iri.jrc.ec.europa.eu/scoreboard14.html>

¹⁹ <http://www.gartner.com/newsroom/id/2867917>

²⁰ 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]

²¹ Source: Eurostat (online data code : nama_nace10_c)

²² http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=isoc_ci_in_h&lang=en (source : Eurostat)

²³ <http://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&language=en&pcode=tin00091&plugin=1> (source : Eurostat)

²⁴ http://ec.europa.eu/information_society/digital-agenda/index_en.htm

²⁵ http://ec.europa.eu/europe2020/index_en.htm

²⁶ <http://ec.europa.eu/digital-agenda/en/digital-society>

public services. ICT can also drive forward the digitization of Europe's cultural heritage providing online access for all. Currently, ICT plays a crucial role in²⁷:

- Advanced research to uncover radically new technological possibilities and ICT contributions to research and innovation;
- Research and innovation activities on generic 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 Program²⁸, to have a developed ICT sector is a cornerstone, especially to support other economic sectors: ecotechnologies (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). Indeed, ICT sector is already a competitive sector at national level which represents more than 1,700 companies or 4.58% of the total employment²⁹. Moreover, the ICT sector has contributed to 6.2% of GVA (Gross Value Added) in 2013³⁰.

Through the national policy pursued in the recent years, Luxembourg has built a branding of "European Trusted Information Center" that the Government intends to consolidate and expand. For this purpose, the Government plans to extend this area by making the country the world database of finance and real economy.

The next section is focused on the standards context of the ICT sector and details in particular the different lead projects established by ILNAS in order to develop ICT standardization in Luxembourg.

²⁷ https://ec.europa.eu/programmes/horizon2020/sites/horizon2020/files/ICT%20in%20H2020%20WP2014-15_0.pdf

²⁸ <http://www.gouvernement.lu/3322796/Programme-gouvernemental.pdf>

²⁹ Source: STATEC

³⁰ Source: Eurostat (online data code: nama_nace10_c)

3.2. STANDARDS CONTEXT OF THE ICT SECTOR

Standards play a very important role in ICT since they provide the language that enables technology to understand each other. This is especially relevant because the key idea behind ICT is that information storage devices need to communicate with communication networks and computing systems. Interoperability is thus a key concept in today's ICT environment. The current landscape of Standards Developing Organizations (SDO) active in the ICT sector is composed of formal standards bodies that are acknowledged standards bodies, developing *de jure* (formal) standards, and *fora/consortia* developing *de facto* standards³¹.

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.

❖ *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, in "A Digital Agenda for Europe" established by the European Commission, the lack of interoperability is considered one of the seven most significant obstacles to a virtuous cycle of the digital economy. Thus, one of the seven pillars of the Digital Agenda is about "Interoperability and standards". Indeed, "*weaknesses in standard setting, public procurement and coordination between public authorities prevent digital services and devices used by Europeans from working together as well as they should*"³².

To tackle the different obstacles identified in "A Digital Agenda for Europe", the European Commission proposes a set of key actions. One of those actions is to propose legal measures on ICT interoperability to reform the rules on the implementation of ICT standards in Europe to allow the use of certain ICT *fora* and *consortia* standards. It is evident that nowadays ICT *fora* and *consortia* play an important role in the frame of ICT standardization. The underlying need is to reach "*effective*

³¹ "*De facto* standards" is sometimes used for common solutions and practices that have not been formally developed and agreed upon. In this document however, this term is used for formal standards published by other structures than the official ones (i.e. ISO, IEC, ITU, CEN, CENELEC and ETSI)

³² [European Commission - COM\(2010\) 245 final/2](#)

interoperability between IT products and services to build a truly digital society". Moreover, the European Commission has also launched a Work Program about ICT standardization entitled "2010-2013 ICT Standardisation Work Programme for industrial innovation"³³. This Work Program was replaced at the end of 2013 by the "Rolling plan for ICT standardization", which was prepared by the European Commission, in collaboration with the European Multi-Stakeholder Platform on ICT Standardization (MSP). This Rolling Plan 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 at the beginning of 2015³⁴.

❖ **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)³⁵, 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 products³⁶.

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.

³³ http://ec.europa.eu/enterprise/sectors/ict/files/ict-policies/2010-2013_ict_standardisation_work_programme_2nd_update_en.pdf

³⁴ http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=9137

³⁵ <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:C:2011:349:0004:0006:EN:PDF>

³⁶ 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.

The Rolling Plan³⁷ established at the beginning of 2015 lists all the topics identified as EU policy priorities where standardization plays a role in the implementation of the respective policy³⁸. The main EU policy topics, related to ICT standardization, are grouped into four clusters, as described below in Table 4:

Table 4: EU policy priorities related to ICT standardization

Societal Challenges	Innovation for the digital single market
<ul style="list-style-type: none"> • eHealth • Active and Healthy Aging • Accessibility of ICT products and services • Web Accessibility • e-Skills and e-Learning • Emergency communications • eCall 	<ul style="list-style-type: none"> • e-Procurement, Pre and Post award • e-Invoicing • Card, Mobile and Internet Payments • eXtensible Business Reporting Language (XBRL) • Online Dispute Resolution (ODR)
Sustainable growth	Key enablers and security
<ul style="list-style-type: none"> • Smart Grids and Smart Metering • Technologies and Services for a Smart and Efficient Energy Use • ICT Environmental Impact • European Electronic Toll Service (EETS) • Intelligent Transport Systems (ITS) • Advanced Manufacturing 	<ul style="list-style-type: none"> • Cloud computing • Public Sector Information, Open Data and Big Data • eGovernment • Electronic identification and trust services including e-signatures • Radio Frequency Identification (RFID) • Internet of Things (IoT) • Network and Information Security • ePrivacy • Broadband Infrastructure Mapping • eInfrastructures for research data and computing-intensive science • Preservation of Digital Cinema

Moreover, the Rolling Plan covers technologies of horizontal importance in the contexts of ICT infrastructures and ICT standardization. It provides an overview of relevant basic horizontal standards and ongoing standardization activities in various technology areas with relevance across the specific topic areas. These technologies are summarized below in Table 5:

³⁷ http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=9137

³⁸ 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* – where the terms “standards and technical specifications” are used.

Table 5: Relevant horizontal areas and major covered technologies

Technology area		Technologies covered
Physical and Link		Cabling, USB, BUS specifications, Ethernet, WIFI, GSM, LTE, Signaling and framing specifications
Internet-working technologies		IP level technologies (e.g.: Binding to lower layers, Mobility solutions, Rendezvous, Locator/Identifier splits, Home networks, Tunneling, DNS, intra and inter domain routing, virtual networking, multi-cast, congestion control mechanism, TCP maintenance, and various traffic optimization mechanisms)
Applications	Messaging and Media	Application layer protocols (e.g.: various e-mail standards, HTTP, LDAP Internet based telephony (SIP and RTP), internet messaging (XMPP), emergency services, geolocation, and web platform (HTML, Cookies, XML, EcmaScript)
	Presentation and Interfacing	Fonts, Internationalization, Audio and Video Codecs, Accessibility standards, File formats (jpeg, SVG), APIs, Cascading style sheets
	Business logic	XML based document definitions, business semantics and Modelling Languages (e.g. invoicing standards)
Security and Privacy		Internet Public Key, Internet infrastructure (x.509 based), web authorization, JavaScript signing and encryption, transport layer security mechanism (TLS), Authentication information exchange mechanisms (SAML), Privacy enhancement mechanisms

❖ CEN

CEN, as defined in Chapter 2, is the formal standards body in charge of developing ICT standards at the European level. The ICT sector is an active standardization domain for CEN, which has 9 technical committees directly concerned under its supervision (according to this standards analysis). The other ICT-related topics are being tackled at the international level by ISO/IEC JTC 1, which complies with the “Vienna Agreement” set up between CEN and ISO in June 1991. Its aim is to avoid parallel or conflicting standards and to provide mutual assistance in the work.

❖ ETSI

ETSI is officially recognized by the European Union as a European Standardization Organization. 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 in charge of developing all standards relating to spectrum management and electromagnetic compatibility used in European law.

Since 2015, ETSI has also become partner of the university certificate *Smart ICT for Business Innovation*, a national initiative launched by ILNAS in collaboration with the University of Luxembourg

(see Section 8.1). This involvement allows ETSI to promote its innovative standardization activities and participate in a global objective of education about standardization.

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 53 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”³⁹ 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 (see Section 4):**
 - 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:**
 - Providing information to the national community:

In order to share ICT standardization knowledge with the related community in Luxembourg (ISO/IEC JTC1, 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”.

- Participating in relevant technical committees:

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

- **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 *Smart ICT for Business Innovation*⁴⁰. This diploma, designed for experienced professionals who wish to enhance their ICT skills, will 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.

³⁹ <http://www.portail-qualite.public.lu/fr/publications/normes-normalisation/orientations-strategiques/politique-luxembourg-aise-pour-la-normalisation-technique-des-TIC-2015-2020/Policy-on-ICT-technical-standardization-2015-2020.pdf>

⁴⁰ <http://www.portail-qualite.public.lu/fr/normes-normalisation/education-recherche/projets-phares-dans-l-education-a-la-normalisation/index.html>

This university certificate will focus on important aspects of Smart ICT and their applications, such as Smart cities, Smart grid, data digitization, big data and analytics, cloud computing and environmental issues related to ICT. Furthermore, in an interconnected world, information security and ICT governance are essential and these aspects will be 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 commissioned ANEC GIE to implement yearly 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 & Smart ICT”, development of a research program, with the University of Luxembourg, dedicated to the domains of “ICT Technical Standardization”.

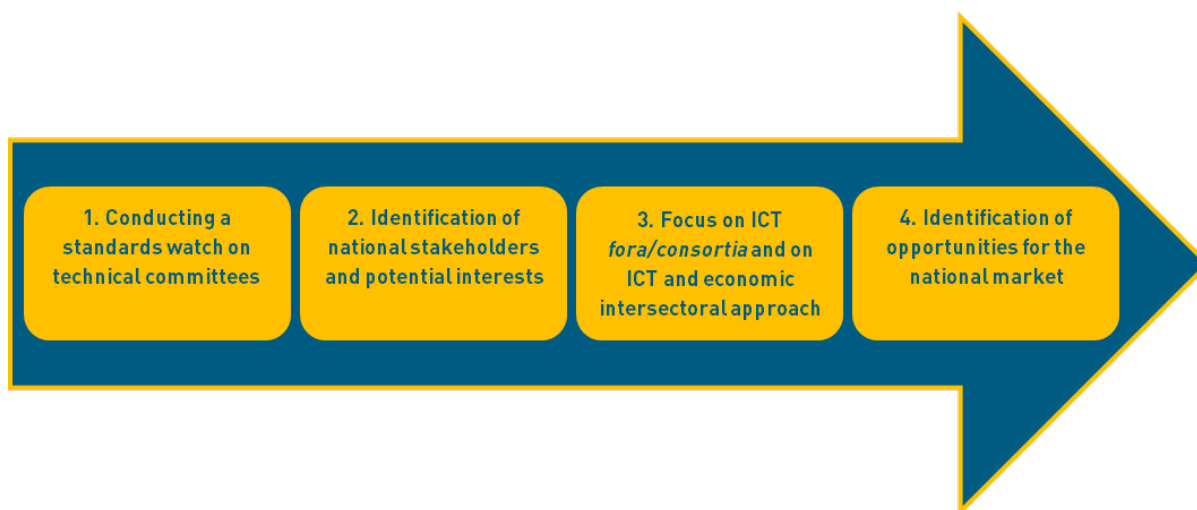
- Prospective of new diplomas:

ILNAS and ANEC, 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.

4. METHOD FOR THE STANDARDS ANALYSIS

This chapter describes a standards analysis that was carried out in the frame of the “Luxembourg’s policy on ICT technical standardization 2015-2020”⁴¹. This document constitutes a “snapshot” of the ICT sector and identifies opportunities for fostering and strengthening the national ICT sector in its involvement in standardization work. This chapter also presents the different steps that were followed, which are illustrated in Figure 2.

Figure 2: ICT standards analysis steps



4.1. STANDARDS WATCH

A standards watch was carried out in order to identify standardization technical committees of potential interest for the national stakeholders in the ICT sector. The analyzed technical committees belong to the formal standards bodies dealing with ICT standardization:

- ISO/IEC that forms a system for international standardization as a whole by means of the ISO/IEC Agreement of 1976⁴²;
- CEN;
- ETSI;
- ITU-T.

The other formal standards bodies (ISO, IEC, and CENELEC) do not specifically deal with ICT standardization but some technical committees have been selected due to their relevance with ILNAS and the national market needs.

However, it is important to note that some technical committees related to economic sectors other than ICT may produce standards related to ICT. These technical committees are identified in Chapter 11 and all the formal standards bodies are analyzed in this frame (step 3 of the standards analysis).

Regarding non-formal standards bodies, they are also considered in step 3 of the standards analysis and surveyed in Section 7.13.

The standard watch has been carried out in three stages, as described below.

⁴¹ http://www.portail-qualite.public.lu/fr/publications/normes-normalisation/orientations-strategiques/politique-luxembourgaise-pour-la-normalisation-technique-des-TIC-2015-2020/Policy-on-ICT-technical-standardization-2015-2020_.pdf

⁴² ISO/IEC Directives, Part 1 (2013, 10th Ed.)

❖ Stage 1: Identification of the standardization technical committees related to the ICT sector

This first step consisted in identifying technical committees relevant to the national ICT sector within the formal standards bodies:

- Identification of the ICT technical committees:

At the international level, ISO and IEC formed a Joint Technical Committee known as the ISO/IEC JTC 1 in 1987. The scope of this committee being “Information Technology”, ISO/IEC JTC1 and all its subcommittees are considered relevant for this standards watch.

CEN standardization is organized in sectors and one of these sectors is ICT, encompassing all ICT technical committees. All of these technical committees are also relevant in the frame of the standards watch.

ETSI and ITU-T deal with standardization of telecommunications. Therefore, ETSI, ITU-T and their technical committees are thus fully in the scope of this standards watch.

- European Multi-Stakeholder Platform on ICT standardization (MSP):

Based on a European Commission Decision, the MSP is an advisory expert group dealing with matters related to the implementation of ICT standardization policies.

In this frame, amongst its activities, the Technical Board (BT) CEN/CLC BT/WG 6 “ICT standardization policy” supports the CEN and CENELEC representatives in the European Commission's ICT Multi-stakeholder Platform. It aims to develop ways and means for further improving the visibility and recognition of CEN and CENELEC, and to draft responses to political issues in ICT standardization context.

❖ Stage 2: Division of the ICT sector into subsectors

The ICT sector covers many issues, dispatched among a number of technical committees. In order to present the standards watch results, the ICT sector was divided into subsectors. The choice of these subsectors was based both on the list of identified committees and the national interests, as described in Section 5.1.

Fora and *consortia* (see Section 4.3) have not been included in the subsectors. Indeed their scope is generally too large to be related to one or several subsectors. Moreover, it is usually difficult to have a clear view of the scope of committees composing the studied *fora/consortia*.


❖ Stage 3: Presentation of the results using identification cards for each standardization technical committee

Identification cards (ID-Cards) were designed in order to provide a quick overview of each surveyed technical committee and *fora/consortia*.

Most of the identified technical committees are linked to formal standard bodies. However, non-formal standards bodies dealing with ICT standards are also important and interesting resources of standards. As the information available is slightly different for these two types of organizations, different templates were designed to present the watch results.


Figure 3 depicts the template used for ISO/IEC, ISO, CEN, CENELEC, ETSI, ITU-T and their technical committees.

Figure 3: ID-Card template used for ISO/IEC, ISO, CEN, CENELEC, ETSI, ITU-T and their technical committees

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			

The template used to present non-formal standards bodies is showed in Figure 4.

Figure 4: ID-Card template used for and non-formal standards bodies

General information			
Forum / Consortium		Title	
Creation date		MEMBERS 	
Chairperson			
Involvement of Luxembourg			
Web site			
Scope			
Executive summary			
Structure			
Standardization work			
Published standards			
Standards under development			

4.2. STAKEHOLDERS OF THE ICT SECTOR AND POTENTIAL INTERESTS FOR STANDARDIZATION

The "Luxembourg's policy on ICT technical standardization 2015-2020"⁴³ annually sets an implementation plan related to the national standards analysis. Its objective is to meet national stakeholders in order to define their interests in standardization and support them in the implementation of relevant opportunities. This allows a sharing knowledge with the national market in order to support 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.

Concretely, after having compiled the selected technical committees in relation to the ICT sector into subsectors (Section 5.1), potential interests for the national stakeholders to participate in the standardization work were described (Section 5.2).

The objective is to facilitate the involvement of national stakeholders, by identifying their needs and increase their awareness of the relevant opportunities as described in the fourth step (Section 4.4).

⁴³ <http://www.portail-qualite.public.lu/fr/publications/normes-normalisation/orientations-strategiques/politique-luxembourgeoise-pour-la-normalisation-technique-des-TIC-2015-2020/Policy-on-ICT-technical-standardization-2015-2020.pdf>

4.3. ICT FORA/CONSORTIA AND ECONOMIC INTERSECTORAL APPROACH

ICT is certainly one of the sectors having the highest number of non-formal standards bodies. In order to complete the ICT standards watch performed, a survey of the main *fora/consortia* seems particularly relevant. A selection of most relevant ICT *fora/consortia* with reference to the current national market has thus been done.

As acknowledged by CEN, many standardization activities in the ICT field are carried out by industry consortia. ICT *fora* and *consortia* are developing *de facto* standards widely spread in the ICT sector.

Fora and *consortia* included in this report 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 procedure⁴⁴;
- 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 standards⁴⁵;
- 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.

ICT can also be considered as a horizontal support to many other sectors in the worldwide economy. The examples of sectors where ICT is a cornerstone are numerous: aeronautics, automobile industry, banking industry, logistics, etc. To reach the same objective of completing the ICT standards watch performed (Section 4.1), a survey of all the formal standards bodies (ISO, IEC, CEN and CENELEC – ETSI and ITU-T) was performed in order to identify technical committees of other economic sectors related to ICT. This survey used the ICS (International Classification for Standards) codes to identify technical committees developing standards related to ICT. A research on every formal standards body has been done using ICS codes⁴⁶ (Table 6).

Each technical committee (representatively) developing standards corresponding to these ICS codes is identified within its economic sector and highlighted as an economic sector using ICT as a supporting sector.

⁴⁴ [ISO/IEC Directives, part 1 – Draft Consolidated JTC 1 Supplement 2015, Annex F](#)

⁴⁵ [List of approved JTC 1 PAS Submitters](#)

⁴⁶ <http://www.iso.org/iso/ics6-en.pdf>

Table 6: ICS Codes related to the ICT sector

33 TELECOMMUNICATIONS. AUDIO AND VIDEO ENGINEERING:	35 INFORMATION TECHNOLOGY. OFFICE MACHINES:
<ul style="list-style-type: none"> - 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 (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. Telemetry. 	<ul style="list-style-type: none"> - 35.020 Information technology (IT) in general; - 35.040 Character sets and information coding; - 35.060 Languages used in information technology; - 35.080 Software; - 35.100 Open systems interconnection (OSI); - 35.110 Networking; - 35.140 Computer graphics; - 35.160 Microprocessor systems; - 35.180 IT terminal and other peripheral equipment; - 35.200 Interface and interconnection equipment; - 35.220 Data storage devices; - 35.240 Applications of information technology; - 35.260 Office machines.

Moreover, several ICT concepts constitute niche opportunities for the national economic development of the ICT sector. Standardization can be an incubator to transform technology trends in effective standardization activities facilitating the access of new technologies to the global market and developing new services across the world. Therefore, the process to analyze promising standardization areas is presented in Chapter 9 to highlight the incubator role of ISO/IEC JTC 1/SWG-P to transform technology trends in effective standardization activities.

4.4. DEFINITION OF THE OPPORTUNITIES FOR THE NATIONAL MARKET

Finally, the opportunities for the national market are identified. These opportunities are based on the feedback of the national market, the relevant standardization developments at the European and international level, and the experience of ILNAS and ANEC GIE by participating into the ICT standardization sector.

Based on the standards analysis of the ICT sector and, in particular, on the potential interests emerging from the stakeholders, there are many opportunities for the national market. Convinced that national stakeholders have a real interest to seize these opportunities, ILNAS and ANEC GIE will jointly and actively contribute to inform them and support their normative developments. The identified opportunities should be seen by national stakeholders as proposals which could lead to go further and engage in future actions with the aim to more rapidly take advantage of standardization.

5. RESULTS OF THE STANDARDS ANALYSIS

5.1. RESULTS OF THE STANDARDS WATCH

The performed standards watch allowed to identify **43 standardization technical committees** (TC) (European and international) directly related to the ICT sector, which are described, through ID-Cards, in Chapter 7.

As defined in Section 4.2, national stakeholders have potential interests to follow and participate in standardization technical committees. To facilitate the identification of relevant technical committees regarding their activities, 11 subsectors have been defined in connection with:

- The main development priorities of stakeholders in the ICT sector at national level (e.g.: cloud computing, data center, etc.);
- Areas of particular interest for ILNAS and the national ICT market (electronic signature, e-archiving). For these subsectors, the standards watch is extended to technical committees potentially out of the scope defined in Section 4.1 in order to establish a link between these subsectors and technical committees.

The 11 subsectors addressed in the standards analysis are described in Table 7. They cover 33 TC (out of 43 identified) listed in Table 8. According to market interests and standardization strategic developments, new subsectors may be added in future versions of this analysis. The 10 remaining TC are listed in Table 10.

5.1.1. ICT subsectors and related technical committees

Table 7: ICT subsectors

Subsector 1 - Cloud computing	<p>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 maintain important information in the cloud, all of this being done faster and at lower cost than through conventional means.</p> <p>Cloud computing is defined by ISO/IEC 17788:2014 as "<i>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</i>"⁴⁷.</p> <p>The main characteristics of cloud computing are:</p> <ul style="list-style-type: none">- 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: 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.
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⁴⁷ [International Standard ISO/IEC 17788:2014, Information technology -- Cloud computing -- Overview and Vocabulary \(developed by ISO/IEC JTC 1/SC 38\)](#)

Subsector 2 - Data center

As stated by the European Commission in "A Digital Agenda for Europe", the data center industry acts as a key business enabler to support the continuous digitalization trend. In 2010, Luxembourg defined its data centers offer as a key component in its development strategy for the coming years (and EUR 100 million ICT infrastructure investment plan has been adopted⁴⁸). As a result of this investment, Luxembourg currently boasts one of the most modern data center parks in Europe and has around 20 data centers in operation. Luxembourg has thus positioned itself as a leading data center marketplace in Europe and has probably one of the highest data center densities in Europe and the world⁴⁹.

It is also interesting to note that this subsector supports several other promising economic sectors such as entertainment and media; biotechnologies, health and patient management; and e-commerce.

Data center is defined by ISO/IEC DIS 30134-1 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"⁵⁰.

Subsector 3 - Telecommunications

Telecommunications is defined by ISO 5127:2001 as the "theory and techniques of the transmission of signals by electromagnetic or electronic means"⁵¹. 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 systems⁵².

Subsector 4 - Software and system engineering

According to ISO/IEC 2382-1:1993 concerning Fundamental terms in ICT, software engineering is defined as "the systematic application of scientific and technological knowledge, methods, and experience to the design, implementation, testing, and documentation of software"⁵³.

The International Standard ISO 16404:2013 defined system engineering as an "interdisciplinary approach and means to enable the realization of successful systems, starting with the definition of customer needs, the identification of product functionality, and the intended validation very early in the lifecycle"⁵⁴.

Software and system engineering is thus a broad subsector encompassing fundamental activities such as requirements engineering, design, coding, integration, installation and management of an information system.

Subsector 5 - Security

Information security includes three main dimensions: confidentiality, availability and integrity. 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:

- Confidentiality is the property that information is not made available or disclosed to unauthorized individuals, entities or processes;
- Integrity is the property of safeguarding the accuracy and completeness of assets. Accuracy could be threatened by (unauthorized or undesirable) update or tampering. Completeness could be threatened by altering or deletion;
- Availability is the property of being accessible and usable upon demand by an authorized entity⁵⁵.

This subsector deals thus with a large scope of standards at the hardware, software, network or management level.

⁴⁸ The future of data centres in Europe – Luxembourg: where else?, PricewaterhouseCoopers, 2010

⁴⁹ <http://ict.investinluxembourg.lu/ict/data-center-europe>

⁵⁰ Draft International Standard ISO/IEC DIS 30134-1, Information Technology -- Data Centres -- Key performance indicators -- Part 1: Overview and general requirements (developed by ISO/IEC JTC 1/SC 39)

⁵¹ ISO 5127:2001, Information and documentation -- Vocabulary (developed by ISO/TC 46)

⁵² Definition extracted from the International Telecommunication Convention (Nairobi, 1982)

⁵³ ISO/IEC 2382-1, Information technology -- Vocabulary -- Part 1: Fundamental terms (developed by ISO/IEC JTC 1)

⁵⁴ ISO 16404:2013, Space systems -- Programme management -- Requirements management (developed by ISO/TC 20/SC 14)

⁵⁵ Based on ISO/IEC 27000:2014, Information technology -- Security techniques -- Information security management systems -- Overview and vocabulary (developed by ISO/IEC JTC 1/SC 27)

<p>Subsector 6 - Data management</p>	<p>As defined by ISO/IEC TR 10032:2003, data management consists of “<i>the activities of defining, creating, storing, maintaining and providing access to data and associated processes in one or more information systems</i>”⁵⁶.</p> <p>This subsector encompasses the whole scope of data management, data going from characters or strings manipulated by a user to sophisticated and valuable assets. Data management can be performed in different environments such as a computer, a wired network or without contact (e.g. RFID - Radio-frequency identification, NFC - Near field communication technologies or Sensor Network); on various supports such as recorded media, hard drives or smartcards.</p>
<p>Subsector 7 - Electronic signature</p>	<p>ETSI has defined electronic signature as a “<i>data in electronic form that is attached to or logically associated with other electronic data and that serves as a method of authentication</i>”⁵⁷.</p> <p>An electronic signature is thus a mechanism to authenticate the author of an electronic document (like the handwritten signature for a paper document), and to ensure its integrity.</p> <p>The directive 1999/93/EC of the European Parliament and of the Council⁵⁸ on a Community framework for electronic signatures establishes a harmonized electronic signature similar to the handwritten signature.</p> <p>This subsector 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).</p>
<p>Subsector 8 - E-archiving</p>	<p>Archiving consists of the maintenance of records for continuing use, where records are information created, received and maintained as evidence and as an asset by an organization or person, in pursuit of legal obligations or in the transaction of business. Moreover, in the frame of a continuing use, the preservation of records is a highly important notion that consists of processes and operations involved in ensuring the maintenance of records over time⁵⁹.</p> <p>This analysis focuses on digital archives.</p>
<p>Subsector 9 - Sensor Networks</p>	<p>Sensor networks consist in a “<i>system of spatially distributed sensor nodes interacting with each other and, depending on applications, possibly with other infrastructure in order to acquire, process, transfer, and provide information extracted from its environment with a primary function of information gathering and possible control capability</i>”⁶⁰.</p> <p>Sensor networks are essential for the development of numerous ICT innovations: smart cities, smart grids, intelligent transport systems, internet of things, etc.</p>

⁵⁶ ISO/IEC TR 10032:2003, Information technology -- Reference Model of Data Management (developed by ISO/IEC JTC 1/SC 32)

⁵⁷ ETSI TS 101 733, Electronic Signatures and Infrastructures (ESI); CMS Advanced Electronic Signatures (CAAdES) (developed by ETSI/TC ESI)

⁵⁸ <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:31999L0093>

⁵⁹ Based on ISO/IEC 30300:2011, Information and documentation -- Management systems for records -- Fundamentals and vocabulary (developed by ISO/TC 46/SC 11)

⁶⁰ ISO/IEC 29182-2:2013, Information technology -- Sensor networks: Sensor Network Reference Architecture (SNRA) -- Part 2: Vocabulary and terminology (developed by ISO/IEC JTC 1/WG 7)

Subsector 10 – Governance of IT	<p>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 determined⁶¹.</p> <p>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 controlled⁶².</p>
Subsector 11 – Internet of Things	<p>The final study report of ISO/IEC JTC 1/SWG 5⁶³ defined Internet of Things (IoT) as: “<i>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</i>”.</p> <p>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.</p> <p>In this frame, standardization is essential to define a universal approach and thus ensure interoperability of IoT infrastructure.</p>

Following the definition of the subsectors categorizing the ICT sector, the technical committees are classified. The 33 standardization technical committees identified that are related to the selected ICT subsectors are listed below in the Table 8 (ETSI and ITU-T are included as a whole). In addition, in order to have access to more details, each technical committee has a detailed ID-Card presented in the following chapters. The exact page number referring to the specific ID-Card is also available in the following table.

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	45
	EU	ETSI/TC NTECH - Network Technologies	47
DATA CENTER	INT	ISO/IEC JTC 1/SC 39 - Sustainability for and by Information Technology	51
	EU	CLC/TC 215 - Electrotechnical aspects of telecommunication equipment	53
TELECOMMUNICATIONS	INT	ISO/IEC JTC 1/SC 6 - Telecommunications and information exchange between systems	57
	INT	ISO/IEC JTC 1/SC 25 - Interconnection of information technology equipment	59
	INT	ITU-T - International Telecommunication Union’s Telecommunication Standardization Sector	61
	EU	ETSI - European Telecommunications Standards Institute	63

⁶¹ OECD principles of corporate Governance

⁶² Based on ISO/IEC TR 38502:2014, Information Technology -- Governance of IT -- Framework and model (developed by ISO/IEC JTC 1/SC 40)

⁶³ 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 new WG 10 on IoT

SUBSECTOR	ORIGIN*	TECHNICAL COMMITTEE (TC)	ID-CARD Ref. Page
	EU	ETSI/TC SES - Satellite and Earth Stations & Systems	65
	EU	ETSI/TC ERM - Electromagnetic compatibility & Radio spectrum Matters	66
	EU	CEN/TC Project Committee 365 - Internet Filtering	68
SOFTWARE AND SYSTEM ENGINEERING	INT	ISO/IEC JTC 1/SC 7 - Software and systems engineering	71
	INT	ISO/IEC JTC 1/SC 22 - Programming languages, their environments and system software interfaces	73
	INT	ISO/IEC JTC 1/SC 29 - Coding of audio, picture, multimedia and hypermedia information	75
SECURITY	INT	ISO/IEC JTC 1/SC 27 - IT Security techniques	79
	INT	ISO/IEC JTC 1/SC 37 - Biometrics	82
	EU	ETSI/TC CYBER - Cyber Security	84
DATA MANAGEMENT	INT	ISO/IEC JTC 1/WG 9 - Big Data	89
	INT	ISO/IEC JTC 1/SC 2 - Coded character sets	91
	INT	ISO/IEC JTC 1/SC 23 - Digitally Recorded Media for Information Interchange and Storage	92
	INT	ISO/IEC JTC 1/SC 24 - Computer graphics, image processing and environmental data representation	93
	INT	ISO/IEC JTC 1/SC 31 - Automatic identification and data capture techniques	95
	INT	ISO/IEC JTC 1/SC 32 - Data management and interchange	97
	INT	ISO/IEC JTC 1/SC 34 - Document description and processing languages	99
ELECTRONIC SIGNATURE	EU	CEN/TC 225 - AIDC Technologies	101
	INT	ISO/IEC JTC 1/SC 17 - Cards and personal identification	105
	EU	CEN/TC 224 - Personal Identification, Electronic Signature and Cards	107
E-ARCHIVING	EU	ETSI/TC ESI - Electronic Signatures and Infrastructures	109
	INT	ISO/TC 46 - Information and documentation	113
SENSOR NETWORKS	INT	ISO/IEC JTC 1/WG 7 - Sensor Networks	117
GOVERNANCE OF IT	INT	ISO/IEC JTC 1/SC 40 - IT Service Management and IT Governance	121
INTERNET OF THINGS	INT	ISO/IEC JTC 1/WG 10 - Internet of Things	125
	EU	ETSI/TC SmartM2M - Smart Machine-to-Machine Communications	127

* EU: European origin and INT: International origin

In summary, the 33 technical committees, which are potentially interesting regarding the national ICT subsectors, are specified below 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
Subsector 1 – Cloud computing	1	1	2
Subsector 2 – Data center	1	1	2
Subsector 3 – Telecommunications	4	3	7
Subsector 4 – Software and System engineering	0	3	3
Subsector 5 – Security	1	2	3
Subsector 6 – Data management	1	7	8
Subsector 7 – Electronic signature	2	1	3
Subsector 8 – E-archiving	0	1	1
Subsector 9 – Sensor Networks	0	1	1
Subsector 10 – Governance of IT	0	1	1
Subsector 11 – Internet of Things	1	1	2
Total	11	22	33

5.1.2. Technical committees not related to subsectors

Finally, the standards watch has identified 10 technical committees that are focused 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	131
	INT	ISO/IEC JTC 1/SC 28 - Office equipment	135
	INT	ISO/IEC JTC 1/SC 35 - User interfaces	136
	INT	ISO/IEC JTC 1/SC 36 - Information technology for learning, education and training	138
CEN	EU	CEN/TC 247 Building - Automation, Controls and Building Management	140
	EU	CEN/TC 251 - Health Informatics	142
	EU	CEN/TC 287 - Geographic Information	143
	EU	CEN/TC 294 - Communication systems for meters and remote reading of meters	144
	EU	CEN/TC 428 - Project Committee - e-competences and ICT Professionalism	145
	EU	CEN/TC 434 - Project Committee - Electronic Invoicing	146

5.2. INTERESTS FOR STAKEHOLDERS

Taking into consideration the ICT subsectors that were identified and classified on the previous section but also considering the different stakeholders of the ICT sector, this section is dedicated to explore the potential interests for national ICT stakeholders to participate in standardization activities. Through the implementation plan, these interests will be turned into concrete opportunities for stakeholders at the national level.

5.2.1. Definition of the implementation plan

In order to meet the national stakeholders' needs and interests, ILNAS and ANEC GIE develop each year an implementation plan. Based on this standards analysis, it defines a framework to approach national stakeholders and gives an overview of all the opportunities offered by standardization (Chapter 6), in relation to the interests for each ICT subsector.

5.2.2. Description of potential interests

The potential interests of stakeholders are the following:

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: <ul style="list-style-type: none">- 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.

6. 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, there are many opportunities for the national market. Convinced that national actors have a real interest to seize these opportunities, ILNAS and ANEC GIE will 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 registered as “O-member” of ISO/IEC JTC 1, and 53 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:

- Giving your opinion during the standardization process;
- 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 and ensure that the national position concerning a vote will represent the consensus in 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).

❖ Participation in national Smart ICT workshops

In order to share the ICT standardization knowledge with the related community in Luxembourg (ISO/IEC JTC1, 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 example, a Smart ICT workshop, dedicated to the yearly ISO/IEC JTC 1 environmental scan results, was organized by ILNAS on June 4th, 2015⁶⁴. On this occasion, Mr. Mario Wendt, the chairman of the ISO/IEC JTC 1 Special Working Group on Planning (SWG-P), presented the planning process of the SWG and the intermediate results of the yearly survey. Moreover, Mr. Volker Jacumeit, the secretary of the JTC 1/SWG-P and German delegate for the CEN-CENELEC-ETSI Cyber Security Coordination Group (CSCG), provided an overview of the CSCG activities. Finally, a round table with national delegates, Mrs. Béatrix Barafort (Chairwoman of the national mirror committee ISO/IEC JTC 1/SC 40), Mr. Cédric Mauny (Vice Chairman of the national mirror committee ISO/IEC JTC 1/SC 27) and the JTC 1/SWG-P experts led to fruitful exchanges on the role and activities of the national standardization delegates and allowed ILNAS to identify new ways of development to better support their work.

ILNAS, with the support of ANEC, moreover, organized a breakfast “Data Centers & Standardization” on July 2nd, 2015⁶⁵. During this event, international standardization activities regarding data centers were presented and relevant information to participate in the standardization work were provided. This kind of meetings intends to bring together national stakeholders of a dedicated ICT subsector to provide them the relevant standardization knowledge and facilitate their engagement in standards development process. In this way, ILNAS organizes regularly short presentations dedicated to standardization of a specific ICT subsector.

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

A result expected from the standards analysis focusing on the ICT sector is to raise awareness and increase the participation of Luxembourg’s stakeholders in standardization technical committees, either at European or international level.

Moreover, national delegates also benefit from the experience of ILNAS in order to:

- Propose new standardization projects in international or European technical committees;
- Propose the development of national standards.

⁶⁴ <http://www.portail-qualite.public.lu/fr/actualites/normes-normalisation/2015/workshop-smart-ict-juin-2015/index.html>

⁶⁵ <http://www.portail-qualite.public.lu/fr/actualites/normes-normalisation/2015/petit-dejeuner-normalisation-et-data-centers/index.html>

❖ Profit from services in relation to standards evolutions

Services in relation to standards and their developments can be proposed to the ICT sector. It could be, for example, standards watch focusing on a specific subsector or a thematic study associating regulatory requirements and standardization duties.

Since 2013, ILNAS, supported by ANEC GIE, has been developing on-demand products and services in order to support and improve the competitiveness of the national economic market through a better knowledge of standardization.

Currently, the products and services offered encompass:

- Coaching;
- Diagnosis;
- Focused standards watch;
- Standards analysis;
- Information about links between research projects and standardization;
- Awareness and training.

In January 2015, ILNAS published its training courses catalog in the field of technical standardization for the year 2015. The catalog offers awareness modules to understand the key standardization concepts, and detailed modules to understand the standardization issues while developing its skills.

❖ Following the standardization work performed in ICT *fora/consortia*

Considering the importance for the market of ICT standards developed by *fora/consortia*, with regards to the number and the range of standards published, it is interesting to follow ICT standardization work performed in *fora/consortia* at the national level.

However, it is important to see upstream if the national actors are interested in further following and participating in ICT *fora/consortia*. Moreover, based on the national market's interest, a selection shall be done to follow a selected number of ICT *fora/consortia*. It is important to note that ICT is certainly one of the sectors that has the highest number of active standardization *fora/consortia*.

❖ Involvement at the strategic level of ICT standardization and identification of promising standardization areas

ISO/IEC JTC 1/SWG 3 on "Planning" (SWG-P) is a Special Working Group as it is not intended to develop standards. It covers planning activities of ISO/IEC JTC 1 and the definition of its action plans.

By following the work performed by the SWG-P, national stakeholders can identify technology trends defined as "mature" for standardization work and which therefore should quickly spread more widely on the global market (see Chapter 9).

❖ 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. 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 have the opportunity to join ILNAS' mailing list to receive relevant MSP documents regarding their area of interest. This registration offers the possibility to comment these documents through ILNAS.

❖ **Participation in research projects involving standardization**

Research in the ICT sector is important in Luxembourg, with several actors active in this field. Moreover, as mentioned by the CEN-CENELEC⁶⁶, 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.

With the support of Luxembourg's standards body, national stakeholders of the ICT technologies sector could have opportunities to be involved in these research projects.

In this context, a second version of the White Paper "Digital Trust - Towards excellence in ICT"⁶⁷ was published in 2014 by ILNAS to investigate and develop the knowledge areas of digital trust. It is worth noting that ILNAS commissioned ANEC GIE to update and develop, every two years, the White Paper on "Digital Trust & Smart ICT".

❖ **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*. 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 (see Chapter 8).

Overall, this university certificate will focus on important aspects of Smart ICT and their applications, such as Smart cities, Smart grid, data digitization, big data and analytics, cloud computing and environmental issues related to ICT. Furthermore, in an interconnected world, information security and ICT governance are essential and thus these aspects will also be addressed.

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.

❖ **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.

⁶⁶ <http://www.cencenelec.eu/research/Pages/default.aspx>

⁶⁷ <http://www.portail-qualite.public.lu/fr/publications/confiance-numerique/etudes-nationales/white-paper-digital-trust-june-2014/White-Paper-Digital-Trust-June-2014.pdf> (Firstly published in 2012)

❖ 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);
- Participation in national Smart ICT workshops;
- Benefit from the support offered by the national standards body;
- Profit from services in relation to standards evolutions;
- Following the standardization work performed in ICT *foral consortia*;
- Following the standardization work performed by the European multi-stakeholder platform on ICT standardization (MSP);
- Participation in research projects involving standardization;
- Participation in the university certificate *Smart ICT for Business Innovation*;
- Contribution to the improvement of Luxembourg's status in the standardization field.

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 delegates⁶⁸.

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.

⁶⁸ [Declaration of interest in ICT standardization](#)

7. ICT STANDARDS WATCH

The objective of the ICT standards watch is to identify the main organizations developing standards in the field of ICT and their related technical committees. This document takes into account every Standards Developing Organization (SDO), i.e. **formal standards bodies** developing *de jure* (or formal) standards, and *fora* and *consortia* developing *de facto* standards⁶⁹.

This chapter focuses on the presentation of technical committees related to ICT standardization. It considers both formal standards bodies and *fora/consortia*:

❖ ISO/IEC standardization committees

ISO is the world's dominant developer and publisher of International Standards in terms of scope. It has around 20,000 standards published and more than 4,500 standards under development⁷⁰. 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 JTC1 subcommittees, ISO/TC 46 is also presented. Although this TC is not directly related to the ICT domain as defined in Section 4.1, it is directly linked to the “e-archiving” topic defined as a subsector in Section 5.1.

❖ 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. They are now collaborating on their standards work in the domain of ICT. The standardization work is hosted at the CEN level except for the technical committee CENELEC/TC 215, particularly relevant for the “data center” subsector as described in Section 5.1.

❖ 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. The high quality of its work and its open approach to standardization has helped it to evolve into a European roots.

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 for the “electronic signature” subsector).

⁶⁹ Hesser, W., Czaya, A., & Riemer, N. (2007). Development of Standards. In W. Hesser (Ed.), *Standardisation in Companies and Markets* (pp. 123-169). Hamburg: Helmut Schmidt University.

⁷⁰ <http://www.iso.org/iso/home/about/iso-in-figures.htm>

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

From its inception in 1865, ITU-T has driven 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 body⁷¹.

An ID-Card is provided in Section 7.3 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.

❖ FORA/CONSORTIA

In order to complete the ICT standards watch, a survey of the main *fora/consortia* seems particularly relevant. ICT is certainly one of the sectors having the highest number of non-formal standards bodies. It is thus not realistic to analyze them all. A selection of the most relevant *fora/consortia* for the current national market has thus been done.

As acknowledged by CEN, many standardization activities in the ICT field are carried out by industry consortia. ICT *fora* and *consortia* are developing *de facto* standards widely spread in the ICT sector. The purpose of Section 7.13 is thus to present some well-known ICT *fora* and *consortia*.

The fora and *consortia* included in this report meet, at least, one of the following criteria (details are provided in Section 4.3):

- Organizations which have a Category A liaison with ISO/IEC JTC 1;
- The Publicly Available Specifications (PAS) Submitters of ISO/IEC JTC 1;
- Organizations which have signed a Partner Standards Development Organization (PSDO) Cooperation Agreement (e.g. IEEE-SA) with formal standards bodies;
- Member organizations of the European Multi-Stakeholder Platform on ICT standardization.

⁷¹ <http://www.itu.int/en/ITU-T/about/Pages/default.aspx>

7.1. 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 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”⁷².

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: 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.*

⁷² *International Standard ISO/IEC 17788:2014, Information technology -- Cloud computing -- Overview and Vocabulary (developed by ISO/IEC JTC 1/SC 38)*

7.1.1.ISO/IEC JTC 1/SC 38


General information			
Committee	ISO/IEC JTC 1/SC 38	Title	Cloud Computing and Distributed Platforms
Creation date	2009		Participating Countries (29): United States, Australia, Austria, Belgium, Brazil, Canada, China, Denmark, Finland, France, Germany, India, Ireland, Israel, Italy, Japan, Republic of Korea, Luxembourg , Netherlands, Poland, Portugal, Russian Federation, Singapore, Slovakia, South Africa, Spain, Sweden, Switzerland, United Kingdom Observing Countries (7): Argentina, Bosnia and Herzegovina, Czech Republic, Hong Kong, New Zealand, Norway, Serbia, Uruguay
Secretariat	ANSI (USA)		
Secretary	Ms. Lisa Rajchel		
Chairperson	Dr. Donald Deutsch		
Organizations in liaison	Cloud security alliance, DMTF, INLAC, ITU, OASIS, OGF, SNIA, Opengroup, United Kingdom, CSCC, EuroCloud, TM Forum		
Web site	http://www.iso.org/iso/standards_development/technical_committees/list_of_iso_technical_committees/iso_technical_committee.htm?commid=601355		
Scope	Standardization in the area of Cloud Computing and Distributed Platforms including but not limited to: <ul style="list-style-type: none"> - 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 2 JTC 1/SC 38/WG 3 JTC 1/SC 38/WG 4 JTC 1/SC 38/WG 5	Service Oriented Architecture (SOA) Cloud Computing Service Level Agreements (CCSLA) Cloud Computing Interoperability and Portability (CCIP) Cloud Computing Data and its Flow (CCDF)	
Standardization work			
Published standards	Number of published ISO standards under the direct responsibility of JTC 1/SC 38 (number includes updates): 6		
Standards under development	8		
Involvement of Luxembourg			
6 delegates			
<ul style="list-style-type: none"> - Mr. Jurgen Blum (Chairman) KBL European Private Bankers S.A. - Mrs. Myriam Djerouni Banque de Luxembourg S.A. - Mr. Jean-Michel Remiche POST Telecom S.A. - Mrs. Shenglan Hu POST Telecom PSF S.A. - Mr. Qiang TANG Université du Luxembourg - Mr. Johnatan Pecero ANEC GIE 			
Comments			
Established by ISO/IEC JTC 1 at its 2009 Plenary meeting in Tel Aviv (Israel), SC 38 on Cloud Computing and Distributed Platforms works mainly in two related technology areas: Service Oriented Architecture (SOA), and Cloud Computing.			

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 work items, 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 address end-user requirements and facilitate the rapid deployment of cloud computing.

The current SC 38 work program includes:

- ISO/IEC FDIS 18384-1, Information technology -- Reference Architecture for Service Oriented Architecture (SOA RA) -- Part 1: Terminology and Concepts for SOA;
- ISO/IEC FDIS 18384-2 Information Technology -- Reference Architecture for Service Oriented Architecture (SOA RA) -- Part 2: Reference Architecture for SOA Solutions;
- ISO/IEC FDIS 18384-3, Distributed Application Platforms and Services (DAPS) -- Reference Architecture for Service Oriented Architecture (SOA) -- Part 3: Service Oriented Architecture Ontology;
- ISO/IEC CD 19086-1, Information technology -- Cloud computing -- Service level agreement (SLA) framework and Technology -- Part 1: Overview and concepts;
- ISO/IEC NP 19086-2, Information technology -- Cloud computing -- Service level agreement (SLA) framework and Technology -- Part 2: Metrics;
- ISO/IEC NP 19086-3, Information technology -- Cloud computing -- Service level agreement (SLA) framework and technology -- Part 3: Core requirements;
- ISO/IEC AWI 19941, Information Technology -- Cloud Computing -- Interoperability and Portability;
- ISO/IEC WD 19944, Information Technology -- Cloud Computing -- Data and their Flow across Devices and Cloud Services.

7.1.2.ETSI/TC NTECH

General information			
Committee	NTECH	Title	Network Technologies
Creation date	2012		/
Chairperson	Mr. Bruno Chartras		
Organizations in liaison	/		
Web site	https://portal.etsi.org/tb.aspx?tbid=824&SubTB=824		
Scope	<p>TC NTECH missions consist in:</p> <ul style="list-style-type: none"> - Provide detailed architecture and protocol (profile) specifications for use in networks addressing the control, data and management planes in both the service and transport layers of these networks, including security; - Provide protocol profile specifications for service interconnection and network interconnection; - Identify and monitor relevant work on Future Networks technologies performed outside ETSI and provide guidelines on their applicability to ETSI compliant networks. <p>It includes the maintenance of Cloud Computing deliverables originally developed by ETSI TC CLOUD.</p>		
Structure	TC NTECH/WG NTECH AFI TC NTECH/STF 486 TC NTECH/STF AFI	Working Group Evolution of Management towards Autonomic Future Internet Specialist Task Force 486 Specialist Task Force AD on Autonomic and Self-Managed Networks	
Standardization work			
Published standards	10		
Standards under development	18		
Involvement of Luxembourg			
/			
Comments			
<p>Since 2015, ETSI TC NTECH is responsible for the development of a set of reports on Cloud standardisation, addressing users' priorities, the status of related standards, security conformance and interoperability, and the relation between standards and Open Source development. The work is done by ETSI Specialist Task Force 486 in the frame of the Cloud Standards Coordination (CSC) Phase 2.</p> <p>The work program relevant in the frame of cloud computing includes the following projects:</p> <ul style="list-style-type: none"> - DSR/NTECH-00033 - Cloud Computing standards: snapshot 2; - DSR/NTECH-00032 - Cloud Computing interoperability, conformance: the case of security; - DSR/NTECH-00031 - Cloud Computing standards and open source; - DSR/NTECH-00030 - Identification of Cloud user need. 			

7.2. DATA CENTER

As stated by the European Commission in "A Digital Agenda for Europe", the data center industry acts as a key business enabler to support the continuous digitalization trend. In 2010, Luxembourg defined its data centers offer as a key component in its development strategy for the coming years (and EUR 100 million ICT infrastructure investment plan has been adopted⁷³). As a result of this investment, Luxembourg currently boasts one of the most modern data center parks in Europe and has around 20 data centers in operation. Luxembourg has thus positioned itself as a leading data center marketplace in Europe and has probably one of the highest data center densities in Europe and the world⁷⁴.

It is also interesting to note that this subsector supports several other promising economic sectors such as entertainment and media; biotechnologies, health and patient management; and e-commerce.

Data center is defined by ISO/IEC DIS 30134-1 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"⁷⁵.

⁷³ *The future of data centres in Europe – Luxembourg: where else?, PricewaterhouseCoopers, 2010*

⁷⁴ <http://ict.investinluxembourg.lu/ict/data-center-europe>

⁷⁵ *Draft International Standard ISO/IEC DIS 30134-1, Information Technology -- Data Centres -- Key performance indicators -- Part 1: Overview and general requirements (developed by ISO/IEC JTC 1/SC 39)*

7.2.1. ISO/IEC JTC 1/SC 39

General information			
Committee	ISO/IEC JTC 1/SC 39	Title	Sustainability for and by Information Technology
Creation date	2012	MEMBERS 	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
Secretariat	ANSI (USA)		
Secretary	Ms. Sally Seitz		
Chairperson	Mr. Jay Taylor		
Organizations in liaison	Ecma International, ITU, TGG, ETSI		
Web site	http://www.iso.org/iso/standards_development/technical_committees/list_of_iso_technical_committees/iso_technical_committee.htm?commid=654019		
Scope	<p>Standardization related to the intersection of resource efficiency and IT which supports environmentally and economically viable development, application, operation and management aspects.</p> <p>To avoid any duplication of work and to support innovation, SC 39 will engage in active liaison and collaboration with:</p> <ul style="list-style-type: none"> - 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. <i>consortia</i>). 		
Structure	JTC 1/SC 39/WG 1 JTC 1/SC 39/WG 2	Resource Efficient Data Centres Green ICT	
Standardization work			
Published standards	Number of published ISO standards under the direct responsibility of JTC 1/SC 39 (number includes updates): 1		
Standards under development	8		
Involvement of Luxembourg			
	2 delegates <ul style="list-style-type: none"> - Mr. Didier Monestes (Chairman) Systemic Area Network S.à r.l. - Mr. Johnatan Pecero ANEC GIE 		
Comments			
The creation of ISO/IEC JTC 1/SC 39 was officially decided on during the 2011 JTC 1 Plenary meeting held in San Diego, California.			


The current work program includes:

- ISO/IEC NP 30131, Information technology -- Data Centres -- Taxonomy and Maturity Model;
- ISO/IEC PDTR 30132, Information technology -- Information technology sustainability -- Guidance for the development, evaluation and application of energy efficient computing systems;
- ISO/IEC AWI TR 30133, Information technology -- Data Centres -- Guidelines for resource efficient data centres
- ISO/IEC DIS 30134-1, Information Technology -- Data Centres -- Key performance indicators -- Part 1: Overview and general requirements;
- ISO/IEC DIS 30134-2, Information Technology -- Data Centres -- Key performance indicators -- Part 2: Power usage effectiveness (PUE);
- ISO/IEC DIS 30134-3, Information Technology -- Data Centres -- Key Performance Indicators -- Part 3: Renewable Energy Factor (REF);
- ISO/IEC CD 30134-4, Information Technology -- Data Centres -- Key performance indicators – Part 4: IT Equipment Energy Efficiency for Servers (ITEE);
- ISO/IEC CD 30134-5, Information Technology -- Data Centres -- Key Performance Indicators -- Part 5: IT Equipment Utilization for Servers (ITEU_SV)

The future series of standards ISO/IEC 30134 will provide a set of key performance indicators for data centers. Several other metrics are currently under consideration by the SC 39:

- Energy Reuse Effectiveness (ERE)
- Carbon Usage Effectiveness (CUE);
- Water Usage Effectiveness (WUE);
- Water Reuse Effectiveness (WR);
- Data Centre Cost Efficiency (DCCE);
- Data Centre Profit Efficiency (DCPE).

7.2.2. CENELEC/TC 215

General information			
Committee	CLC/TC 215	Title	Electrotechnical aspects of telecommunication equipment
Creation date	1991	MEMBERS 	33 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	<p>The priorities of CLC/TC 215 are:</p> <ul style="list-style-type: none"> - 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 CLC/TC 215/WG 01-04 CLC/TC 215/WG 02 CLC/TC 215/WG 03	Cabling design Testing of installed cabling Cabling installation – Quality assurance and installation practices Facilities and infrastructures	
Standardization work			
Published standards			45
Standards under development			2

Involvement of Luxembourg

1 delegate

- Mr. Didier Monestes (Acting as Chairman) Systemic Area Network 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.

The following parts are still under development:

- FprEN 50600-2-5, Information technology - Data centre facilities and infrastructures - Part 2-5: Security systems;
- FprEN 50600-3-1, Information technology - Data centre facilities and infrastructures - Part 3-1: Management and operational information;
- prEN 50600-4-1, Information technology - Data centre facilities and infrastructures - Part 4-1: Overview and general requirements for key performance indicators (transposition from JTC 1/SC 39);
- prEN 50600-4-2, Information technology - Data centre facilities and infrastructures - Part 4-2: Key performance indicator PUE (transposition from JTC 1/SC 39);
- prEN 50600-4-3, Information technology - Data centre facilities and infrastructures - Part 4-3: Key performance indicator REF (transposition from JTC 1/SC 39);
- CLC/prTR 50600-99-1, Information technology - Data centre facilities and infrastructures - Part 99-1: Recommended practices for energy management.

7.3.

TELECOMMUNICATIONS

Telecommunications is defined by ISO 5127:2001 as the “theory and techniques of the transmission of signals by electromagnetic or electronic means”⁷⁶.

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 systems⁷⁷.

⁷⁶ ISO 5127:2001, *Information and documentation -- Vocabulary (developed by ISO/TC 46)*

⁷⁷ Definition extracted from *the International Telecommunication Convention (Nairobi, 1982)*

7.3.1.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 (19): Republic of Korea, Austria, Belgium, Canada, China, Czech Republic, Finland, Germany, Greece, Jamaica, Japan, Kazakhstan, Netherlands, Russian Federation, Spain, Switzerland, Tunisia, United Kingdom, United States Observing Countries (30): 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, Ukraine
Secretariat	KATS (Republic of Korea)		
Secretary	Ms. Jooran Lee		
Chairperson	Prof. Dae Young Kim		
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	http://www.iso.org/iso/standards_development/technical_committees/list_of_iso_technical_committees/iso_technical_committee.htm?commid=45072		
Scope	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. The 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. Future Network has recently been added as an important work scope. A considerable part of the work is done in effective cooperation with ITU-T and other standardization bodies including IEEE 802 and Ecma International.		
Structure	JTC 1/SC 6/WG 1 JTC 1/SC 6/WG 7 JTC 1/SC 6/WG 10	Physical and data link layers Network, transport and future network Directory, ASN.1 and Registration	
Standardization work			
Published standards	Number of published ISO standards under the direct responsibility of JTC 1/SC 6 (number includes updates): 363		
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. Several parts of the series are already published (1, 3, 4, 6 and 7).			

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 TR 20002:2012, Information technology -- Telecommunications and Information Exchange Between Systems -- Managed P2P: Framework.

7.3.2.ISO/IEC JTC 1/SC 25

General information			
Committee	ISO/IEC JTC 1/SC 25	Title	Interconnection of information technology equipment
Creation date	1987	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. Gerd Weking		
Organizations in liaison	EC, Ecma International, ITU, UNCTAD, UNECE		
Web site	http://www.iso.org/iso/standards_development/technical_committees/list_of_iso_technical_committees/iso_technical_committee.htm?commid=45270		
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 JTC 1/SC 25/WG 1 JTC 1/SC 25/WG 3 JTC 1/SC 25/WG 4	Project Team: Taxonomy and Terminology (PTTT) Home electronic systems Customer premises cabling Interconnection of computer systems and attached equipment	
Standardization work			
Published standards	Number of published ISO standards under the direct responsibility of JTC 1/SC 25 (number includes updates): 177		
Standards under development	33		
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 TR 29108:2013, Information technology -- Terminology for intelligent homes;
- ISO/IEC 14165 series of standards concerning Fiber Channel.


Standards for Generic cabling, SCSI, Fiber Channel and Intelligent homes and buildings are at some of the priorities of the subcommittee.

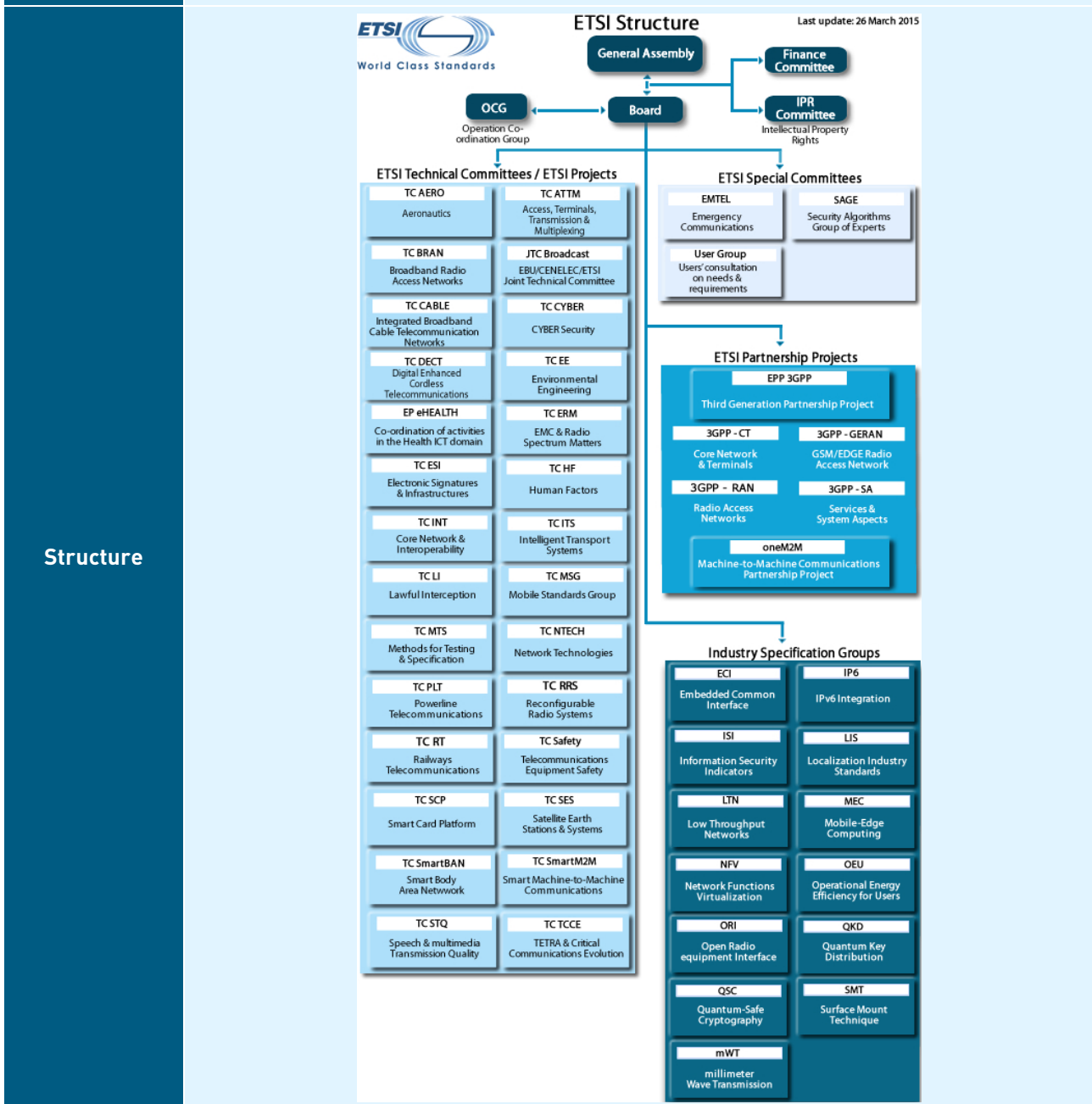
7.3.3.ITU-T - International Telecommunication Union - Telecommunication Standardization Sector

General information			
Organization	ITU-T	Title	ITU - Telecommunication Standardization Sector
Creation date	1865	MEMBERS	193 countries and over 700 private-sector entities and academic institutions
Chairperson	Mr. Chaesub Lee		
Web site	http://www.itu.int/en/ITU-T/Pages/default.aspx		
Scope	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.		
Structure	<p><u>Advisory Group</u></p> <ul style="list-style-type: none"> - Telecommunication Standardization Advisory Group (TSAG) <p><u>Study Groups</u></p> <ul style="list-style-type: none"> - 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) <p><u>Focus Groups</u></p> <ul style="list-style-type: none"> - Focus Group on IMT-2020 (FG IMT-2020) - Focus Group on Aviation Applications of Cloud Computing for Flight Data Monitoring (FG AC) - Focus Group on Smart Sustainable Cities (FG-SSC) - Focus Group Digital Financial Services (FG DFS) - Focus Group on Smart Water Management (FG-SWM) - Focus Group on Bridging the Gap: from Innovation to Standards (FG Innovation) <p><u>Joint Coordination Activities</u></p> <ul style="list-style-type: none"> - 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 (JCA-IoT) - Joint Coordination Activity on ICT and climate change (JCA-ICT&CC) - Joint Coordination Activity on Accessibility and Human factors (JCA-AHF) - Joint Coordination Activity for Identity Management (JCA-IdM) 		

	<ul style="list-style-type: none"> - Joint Coordination Activity on IPTV (JCA-IPTV) - Joint Coordination Activity on Conformance and Interoperability Testing (JCA-CIT) <p>Global Standards Initiative</p> <ul style="list-style-type: none"> - Internet of Things Global Standards Initiative (IoT-GSI) - IPTV Global Standards Initiative (IPTV-GSI) <p>Committees</p> <ul style="list-style-type: none"> - Standardization Committee for Vocabulary
Standardization work	
Published standards	Over 4000 ITU-T Recommendations
Standards under development	/
Involvement of Luxembourg	
3 members	
<ul style="list-style-type: none"> - <i>Service des medias et des Communications</i> - <i>Institut Luxembourgeois de Régulation (ILR)</i> - POST Telecom 	
Comments	
<p>The main products of ITU-T are normative Recommendations. Recommendations 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.</p>	

7.3.4.ETSI – European Telecommunications Standards Institute


General information			
Organization	ETSI	Title	European Telecommunications Standards Institute
Creation date	1988	MEMBERS	More than 800 ETSI member organizations drawn from 64 countries across 5 continents worldwide
Chairperson	Mr. Luis Jorge Romero Saro		
Web site	http://www.etsi.org/website/homepage.aspx		
Scope	The European Telecommunications Standards Institute (ETSI) produces globally applicable standards for Information and Communications Technologies (ICT), including fixed, mobile, radio, converged, broadcast and internet technologies.		




Standardization work	
Published standards	Over 35000 standards and reports
Standards under development	More than 1100
Involvement of Luxembourg	
9 members	
<ul style="list-style-type: none"> - ILNAS - ANEC GIE - Arhs - eWitness - FBConsulting - POST Telecom - SES S.A - Skylane Optics - Interdisciplinary Centre for Security, Reliability and Trust (SnT) 	
Comments	
<p>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.</p> <p>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.</p> <p>ETSI is currently conducting an intensive review of more than 270 harmonized standards, following the new Radio Equipment Directive of the European Commission⁷⁸.</p> <p>The following ETSI standards are used in Luxembourg by ILNAS to supervise/accredit Certification Service Providers:</p> <ul style="list-style-type: none"> - ETSI TS 101 456 "Policy requirements for certification authorities issuing qualified certificates"; - ETSI TS 102 042 "Policy requirements for certification authorities issuing public key certificates"; - ETSI TS 102 023 "Policy requirements for time-stamping authorities". 	

⁷⁸ http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=OJ:JOL_2014_153_R_0002&from=EN

7.3.5.ETSI/TC SES


General information			
Committee	SES	Title	Satellite and Earth Stations & Systems
Creation date	/	MEMBERS 	/
Chairperson	Mr. Jean-Jacques Bloch		
Organizations in liaison	CEN, CENELEC, CEPT, EMSA, ERA, ITU, TIA		
Web site	https://portal.etsi.org/tb.aspx?tbid=162&SubTB=162		
Scope	<p>Responsible for all aspects related to satellite earth stations and systems.</p> <p>The field includes:</p> <ul style="list-style-type: none"> - All types of satellite communication systems, services and applications including fixed, mobile and broadcasting - Satellite navigation systems and services - All types of earth stations and earth station equipment, especially the radio frequency interfaces and network and/or user interfaces - Protocols implemented in earth stations and satellite systems <p>Primary Committee for coordinating the position of ETSI with relevant ITU Study Groups.</p>		
Structure	SES HARM SES MAR ESV SES SatEC SES SCN	Harmonization under the R&TTE Directive (99/5/EC) Maritime and Railways Satellite Earth stations on Board Vessels & Train Satellite Emergency Communication Satellite Communication and Navigation	
Standardization work			
Published standards	465		
Standards under development	76		
Involvement of Luxembourg			
2 members			
<ul style="list-style-type: none"> - SES S.A. - Interdisciplinary Centre for Security, Reliability and Trust (SnT) 			
Comments			
/			

7.3.6.ETSI/TC ERM

General information			
Committee	ERM	Title	Electromagnetic compatibility & Radio spectrum Matters
Creation date	2005	MEMBERS 	/
Chairperson	Mr. Holger Butscheidt		
Organizations in liaison	ADCO R&TTE, CCSA, CEN, CENELEC, CEPT, CESI, Continua Health Alliance, DMR Association, EASA, ECC, Ecma Intl, ERA, ERTICO, ESMIG, EUROCAE, GIFSI, IEC, IEEE, ISO/IEC JTC1, ITU, TIA, TSDSI		
Web site	https://portal.etsi.org/tb.aspx?tbid=286&SubTB=286		
Scope	<p>All TC-ERM activities have a common theme of electromagnetic and/or radio spectrum compatibility.</p> <ul style="list-style-type: none"> - Studies of the EMC and radio parameters and their methods of measurement - taking due account of the work in the international community and specifically IEC; - Preparation of ETSI deliverables as required by ETSI members or those to support mandated work from the EC/EFTA in support of EU Directives or as requested by CEPT ECC; - Preparation of ETSI deliverables including harmonized standards used to describe the electromagnetic and/or radio environment; - Co-ordination of ETSI positions on the efficient use of the radio spectrum and spectrum allocations and the administration of the MoU between CEPT ECC and ETSI. These activities will be carried out in close cooperation with relevant ETSI Technical Bodies; - TC-ERM (EMC and Radio Spectrum Matters) also provides ETSI with a center of technical expertise in the radio and EMC fields, able to offer advice to ETSI Technical Bodies, the ETSI Board, and the ETSI General Assembly. 		
Structure	ERM EMC ERM RM ERM TG11 ERM TG17 ERM TG26 ERM TG28 ERM TG30 ERM TG34 ERM TG37 ERM TG41 ERM JTFEA ERM JTFER ERM TGDMR ERM TGSRR ERM TGUWB ERM JWG CLC 210 Task Force for ERM and MSG for Harmonized Standards for IMT-2000	ElectroMagnetic Compatibility Radio Matters Wideband data systems Standards for Broadcast and Ancillary Communications Equipment Maritime Generic SRD's Wireless Medical Devices RF Identification Devices Intelligent Transport Systems Wireless Industrial Applications TC ERM /TC AERO Joint Task Force TC ERM / TC RRS Joint Task Force Digital Mobile Radio Automotive and Surveillance Radar Ultra Wide Band Joint Working Group CENELEC 210	
Standardization work			

Published standards	853
Standards under development	167
Involvement of Luxembourg	
/	
Comments	
/	

7.3.7.CEN/TC Project Committee 365

General information			
Committee	CEN/TC Project Committee 365	Title	Internet Filtering
Creation date	2007	MEMBERS 	33 members of CEN/CENELEC
Secretariat	AENOR (Spain)		
Secretary	Ms. P. Garcia Lopez		
Chairperson	/		
Organizations in liaison	/		
Web site	http://standards.cen.eu/dyn/www/f?p=204:7:0:::FSP_ORG_ID:625771&cs=1F652BC44F0DDC3A32C5C992CAE9778AF		
Scope	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.		
Structure	/		
Standardization work			
Published standards	1		
Standards under development	0		
Involvement of Luxembourg			
NO (no registered delegate)			
Comments			
CEN/PC 365 has published the Technical Specification CEN/TS 16080:2013 to define a set of criteria on how Web filters shall perform and shall give Internet users more confidence in choosing a suitable product or service in order to help protecting children online.			

7.4.

SOFTWARE AND SYSTEM ENGINEERING

According to ISO/IEC 2382-1:1993 concerning Fundamental terms in ICT, software engineering is defined as “the systematic application of scientific and technological knowledge, methods, and experience to the design, implementation, testing, and documentation of software”⁷⁹.

The International Standard ISO 16404:2013 defined system engineering as an “interdisciplinary approach and means to enable the realization of successful systems, starting with the definition of customer needs, the identification of product functionality, and the intended validation very early in the lifecycle”⁸⁰.

Software and system engineering is thus a broad subsector encompassing fundamental activities such as requirements engineering, design, coding, integration, installation, and management of an information system.

⁷⁹ ISO/IEC 2382-1, Information technology -- Vocabulary -- Part 1: Fundamental terms (developed by ISO/IEC JTC 1)

⁸⁰ ISO 16404:2013, Space systems -- Programme management -- Requirements management (developed by ISO/TC 20/SC 14)

7.4.1.ISO/IEC JTC 1/SC 7

General information			
Committee	ISO/IEC JTC 1/SC 7	Title	Software and systems engineering
Creation date	1987	MEMBERS 	Participating Countries (40): Canada, Argentina, Australia, Belgium, Brazil, China, Costa Rica, Czech Republic, Denmark, Finland, France, Germany, India, Ireland, Israel, Italy, Jamaica, Japan, Kazakhstan, Republic of Korea, Luxembourg , Malaysia, Mexico, Netherlands, New Zealand, Peru, Poland, Portugal, Romania, Russian Federation, Slovakia, South Africa, Spain, Sweden, Switzerland, Thailand, Ukraine, United Kingdom, United States, Uruguay Observing Countries (20): 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
Secretariat	SCC (Canada)		
Secretary	Dr. Witold Suryn		
Chairperson	Mr. François Coallier		
Organizations in liaison	AES, Ecma International, IEEE, INCOSE, ISACA, ITU, PMI, WMO, itSMF, ESI software, IAITAM, The SPICE User Group, BSA, ETSI		
Web site	http://www.iso.org/iso/standards_development/technical_committees/list_of_iso_technical_committees/iso_technical_committee.htm?commid=45086		
Scope	Standardization of processes, supporting tools and supporting technologies for the engineering of software products and systems. Note: The processes, tools and technologies are within the scope of JTC 1 terms of references and exclude specific tools and technologies that have been assigned by JTC 1 to other of its SC's.		
Structure	JTC 1/SC 7/STTF JTC 1/SC 7/AG 1 JTC 1/SC 7/SWG 1 JTC 1/SC 7/SWG 5 JTC 1/SC 7/SWG 22 JTC 1/SC 7/WG 2 JTC 1/SC 7/WG 4 JTC 1/SC 7/WG 6 JTC 1/SC 7/WG 7 JTC 1/SC 7/WG 10 JTC 1/SC 7/WG 19 JTC 1/SC 7/WG 20 JTC 1/SC 7/WG 21 JTC 1/SC 7/WG 24 JTC 1/SC 7/WG 26 JTC 1/SC 7/WG 28 JTC 1/SC 7/WG 42	Spanish Translation Task Force Life Cycle Processes Harmonization Advisory Group (LCPHAG) JTC 1/SC7 Business Planning Group (BPG) Standards management group Vocabulary validation System software documentation Tools and environment Software Product and System Quality Life cycle management Process assessment Techniques for Specifying IT Systems Software and systems bodies of knowledge and professionalization Information technology asset management SLC Profile and guidelines for VSE Software testing Joint between ISO/IEC JTC 1/SC 7 and ISO/TC 159/SC 4: Common Industry Formats for Usability Reports Architecture	

Standardization work	
Published standards	Number of published ISO standards under the direct responsibility of JTC 1/SC 7 (number includes updates): 153
Standards under development	45
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. Séverine Mignon	LIST
- Mr. Rudolphe Hilbert	Dimension Data Financial Services S.A.
- Mrs. Jeanette Ewen	EWEN Consult S.à.r.l.
- Mr. Dietmar Gehring	UBS Fund Services Luxembourg S.A.
Comments	
<p>The main standards published by the subcommittee are:</p> <ul style="list-style-type: none"> - ISO/IEC 15288:2008, Systems and software engineering -- System life cycle processes; - ISO/IEC 19759:2005, 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; - ISO/IEC 15504 series of standards concerning Process assessment (10 parts); - ISO/IEC 12207:2008, Systems and software engineering -- Software life cycle processes; - ISO/IEC 38500:2008, Corporate governance of information technology; - 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 (parts 4 and 5 are under development). <p>It is important to note that ISO/IEC 20000 and ISO/IEC 38500 series of standards are now 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. Moreover the ISO/IEC 15504 series of standards is following a major revision and will be derived in the ISO/IEC 33000 series.</p>	

7.4.2.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	1985	MEMBERS 	Participating Countries (18): United States, Austria, Canada, China, Denmark, Finland, Germany, Italy, Japan, Kazakhstan, Republic of Korea, Netherlands, Portugal, Russian Federation, Spain, Switzerland, Ukraine, United Kingdom Observing Countries (27): Argentina, Belgium, Bosnia and Herzegovina, Bulgaria, Cuba, Czech Republic, Egypt, France, Ghana, Greece, Hungary, Iceland, India, Indonesia, Islamic Republic of Iran, Ireland, Democratic People's Republic Korea, Malaysia, New Zealand, Norway, Poland, Romania, Serbia, Singapore, Slovenia, 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	http://www.iso.org/iso/standards_development/technical_committees/list_of_iso_technical_committees/iso_technical_committee.htm?commid=45202		
Scope	<p>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.</p> <p>The most recently created WG has a project to document the vulnerabilities of various programming languages.</p> <p>Program portability between different implementations of the same language is a key goal.</p>		
Structure	JTC 1/SC 22/WG 4 JTC 1/SC 22/WG 5 JTC 1/SC 22/WG 9 JTC 1/SC 22/WG 14 JTC 1/SC 22/WG 17 JTC 1/SC 22/WG 21 JTC 1/SC 22/WG 23	COBOL Fortran Ada C Prolog C++ Programming Language Vulnerabilities	
Standardization work			
Published standards	Number of published ISO standards under the direct responsibility of JTC 1/SC 22 (number includes updates): 98		
Standards under development	13		
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).

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#

7.4.3.ISO/IEC JTC 1/SC 29

General information			
Committee	ISO/IEC JTC 1/SC 29	Title	Coding of audio, picture, multimedia and hypermedia information
Creation date	1991	MEMBERS 	Participating Countries (25): Japan, Australia, Austria, Belgium, Canada, China, Finland, France, Germany, Hungary, India, Israel, Italy, Republic of Korea, Netherlands, Poland, Portugal, Russian Federation, Singapore, Spain, Sweden, Switzerland, Ukraine, United Kingdom, United States Observing Countries (17): Argentina, Bosnia and Herzegovina, Czech Republic, Denmark, Greece, Hong Kong, Indonesia, Islamic Republic of Iran, Ireland, Malaysia, Morocco, Norway, Romania, Serbia, Slovakia, South Africa, Turkey
Secretariat	JISC (Japan)		
Secretary	Mr. Shinji Watanabe		
Chairperson	Mr. Kohtaro Asai		
Organizations in liaison	3GPP, AES, AGICOA, ATSC, CIE, CISAC, ETSI, FIAPF, IMTC, ISOC, ITU, MMA, SMPTE, WIPO		
Web site	http://www.iso.org/iso/standards_development/technical_committees/list_of_iso_technical_committees/iso_technical_committee.htm?commid=45316		
Scope	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: <ul style="list-style-type: none"> - 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.		
Structure	JTC 1/SC 29/WG 1 JTC 1/SC 29/WG 11	Coding of still pictures Coding of moving pictures and audio	
Standardization work			
Published standards	Number of published ISO standards under the direct responsibility of JTC 1/SC 29 (number includes updates): 542		
Standards under development	110		
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.

7.5. SECURITY

Information security includes three main dimensions: confidentiality, availability and integrity. 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:

- *Confidentiality is the property that information is not made available or disclosed to unauthorized individuals, entities or processes;*
- *Integrity is the property of safeguarding the accuracy and completeness of assets. Accuracy could be threatened by (unauthorized or undesirable) update or tampering. Completeness could be threatened by altering or deletion;*
- *Availability is the property of being accessible and usable upon demand by an authorized entity⁸¹.*

This subsector deals thus with a large scope of standards at the hardware, software, network or management level.

⁸¹ Based on ISO/IEC 27000:2014, Information technology -- Security techniques -- Information security management systems -- Overview and vocabulary (developed by ISO/IEC JTC 1/SC 27)

7.5.1.ISO/IEC JTC 1/SC 27

General information				
Committee	ISO/IEC JTC 1/SC 27		Title	IT Security techniques
Creation date	1990		 <p>MEMBERS</p>	<p>Participating Countries (51): Germany, Algeria, Argentina, Australia, Austria, Belgium, Brazil, Canada, Chile, China, Cyprus, Czech Republic, Côte d'Ivoire, Denmark, Finland, France, India, Ireland, Israel, Italy, Jamaica, Japan, Kazakhstan, Kenya, Republic of Korea, Luxembourg, Malaysia, Mauritius, Mexico, Netherlands, New Zealand, Norway, Peru, Poland, Romania, Russian Federation, Rwanda, Singapore, Slovakia, South Africa, Spain, Sri Lanka, Sweden, Switzerland, Thailand, The Former Yugoslav Republic of Macedonia, Ukraine, United Arab Emirates, United Kingdom, United States, Uruguay</p> <p>Observing Countries (20): Belarus, Bosnia and Herzegovina, Costa Rica, El Salvador, Estonia, Ghana, Hong Kong, Hungary, Iceland, Indonesia, Islamic Republic of Iran, Lithuania, Morocco, State of Palestine, Portugal, Saudi Arabia, Serbia, Slovenia, Swaziland, Turkey</p>
Secretariat	DIN (Germany)			
Secretary	Ms. Krystyna Passia			
Chairperson	Dr. Walter Fumy			
Organizations in liaison	(ISC)2, CCETT, Cloud security alliance, ECBS, ENISA, EPC, ETSI, Ecma International, IEEE, ISACA, ISSEA, ITU, MasterCard International, MasterCard Europe, ISA, CCCC, ABC4Trust, CCBD, Opengroup UK, TCG, TMForum, INLAC, (ISC)2, PRACTICE, CyberSecurity, TAS3, ISF, FIRST, OIFD, EuroCloud, ISCI, Kantara Initiative, PRIPARE, Interpol, PICOS, Article 29 Data Protection Working Party, TREsPASS, EUDCA			
Web site	http://www.iso.org/iso/standards_development/technical_committees/list_of_iso_technical_committees/iso_technical_committee.htm?commid=45306			
Scope	<p>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:</p> <ul style="list-style-type: none"> - 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. <p>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.</p>			
Structure	JTC 1/SC 27/SWG-M JTC 1/SC 27/SWG-T JTC 1/SC 27/WG 1	Special Working Group on Management Transversal Items 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 standards under the direct responsibility of JTC 1/SC 27 (number includes updates): 147
Standards under development	83

Involvement of Luxembourg

26 delegates

- Mr. Benoit Poletti (Chairman)	INCERT GIE
- Mr. Cédric Mauny (Vice-Chairman)	Telindus Luxembourg S.A.
- Mr. Tom Leclerc	Telindus Luxembourg S.A.
- Mr. François Barret	Ernst & Young Business Advisory Services S.à.r.l.
- Mr. Peter Schaffer	Ernst & Young Business Advisory Services S.à.r.l.
- Mr. Guillaume Bentag	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. Benoît Chenal	Victor Buck Services S.A.
- Mr. Sébastien Poggi	Victor Buck Services S.A.
- Mr. Carlo Harpes	itrust consulting S.à.r.l.
- 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.
- Mr. Olivier Antoine	e-Business & Resilience Centre
- Mr. Christophe Ajdonik	e-Business & Resilience Centre
- Mrs. Bérange Broutin	e-Business & Resilience Centre
- Mrs. Myriam Djerouni	Banque de Luxembourg S.A.
- Mr. Qiang Tang	Université du 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. 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 numerous⁸².

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 recently published a standard related to the security for cloud computing and a second one is under development (in liaison with 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 FDIS 27017, Information technology -- Security techniques -- Code of practice for information security controls based on ISO/IEC 27002 for cloud services.

⁸² Source: [ISO survey 2013](#)

7.5.2.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 (12): Austria, Belgium, Bosnia and Herzegovina, Ghana, Hungary, Indonesia, Islamic Republic of Iran, Ireland, Kenya, Romania, Serbia, Thailand
Secretariat	ANSI (United States)		
Secretary	Ms. Lisa Rajchel		
Chairperson	Mr. Fernando Podio		
Organizations in liaison	IBIA, ILO, ITU, OASIS, VoiceXML, FRONTEX		
Web site	http://www.iso.org/iso/standards_development/technical_committees/list_of_iso_technical_committees/iso_technical_committee.htm?commid=313770		
Scope	<p>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.</p> <p>Excluded is the work in ISO/IEC JTC 1/SC 17 to apply biometric technologies to cards and personal identification.</p> <p>Excluded is the work in ISO/IEC JTC 1/SC 27 for biometric data protections techniques, biometric security testing, evaluations, and evaluations methodologies.</p>		
Structure	JTC 1/SC 37/WG 1 JTC 1/SC 37/WG 2 JTC 1/SC 37/WG 3 JTC 1/SC 37/WG 4 JTC 1/SC 37/WG 5 JTC 1/SC 37/WG 6	Harmonized biometric vocabulary Biometric technical interfaces Biometric data interchange formats Technical Implementation of Biometric Systems Biometric testing and reporting Cross-Jurisdictional and Societal Aspects of Biometrics	
Standardization work			
Published standards	Number of published ISO standards under the direct responsibility of JTC 1/SC 37 (number includes updates): 104		
Standards under development	46		
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 2982-37:2012) that will serve the standards community as well as other customers has been developed.

7.5.3.ETSI/TC CYBER

General information			
Committee	CYBER	Title	Cyber Security
Creation date	2014		/
Chairperson	Mr. Charles Brookson		
Organizations in liaison	CEN, CENELEC, ENISA, GIFSI, TCG		
Web site	https://portal.etsi.org/tb.aspx?tbid=824&SubTB=824		
Scope	<p>The activities of ETSI TC CYBER include the following broad areas:</p> <ul style="list-style-type: none"> - 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	1		
Standards under development	9		
Involvement of Luxembourg			
/			
Comments			
<p>ETSI TC CYBER has published its first technical report in May 2015: ETSI TR 103 305, CYBER; Critical Security Controls for Effective Cyber Defence. It describes a specific set of technical measures available to detect, prevent, respond, and mitigate damage from the most common to the most advanced of cyber attacks developed and maintained by the Council of Cybersecurity. The measures reflect the combined knowledge of actual attacks and effective defences.</p> <p>The work program of TC CYBER include the following projects:</p> <ul style="list-style-type: none"> - DTR/CYBER-001 - Protection measures for ICT in the context of Critical Infrastructure; - DTR/CYBER-002 - PII Protection and Retention; - DTR/CYBER-004 - Global Cyber Security Ecosystem; - DTR/CYBER-005 - Security Aspects for LI and RD Interfaces; - DTR/CYBER-006 - A security baseline regarding LI and RD for NFV and related platforms; - DTR/CYBER-007 - Secure by Default - platform security technology; - DTR/CYBER-008 - Post Quantum Computing Impact on ICT Systems; Business Continuity and Algorithm Selection; - DTR/CYBER-009 - Structured threat information sharing; - DTR/CYBER-0010 - Practical introductory guide to privacy. <p>The first technical report of the committee, DTR/CYBER-003 - Critical Security Controls for Effective Cyber Defence, has been published in July 2015. It describes a specific set of technical measures available to detect, prevent, respond, and mitigate damage from the most common to the most advanced of cyber attacks</p>			

developed and maintained by the Council of Cybersecurity. The measures reflect the combined knowledge of actual attacks and effective defences.

7.6.

DATA MANAGEMENT

As defined by ISO/IEC TR 10032:2003, data management consists of “the activities of defining, creating, storing, maintaining and providing access to data and associated processes in one or more information systems”⁸³.

This subsector encompasses the whole scope of data management, data going from characters or strings manipulated by a user to sophisticated and valuable assets. Data management can be performed in different environments such as a computer, a wired network or without contact (e.g. RFID - Radio-frequency identification, NFC - Near field communication technologies or Sensor Network); on various supports such as recorded media, hard drives or smartcards.


⁸³ ISO/IEC TR 10032:2003, Information technology -- Reference Model of Data Management (developed by ISO/IEC JTC 1/SC 32)

7.6.1.ISO/IEC JTC 1/WG 9


General information			
Committee	ISO/IEC JTC 1/WG 9	Title	Big Data
Creation date	2014	MEMBERS 	Participating countries (16): United States, Australia, Brazil, Canada, Finland, Germany, Ireland, Italy, Japan, Republic of Korea, Luxembourg , Netherlands, Singapore, Spain, Sweden, United Kingdom
Secretariat	United States (ANSI)		
Secretary	Ms. Jennifer Garner		
Chairperson	Mr. Wo Chang		
Organizations in liaison	/		
Web site	http://isotc.iso.org/livelink/livelink/open/jtc1wg9		
Scope	<ul style="list-style-type: none"> - 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. JTC 1 Plenary Resolutions - 15-20 November 2014, Abu Dhabi, UAE. - 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 		
Structure	/		
Standardization work			
Published standards	0		
Standards under development	5		
Involvement of Luxembourg			
1 delegate			
-	Mr. Johnatan Pecero	ANEC GIE	
Comments			
<p>This WG has been established during the 2014 ISO/IEC JTC 1 plenary meeting.</p> <p>The current WG 9 work program includes the development of the International Standard 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:</p>			

- ISO/IEC NP TR 20547-1, Information technology – Big Data Reference Architecture -- Part 1: Framework and Application Process;
- ISO/IEC NP TR 20547-2, Information technology – Big Data Reference Architecture - - Part 2: Use Cases and Derived Requirements;
- ISO/IEC NP 20547-3, Information technology -- Big Data Reference Architecture – Part 3: Reference Architecture;
- ISO/IEC NP 20547-4, Information technology -- Big Data Reference Architecture – Part 4: Security and Privacy Fabric;
- ISO/IEC NP TR 20547-5, Information technology – Big Data Reference Architecture - - Part 5: Standards Roadmap.


7.6.2.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 (22): Armenia, Belgium, Bosnia and Herzegovina, Cuba, Czech Republic, Estonia, 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	Dr. Yoshiki Mikami		
Organizations in liaison	CCSDS, EC, ISOC, ITU, UNCTAD, UNECE, UNICODE, WIPO, WMO, UC Berkeley, UNU-IIST, HKITF		
Web site	http://www.iso.org/iso/home/standards_development/list_of_iso_technical_committees/iso_technical_committee.htm?commid=45050		
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 standards under the direct responsibility of JTC 1/SC 2 (number includes updates): 53		
Standards under development	3		
Involvement of Luxembourg			
NO (no registered delegate)			
Comments			
Noteworthy standards of ISO/IEC JTC 1/SC 2 are: <ul style="list-style-type: none"> - 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). 			

7.6.3.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 (7): Japan, China, Republic of Korea, Netherlands, Russian Federation, Switzerland, United States 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	http://www.iso.org/iso/standards_development/technical_committees/list_of_iso_technical_committees/iso_technical_committee.htm?commid=45240		
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: <ul style="list-style-type: none"> - 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 standards under the direct responsibility of JTC 1/SC 23 (number includes updates): 145		
Standards under development	1		
Involvement of Luxembourg			
NO (no registered delegate)			
Comments			
Examples of standards developed by ISO/IEC JTC 1/SC 23 are: <ul style="list-style-type: none"> - 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). 			

7.6.4.ISO/IEC JTC 1/SC 24

General information			
Committee	ISO/IEC JTC 1/SC 24	Title	Computer graphics, image processing and environmental data representation
Creation date	1987	MEMBERS 	Participating Countries (10): United Kingdom, Australia, China, Egypt, France, Japan, Republic of Korea, Portugal, Russian Federation, United States Observing Countries (24): Argentina, Austria, Belgium, Bosnia and Herzegovina, Bulgaria, Canada, Cuba, Czech Republic, Finland, Ghana, Hungary, Iceland, India, Indonesia, Islamic Republic of Iran, Italy, Kazakhstan, Malaysia, Poland, Romania, Serbia, Slovakia, Switzerland, Thailand
Secretariat	BSI (United Kingdom)		
Secretary	Dr. Charles A. Whitlock		
Chairperson	Professor Ha-Jine Kimn		
Organizations in liaison	SEDRIS Organization, WIPO, SISO USA, OGC, IHO, DGIWG		
Web site	http://www.iso.org/iso/standards_development/technical_committees/list_of_iso_technical_committees/iso_technical_committee.htm?commid=45252		
Scope	<p>Standardization of interfaces for information technology based applications relating to:</p> <ul style="list-style-type: none"> - Computer graphics; - Image processing; - Environmental data representation; - Support for the augmented reality continuum (ARC); - Interaction with, and visual presentation of, information. <p><u>Included are the following related areas:</u> Modeling and simulation, related reference models; virtual reality with accompanying augmented reality/augmented virtuality aspects, related reference models; application program interfaces; functional specifications; representation models; interchange formats, encodings and their specifications, including metafiles; device interfaces; testing methods; registration procedures; presentation and support for creation of multimedia, hypermedia, and mixed reality documents.</p> <p><u>Excluded:</u> Character and image coding; coding of multimedia and hypermedia document interchange formats; JTC 1 work in user system interfaces and document presentation: ISO/TC 207 work on ISO 14000 environment management, ISO/TC 211 work on geographic information and geomatics; and software environments as described by ISO/IEC JTC 1/SC 22.</p>		
Structure	JTC 1/SC 24/WG 6 JTC 1/SC 24/WG 8 JTC 1/SC 24/WG 9	Augmented reality continuum presentation and interchange Environmental representation Augmented reality continuum concepts and reference model	
Standardization work			
Published standards	Number of published ISO standards under the direct responsibility of JTC 1/SC 24 (number includes updates): 80		
Standards under development	14		
Involvement of Luxembourg			
NO (no registered delegate)			

Comments


Examples of standards developed by ISO/IEC JTC 1/SC 23 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 (under revision).

The current work program notably includes:

- ISO/IEC 18521 series of standards concerning "Mixed and Augmented Reality (MAR) concepts and reference model";
- ISO/IEC 19776 series of standards entitled "Information technology -- Computer graphics, image processing and environmental data representation -- Extensible 3D (X3D) encodings".


7.6.5.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 (27): United States, Australia, Austria, Belgium, Brazil, Canada, China, Colombia, Czech Republic, Denmark, France, Germany, India, Ireland, Israel, Japan, Republic of Korea, Malaysia, Netherlands, Peru, Philippines, Russian Federation, Slovakia, South Africa, Sweden, Switzerland, United Kingdom Observing Countries (18): Argentina, Bosnia and Herzegovina, Finland, Ghana, Hong Kong, Hungary, Indonesia, Islamic Republic of Iran, Italy, Kazakhstan, Kenya, Luxembourg , New Zealand, Romania, Serbia, Singapore, Spain, Thailand
Secretariat	ANSI (United States)		
Secretary	Mr. Frank M. Sharkey		
Chairperson	Mr. Dan Kimball		
Organizations in liaison	AIM Global, ETSI, Ecma International, GS1, IATA, ITU, OGC, UPU, NATO		
Web site	http://www.iso.org/iso/standards_development/technical_committees/list_of_iso_technical_committees/iso_technical_committee.htm?commid=45332		
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 JTC 1/SC 31/WG 2 JTC 1/SC 31/WG 4 JTC 1/SC 31/WG 5 JTC 1/SC 31/WG 7	Data carrier Data structure Radio frequency identification for item management Real time locating systems Security for item management	
Standardization work			
Published standards	Number of published ISO standards under the direct responsibility of JTC 1/SC 31 (number includes updates): 113		
Standards under development	42		
Involvement of Luxembourg			
1 delegate			
- Mr. Juan Luis Jimenez ANEC GIE			
Comments			
<p>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.</p> <p>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</p>			

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).

7.6.6.ISO/IEC JTC 1/SC 32

General information			
Committee	ISO/IEC JTC 1/SC 32	Title	Data management and interchange
Creation date	1997	MEMBERS 	Participating Countries (14): United States, Canada, China, Czech Republic, Côte d'Ivoire, Egypt, Finland, Germany, India, Japan, Republic of Korea, Portugal, Russian Federation, United Kingdom Observing Countries (23): Argentina, Australia, Austria, Belgium, Bosnia and Herzegovina, France, Ghana, Hungary, Iceland, Indonesia, Islamic Republic of Iran, Ireland, Italy, Kazakhstan, Luxembourg , Netherlands, Norway, Poland, Romania, Serbia, Spain, Switzerland, Turkey
Secretariat	ANSI (USA)		
Secretary	Ms. Michaela Miller		
Chairperson	Mr. Jim Melton		
Organizations in liaison	CISAC, ITSO, ITU, Infoterm, SWIFT, UNECE, WMO, OMG, EUROSTAT, DCMI		
Web site	http://www.iso.org/iso/standards_development/technical_committees/list_of_iso_technical_committees/iso_technical_committee.htm?commid=45342		
Scope	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: <ul style="list-style-type: none"> - 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. 		
Structure	JTC 1/SC 32/WG 1 JTC 1/SC 32/WG 2 JTC 1/SC 32/WG 3 JTC 1/SC 32/WG 4	eBusiness MetaData Database language SQL/Multimedia and application packages	
Standardization work			
Published standards	Number of published ISO standards under the direct responsibility of JTC 1/SC 32 (number includes updates): 74		
Standards under development	40		
Involvement of Luxembourg			
1 delegate			
-	Mr. Johnatan Pecero (Acting as Chairman)	ANEC GIE	

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.

The subcommittee is currently revising the ISO/IEC 9075 series of standards concerning the SQL database language.

7.6.7.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 (26): Japan, Armenia, Bulgaria, Chile, China, Czech Republic, Egypt, Finland, France, Germany, India, Italy, Republic of Korea, Lebanon, Luxembourg , Malaysia, Malta, Netherlands, Pakistan, Poland, Russian Federation, Slovakia, South Africa, Sri Lanka, United Kingdom, United States Observing Countries (30): Argentina, Austria, Belgium, Bosnia and Herzegovina, Brazil, Canada, Croatia, Cyprus, Côte d'Ivoire, Denmark, Greece, Hong Kong, Hungary, Indonesia, Islamic Republic of Iran, Ireland, Israel, Kazakhstan, Lithuania, Mexico, Norway, Portugal, Romania, Serbia, Spain, Sweden, Switzerland, Thailand, Turkey, Ukraine
Secretariat	JISC (Japan)		
Secretary	Ms. Toshiko Kimura		
Chairperson	Professor Sam Gyun Oh		
Organizations in liaison	Ecma International, ISUG, OASIS		
Web site	http://www.iso.org/iso/standards_development/technical_committees/list_of_iso_technical_committees/iso_technical_committee.htm?commid=45374		
Scope	Standardization in the field of document structures, languages and related facilities for the description and processing of compound and hypermedia documents, including: <ul style="list-style-type: none"> - 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/WG 4 JTC 1/SC 34/WG 6 JTC 1/SC 34/JWG 7 JTC 1/SC 34/WG 8	Office Open XML OpenDocument Format Joint JTC 1/SC 34 – TC 46/SC 4 – IEC/TC 100/TA 10 WG: EPUB Document processing and presentation	
Standardization work			
Published standards	Number of published ISO standards under the direct responsibility of JTC 1/SC 34 (number includes updates): 70		
Standards under development	9		
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.

7.6.8.CEN/TC 225

General information			
Committee	CEN/TC 225	Title	AIDC Technologies
Creation date	1989	MEMBERS 	33 members of CEN/CENELEC
Secretariat	NEN (Netherlands)		
Secretary	Mr. Martin Peelen		
Chairperson	Mr. Henri Barthel		
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	28		
Standards under development	2		
Involvement of Luxembourg			
NO (no registered delegate)			
Comments			
<p>When preparing standards for Europe, CEN/TC 225 will take into account the technical specifications, standards and regulations currently available or being prepared at international levels. 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) will be taken into account.</p> <p>CEN/TC 225 will deliver EN standards and technical reports to:</p> <ul style="list-style-type: none"> - Close the standardization gaps identified by the EC M436 mandate process; - 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; 			

- 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;
- Special focus will be given to the Future Internet and the Internet of Things which includes unique identification schemes, privacy and security aspects.

Furthermore, CEN/TC 225 will:

- Focus on issues arising from the EC M436 mandate process and rapidly develop EN/TR to deliver the objectives of the EC Mandate;
- Use and refine the resulting frameworks, especially in relation to PIA's (Privacy Impact Assessment), to build application guidelines and standards;
- Promote the CEN/TC 225 WG work plans to mirror committees in all CEN member states;
- Establish and maintain effective liaisons with other ESOs (European Standardization Organizations), global standards organizations, trade associations and regulatory bodies;
- Evaluate the need for adopting ISO/IEC 18000 (and related) standards as EN standards;
- Take 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;
- Use the Vienna Agreement to ensure alignment of European AIDC standards with the ISO environment.

7.7.

ELECTRONIC SIGNATURE

ETSI has defined electronic signature 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”⁸⁴.

An electronic signature is thus a mechanism to authenticate the author of an electronic document (like the handwritten signature for a paper document), and to ensure its integrity.


The directive 1999/93/EC of the European Parliament and of the Council⁸⁵ on a Community framework for electronic signatures establishes a harmonized electronic signature similar to the handwritten signature.

This subsector 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).

⁸⁴ ETSI TS 101 733, *Electronic Signatures and Infrastructures (ESI); CMS Advanced Electronic Signatures (CAAdES)* (developed by ETSI/TC ESI)

⁸⁵ <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:31999L0093>

7.7.1.ISO/IEC JTC 1/SC 17

General information			
Committee	ISO/IEC JTC 1/SC 17	Title	Cards and personal identification
Creation date	1969	MEMBERS 	Participating Countries (34): 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, Portugal, Romania, Russian Federation, Singapore, Slovakia, Slovenia, South Africa, Spain, Sweden, Switzerland, United States Observing Countries (18): Argentina, Bosnia and Herzegovina, Croatia, Estonia, Ghana, Hungary, Iceland, Indonesia, Islamic Republic of Iran, Ireland, Kazakhstan, Lithuania, New Zealand, Serbia, Thailand, Turkey, Ukraine, Viet Nam
Secretariat	BSI (United Kingdom)		
Secretary	Ms. Shanti Conn		
Chairperson	Mr. Richard A. Mabbott		
Organizations in liaison	AMEX, CCETT, ECBS, Ecma International, IATA, ICAO, ICMA, ILO, MasterCard International, MasterCard Europe, UNECE, VISA, VISA EU, NFC Forum, JAVA CARD FORUM, EUDCA		
Web site	http://www.iso.org/iso/standards_development/technical_committees/list_of_iso_technical_committees/iso_technical_committee.htm?commid=45144		
Scope	Standardization in the area of: <ul style="list-style-type: none"> - Identification and related documents; - Cards and devices associated with their use in inter-industry applications and International interchange. 		
Structure	JTC 1/SC 17/WG 1 JTC 1/SC 17/WG 3 JTC 1/SC 17/WG 4 JTC 1/SC 17/WG 5 JTC 1/SC 17/WG 8 JTC 1/SC 17/WG 9 JTC 1/SC 17/WG 10 JTC 1/SC 17/WG 11	Physical characteristics and test methods for ID-cards Identification cards - Machine readable travel documents Integrated circuit card with contacts Registration Management Group (RMG) Integrated circuit cards without contacts Optical memory cards and devices Motor vehicle driver license and related documents Application of biometrics to cards and personal identification	
Standardization work			
Published standards	Number of published ISO standards under the direct responsibility of JTC 1/SC 17 (number includes updates): 123		
Standards under development	39		
Involvement of Luxembourg			
1 delegates			
-	Mr. Valentin Lacave (acting as Chairman)		Telindus Luxembourg 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.

7.7.2.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 	33 members of CEN/CENELEC
Secretariat	AFNOR (France)		
Secretary	Ms. Caroline De Condé		
Chairperson	Mr. Dominique Lescribaa		
Organizations in liaison	ANEC, CCC, EPC, ERTICO, ETSI, Euro Commerce, FRONTEX, GlobalPlatform, Master Card Europe, UIC, VISA International		
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	<p>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:</p> <ul style="list-style-type: none"> - 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; <p>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.</p>		
Structure	CEN/TC 224/WG 6 CEN/TC 224/WG 9 CEN/TC 224/WG 11 CEN/TC 224/WG 15 CEN/TC 224/WG 16 CEN/TC 224/WG 17 CEN/TC 224/WG 18	User Interface Telecommunication applications Transport applications European citizen card Application Interface for smart cards used as Secure Signature Creation Devices Protection Profiles in the context of SSCD Interoperability of biometric recorded data	
Standardization work			
Published standards			52
Standards under development			14

Involvement of Luxembourg

2 delegates

- | | |
|---------------------------------|------------------|
| - Mr. Benoit Poletti (Chairman) | INCERT GIE |
| - Mrs. Shenglan Hu | POST Telecom PSF |

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 elec 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.

7.7.3.ETSI/TC ESI

General information			
Committee	ESI	Title	Electronic Signatures and Infrastructures
Creation date	/	MEMBERS 	/
Chairperson	Mr. Riccardo Genghini		
Organizations in liaison	CAB Forum, CEN, CENELEC, ENISA, ISO, ISOC/IETF, ITU, OASIS, UNECE, UPU		
Web site	http://portal.etsi.org/portal/server.pt/community/ESI/307		
Scope	<p>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:</p> <ul style="list-style-type: none"> - 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. 		
Structure	/		
Standardization work			
Published standards	159		
Standards under development	62		
Involvement of Luxembourg			
<p style="text-align: center;">2 members</p> <ul style="list-style-type: none"> - Arhs - eWitness 			
Comments			
<p>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 applications.</p> <p>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.</p> <p>The ETSI strategy is in line with, and endorsed by the initiative of the EU Commission to establish a harmonized infrastructure for electronic signatures.</p>			

7.8. E-ARCHIVING


Archiving consists in the maintenance of records for continuing use, where records are information created, received and maintained as evidence and as an asset by an organization or person, in pursuit of legal obligations or in the transaction of business. Moreover, in the frame of a continuing use, the preservation of records is a highly important notion that consists of processes and operations involved in ensuring the maintenance of records over time⁸⁶.

This analysis focuses on digital archives.

⁸⁶ Based on ISO/IEC 30300:2011, Information and documentation — Management systems for records — Fundamentals and vocabulary (developed by ISO/TC 46/SC 11)



7.8.1.ISO/TC 46

General information			
Committee	ISO/TC 46	Title	Information and documentation
Creation date	1947	 <p>MEMBERS</p>	<p>Participating Countries (36): France, Armenia, Australia, Austria, Belgium, Bulgaria, Canada, China, Croatia, Denmark, Egypt, Estonia, Finland, Germany, Islamic Republic of Iran, Ireland, Italy, Japan, Kenya, Republic of Korea, Latvia, Morocco, Netherlands, Norway, Poland, Portugal, Russian Federation, South Africa, Spain, Sweden, Switzerland, Thailand, The former Yugoslav Republic of Macedonia, Ukraine, United Kingdom, United States</p> <p>Observing Countries (35): Argentina, Belarus, Bosnia and Herzegovina, Brazil, Colombia, Cuba, Czech Republic, Ethiopia, Greece, Hong Kong, Hungary, Iceland, India, Indonesia, Israel, Kazakhstan, Democratic People's Republic of Korea, Lithuania, Luxembourg, Malaysia, Republic of Moldova, Mongolia, New Zealand, Pakistan, Romania, Saudi Arabia, Serbia, Singapore, Slovakia, Slovenia, Sri Lanka, Sudan, United Republic of Tanzania, Tunisia, Turkey</p>
Secretariat	AFNOR (France)		
Secretary	Ms. Sabine Donnard Cusse		
Chairperson	Ms. Gaëlle Béquet		
Organizations in liaison	CIDOC, CISAC, DOI, EC, IAEA, ICA, ICSTI, IFLA, IIF, ISAN, ISOC, ISSN International Center, ITU, UN, UNCTAD, UNECE, UNESCO, UPU, WIPO, ICANN		
Web site	http://www.iso.org/iso/home/standards_development/list_of_iso_technical_committees/iso_technical_committee.htm?commid=48750		
Scope	Standardization of practices relating to libraries, documentation and information centers, publishing, archives, records management, museum documentation, indexing and abstracting services, and information science.		
Structure	TC 46/MA TC 46/MA (TF ISO 3166-2) TC 46/ MA (Voting Members) TC 46/WG 2 TC 46/WG 3 TC 46/WG 4 TC 46/SC 4 TC 46/SC 8 TC 46/SC 9 TC 46/SC 10 TC 46/SC 11	ISO 3166 Maintenance Agency Task Force ISO 3166-2 ISO 3166 Maintenance Agency (Voting members) Coding of country names and related entities Conversion of written languages Terminology of information and documentation Technical interoperability Quality - Statistics and performance evaluation Identification and description Requirements for document storage and conditions for preservation Archives/records management	
Standardization work			
Published standards	Total number of published ISO standards related to the TC and its SCs (number includes updates): 112		
	Number of published ISO standards under the direct responsibility of TC 46 (number includes updates): 32		

Involvement of Luxembourg**9 delegates (ISO/TC 46/SC 11)**

- Mr. Lucas Colet (Chairman)	PricewaterhouseCoopers SC
- Mrs. Sylvie Forastier	Linklaters LLP
- Mrs. Stefanie Zutter	Knowledge@Work
- Mr. Alain Wahl	ILNAS
- Mr. Serge Raucq	Vectis ACF S.A.
- Mr. Reidun Valo	Vectis ACF S.A.
- Mr. Xavier Lisoir	PricewaterhouseCoopers
- Mr. Michel Picard	Luxembourg Institute of Science and Technology (LIST)
- Mr. Cyril Miel	OpenText S.A.

Comments

The ISO/TC 46/SC 11 is the subcommittee particularly relevant for e-archiving. At national level, all the delegates are registered in this subcommittee. Its scope includes 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.

Examples of standards being developed by ISO/TC 46/SC 11 are:

- ISO/DIS 15489-1, Information and documentation -- Records management -- Part 1: Concepts and principles;
- ISO/NP TR 15489-2, Information and documentation -- Records management -- Part 1: Concepts and Principles;
- ISO/CD 17068, Information and documentation -- Trusted third party repository for digital records.


SENSOR NETWORKS

Sensor networks consist in a “system of spatially distributed sensor nodes interacting with each other and, depending on applications, possibly with other infrastructure in order to acquire, process, transfer, and provide information extracted from its environment with a primary function of information gathering and possible control capability”⁸⁷.

Sensor networks are essential for the development of numerous ICT innovations: smart cities, smart grids, intelligent transport systems, internet of things, etc.

⁸⁷ ISO/IEC 29182-2:2013, Information technology -- Sensor networks: Sensor Network Reference Architecture (SNRA) -- Part 2: Vocabulary and terminology (developed by ISO/IEC JTC 1/WG 7)

7.9.1.ISO/IEC JTC 1/WG 7

General information			
Committee	ISO/IEC JTC 1/WG 7	Title	Sensor networks
Creation date	2009	MEMBERS 	Participating countries (17): Republic of Korea, Australia, Austria, Canada, China, Finland, France, Germany, Japan, Luxembourg , Norway, Pakistan, Singapore, South Africa, Sweden, United Kingdom, United States Observing Countries (1): Spain
Secretariat	KATS (Republic of Korea)		
Secretary	Ms. Jooran Lee		
Chairperson	Dr. Yongjin Kim		
Organizations in liaison	DEWI, OGC, IEEE Instrumentation and Measurement Society TC 9		
Web site	http://isotc.iso.org/livelink/livelink/open/jtc1wg7		
Scope	<p>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:</p> <ul style="list-style-type: none"> - Standardization of terminology; - Development of a taxonomy; - Standardization of reference architectures; - Development of guidelines for interoperability; - Standardization of specific aspects of sensor networks. <p>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:</p> <ul style="list-style-type: none"> - 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. <p>3) In order to foster communication and sharing of information between groups working in the field of sensor networks:</p> <ul style="list-style-type: none"> - 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 <i>consortia</i>. 		
Structure	/		
Standardization work			
Published standards	5		
Standards under development	5		

Involvement of Luxembourg

1 delegate

- Mr. Juan Luis Jimenez ANEC GIE

Comments

ISO/IEC JTC 1/WG 7 has recently published the ISO/IEC 29182 series of standards for Sensor Network Reference Architecture (SNRA). This series aims to provide guidance to facilitate the design and development of sensor networks, to improve interoperability of sensor networks, and to make sensor network components plug-and-play, so that it becomes fairly easy to add/remove sensor nodes to/from an existing sensor network.

The current work program includes:

- ISO/IEC NP 18765, Information technology -- Uniform identification scheme for sensor network managed objects;
- ISO/IEC NP 19637, Information technology -- Sensor Network Testing Framework;
- ISO/IEC CD 30140-1, Information technology -- Underwater acoustic sensor network -- Part 1: Reference model;
- ISO/IEC DIS 30128, Information technology -- Underwater acoustics sensor network -- Part 2: Reference architecture.

7.10.

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 determined⁸⁸.

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 controlled⁸⁹.

⁸⁸ OECD principles of corporate Governance

⁸⁹ Based on ISO/IEC TR 38502:2014, Information Technology -- Governance of IT -- Framework and model (developed by ISO/IEC JTC 1/SC 40)

7.10.1. ISO/IEC JTC 1/SC 40

General information			
Committee	ISO/IEC JTC 1/SC 40	Title	IT Service Management and IT Governance
Creation date	2013	MEMBERS 	Participating Countries (29): Australia, Brazil, Canada, China, Côte d'Ivoire, Denmark, Finland, France, Germany, India, Italy, Japan, Republic of Korea, Luxembourg , Malaysia, Netherlands, New Zealand, Peru, Poland, Portugal, Romania, Russian Federation, Rwanda, Singapore, South Africa, Spain, Sweden, United Kingdom, United States Observing Countries (10): Argentina, Austria, Belgium, Czech Republic, Hong Kong, Islamic Republic of Iran, Ireland, Kenya, Switzerland, Uruguay
Secretariat	SA (Australia)		
Secretary	Mrs. Jenny Mance		
Chairperson	Mr. John Sheridan		
Organizations in liaison	IEEE, ISACA, OASIS, itSMFI, IAF		
Web site	http://www.iso.org/iso/standards_development/technical_committees/list_of_iso_technical_committees/iso_technical_committee.htm?commid=5013818		
Scope	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: <ul style="list-style-type: none"> - Corporate Governance of IT: the development of the ISO/IEC 38500 series standards and related documents; - Operational aspects of Governance of IT: work in ISO/IEC 30120 series 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 and IT-Enabled Services/Business Process Outsourcing. 		
Structure	JTC 1/SC 40/CAG 1 JTC 1/SC 40/SG 1 JTC 1/SC 40/SG 2 JTC 1/SC 40/SG 3 JTC 1/SC 40/WG 1 JTC 1/SC 40/WG 2 JTC 1/SC 40/WG 3	Chairman Advisory Group General Study Group on Future Work Study Group on Service Maintenance Study Group on the governance and service management of IT and IT-enabled services/Business process outsourcing Governance of Information Technology IT service management IT-enabled services / Business process outsourcing	
Standardization work			
Published standards	Number of published ISO standards under the direct responsibility of JTC 1/SC 40 (number includes updates): 11		
Standards under development	13		

Involvement of Luxembourg

7 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. Rudolphe Hilbert | Dimension Data Financial Services S.A. |

Comments

ISO/IEC JTC 1/SC 40 is a new subcommittee 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 recently published three 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.

The following standards are currently under development:

- ISO/IEC PDTR 38503, Information technology -- governance of IT -- Guidance on the audit of the governance of IT;
- ISO/IEC PDTR 38504, Information technology -- Governance of IT -- The structure of principles-based standards in the governance of information technology;
- ISO/IEC 20000 series standards on IT service management;
- ISO/IEC 30105 series standards on ITES-BPO.

7.11.

INTERNET OF THINGS

The final study report of ISO/IEC JTC 1/SWG 5⁹⁰ 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 infrastructure.

INTERNET OF THINGS


⁹⁰ 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 new WG 10 on IoT

7.11.1. ISO/IEC JTC 1/WG 10

General information			
Committee	ISO/IEC JTC 1/WG 10	Title	Internet of Things (IoT)
Creation date	2014	MEMBERS 	Participating countries (20): Republic of Korea, Australia, Austria, Belgium, Canada, China, Czech Republic, Finland, Germany, India, Italy, Japan, Luxembourg , Netherlands, Russian Federation, Singapore, Spain, Sweden, United Kingdom, United States Observing Countries (1): Norway
Secretariat	KATS (Republic of Korea)		
Secretary	Ms. Yaeseul Park		
Chairperson	Mr. Sangkeun Yoo		
Organizations in liaison	ITU, IEC		
Web site	http://isotc.iso.org/livelink/livelink?func=ll&objId=16911907		
Scope	<ul style="list-style-type: none"> - 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: <ul style="list-style-type: none"> 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. 		
Structure	/		
Standardization work			
Published standards	0		
Standards under development	4		
Involvement of Luxembourg			
1 delegate			
<ul style="list-style-type: none"> - Mr. Juan Luis Jimenez ANEC GIE 			
Comments			
This WG been established during the 2014 ISO/IEC JTC 1 plenary meeting. The current WG 10 work program includes the following projects: <ul style="list-style-type: none"> - ISO/IEC AWI 30141-1, Information technology -- Internet of Things -- Internet of Things Reference Architecture (IoT RA) -- Part 1: General Overview; 			

- ISO/IEC AWI 30141-2, Information technology -- Internet of Things -- Internet of Things Reference Architecture (IoT RA) -- Part 2: Conceptual Model;
- ISO/IEC AWI 30141-3, Information technology -- Internet of Things -- Internet of Things Reference Architecture (IoT RA) -- Part 3: Reference Architecture;
- ISO/IEC AWI 30141-4, Information technology -- Internet of Things -- Internet of Things Reference Architecture (IoT RA) -- Part 4: Part 4: Security and Privacy.

7.11.2. ETSI/TC SmartM2M


General information			
Committee	SmartM2M	Title	Smart Machine-to-Machine Communication
Creation date	/	MEMBERS 	/
Chairperson	Ms. Marylin Arndt		
Organizations in liaison	4Home, Broadband Forum, CCSA, CEN, CENELEC, China-EU IoT, Continua Health Alliance, DLMS-UA, ESMIG, GSMA, ISO/IEC JTC1, IETF, ITU, OMA-DM, TIA		
Web site	http://portal.etsi.org/portal/server.pt/community/SmartM2M		
Scope	<p>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.</p> <p>The activities of TC Smart M2M include:</p> <ul style="list-style-type: none"> - 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	28		
Standards under development	12		
Involvement of Luxembourg			
NO (no registered delegate)			
Comments			
/			

7.12.

**TECHNICAL COMMITTEES
NOT RELATED TO
SUBSECTORS**

The standards watch has identified 10 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.

7.12.1. ISO/IEC JTC 1

General information			
Committee	ISO/IEC JTC 1	Title	Information technology
Creation date	1987	MEMBERS 	Participating countries (34): United States, Australia, Austria, Belgium, Canada, China, Costa Rica, Czech Republic, Côte d'Ivoire, Denmark, Finland, France, Germany, India, Ireland, Italy, Japan, Kazakhstan, Republic of Korea, Lebanon, Malaysia, Malta, Netherlands, Nigeria, Norway, Peru, Russian Federation, Singapore, South Africa, Spain, Sweden, Switzerland, United Arab Emirates, United Kingdom Observing countries (59): Algeria, Argentina, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Brazil, Bulgaria, Chile, Colombia, 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, Mongolia, Montenegro, Morocco, New Zealand, Pakistan, State of Palestine, Philippines, Poland, Portugal, Romania, Rwanda, Saudi Arabia, Serbia, Slovakia, Slovenia, Sri Lanka, Swaziland, Thailand, The former Yugoslav Republic of Macedonia, Tunisia, Turkey, Uganda, Ukraine, Uruguay, Uzbekistan, Viet Nam, Zimbabwe
Secretariat	ANSI (United States)		
Secretary	Ms. Lisa Rajchel		
Chairperson	Ms. Karen Higginbottom		
Organizations in liaison	EC, Ecma International, ITU, DEWI, OGC, IEEE		
Web site	http://www.iso.org/iso/fr/jtc1_home		
Scope	Standardization in the field of information technology		
Structure	ISO/IEC JTC 1/SWG 2 ISO/IEC JTC 1/SWG 3 ISO/IEC JTC 1/SWG 6 ISO/IEC JTC 1/SG 1 ISO/IEC JTC 1/WG 7 ISO/IEC JTC 1/WG 9 ISO/IEC JTC 1/WG 10 ISO/IEC JTC 1/SC 2 ISO/IEC JTC 1/SC 6 ISO/IEC JTC 1/SC 7 ISO/IEC JTC 1/SC 17 ISO/IEC JTC 1/SC 22 ISO/IEC JTC 1/SC 23 ISO/IEC JTC 1/SC 24 ISO/IEC JTC 1/SC 25 ISO/IEC JTC 1/SC 27 ISO/IEC JTC 1/SC 28 ISO/IEC JTC 1/SC 29 ISO/IEC JTC 1/SC 31	Directives (SWG-D) Planning (SWG-P) Management Smart Cities Sensor Networks Big Data Internet of Things (IoT) Coded character sets Telecommunications and information exchange between systems Software and systems engineering Cards and personal identification Programming languages, their environments, and system software interfaces Digitally Recorded Media for Information Interchange and Storage Computer graphics, image processing, and environmental data representation Interconnection of information technology equipment IT Security techniques Office equipment Coding of audio, picture, multimedia and hypermedia information 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 standards related to the technical committee and its SCs (number includes updates): 2845	
	Number of published ISO standards under the direct responsibility of JTC 1 (number includes updates): 434	
Standards under development	659	
Involvement of Luxembourg		
3 delegates		
Mr. Nicolas Domenjoud	ANEC GIE	
Mr. Johnatan Pecero	ANEC GIE	
Mr. Juan Luis Jimenez	ANEC GIE	
Comments		
<p>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 (and at ILNAS level concerning the top 3) and therefore particularly relevant for the economic market (source: ISO Customer Services – January 2015):</p> <ul style="list-style-type: none"> - ISO/IEC 27001:2015, 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; - 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. <p>ISO/IEC JTC 1 also benefits from the rapid, market-driven work of <i>de facto</i> standards-setting organizations and industry <i>consortia</i>. This is amplified by having many technical experts participating not only in national standardization bodies but also in key <i>de facto</i> standards-setting bodies and industrial <i>fora</i>. Liaising and</p>		

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 enhanced⁹¹.

ISO/IEC JTC 1/SWG 2 - Directives (SWG-D)

The SWG-Directives were implemented with Resolution 15 of the JTC 1 Plenary meeting in 2005 in Banff. Its role is to ensure compliance with the JTC 1 Directives, but also to implement changes to the JTC 1 Directives. SWG-D also ensures harmonization of procedures of ISO and IEC.

The 2005 JTC 1 Plenary established the Special Working Group on Directives (SWG-D) with the following Terms of Reference:

- The SWG-Directives operates under the direction of JTC 1 to maintain the JTC 1 Directives and implement changes to the JTC 1 Directives agreed by JTC 1. The SWG-Directives shall monitor the implementation of existing procedures, evaluating their effectiveness and making proposals for changes where found necessary;
- The SWG-Directives shall cooperate with ISO and IEC in the development of detailed harmonized procedures;
- Membership in the SWG-Directives is open to all P-members of JTC 1. O-members of JTC 1, Category A Liaison members of JTC 1, and SCs may also participate in the SWG-Directives;
- The SWG-Directives is empowered to issue 60 day JTC 1 Letter Ballots if necessary.

ISO/IEC JTC 1/SWG 3 - Planning (SWG-P)

ISO/IEC JTC 1/SWG 3 - Planning is a "special" working group in the sense that it does not intend to develop standards. It covers planning activities of the ISO / IEC JTC 1 and the definition of its action plans. Its role is to:

- Assist the JTC 1 Chairman and Secretariat in developing/revising the JTC 1 Strategic Business Plan;
- Recommend actions for JTC 1 to successfully execute the business plans;
- Connect with SC business planning processes;
- Encourage SC participation in the development and execution of the overall JTC 1 Business Plans;
- Perform the Environmental Scanning activity to identify new work areas of interest to JTC 1. SWG on Planning will analyze the provided information and will give a yearly report with its recommendations for new work areas to the JTC 1 plenary. Presentations to provide JTC 1 with more details on such proposed technology areas may supplement the report to the JTC 1 Plenary;
- Maintain a description of the JTC 1 planning process as per JTC 1 Standing Document 4;
- Maintain JTC 1 Standing Document 2, Historical Background of JTC 1, in close cooperation with, and under the guidance of, the editor of SD 2;
- Establish a working relationship with the ITU-T Technology Watch function, send the SWG on Planning's report to the ITU-T Technology Watch function and invite input from ITU-T Technology Watch function to the SWG for its planning on environmental scanning process;
- Support the JTC 1 Incubator function as defined in the JTC 1 Incubator Operating Principles and maintain the corresponding description of the operating principles;
- Perform the operational functions of a Parent Group, in cases where JTC 1 is designated as the Parent Group of an Incubator Group ISO/IEC JTC 1/SWG 2 – Directives (SWG-D).

ISO/IEC JTC 1/SWG 6 - Management

A new SWG on Management was recently created with the following Terms of Reference:

The SWG on Management operates under the direction of JTC 1 to review and evaluate the organizational effectiveness of JTC 1 and make recommendations to JTC 1 to this effect. This includes:

- Review and evaluation of the JTC 1 structure on a regular basis;
- Development of recommendations on management aspects of JTC 1;
- Review of issues arising from overlapping/conflicting scopes, activities and projects as well as disagreements over project assignments. The SWG shall work with JTC 1 subgroup chairs and conveners to identify issues and to reach acceptable resolutions;
- Provide advice on matters of operational efficiency and management to the JTC 1 chairman;

⁹¹ [JTC1 Vision, Mission and Principles, 2014](#)

- Review of the effective distribution of public information on JTC 1 activities and making suggestions for improvements.

ISO/IEC JTC 1/SG 1 - Smart Cities

JTC 1 recognizes the importance of Smart Cities as a trend that will shape many standards in the ICT sector, and notes a growing interest in this area among a number of standards setting organizations. The topic Smart Cities is relevant to the mission of JTC 1 and intersects with the scope of a number of JTC 1 entities.


Therefore, JTC 1 established a Study Group on Smart Cities during its 2013 Plenary Meeting and reconstitutes this SG during the 2014 Plenary meeting with the following Terms of Reference:

- Investigating the value and scope of a Smart Cities' model, including a Smart City Reference Model from an ICT perspective, a domain knowledge model, and a data and service model;
- Investigating the need for guidelines for smart city leaders and practitioners highlighting the roles and implications of ICT standards in their work;
- Investigating the scope for guidance for city managers on the selection and use of performance and other ICT-related indicators, and the potential contribution of further ICT-related indicators to the work of ISO TC 268;
- Investigating the need of guidance for city managers on the selection and use of performance and other ICT-related indicators;
- Investigating the value of requirements for standardized risk assessment methodologies that underline the dependencies across organizations and sectors inherent to Smart Cities;
- Monitoring the development of AWI 19 944 ("Data and their flow across Devices and Cloud Services") and identifying further smart city-specific related requirements if and when they arise;
- Investigating ICT standardization requirements and techniques that contribute to enhancing individual control over personal data while recognizing the benefit to society of the sharing of pertinent personal data (such as in the fields of healthcare, security, economic and social indicators, etc.);
- Investigating Smart Cities-specific requirements for ongoing work on Privacy Impact Assessments;
- Liaison with relevant JTC 1 SCs, (S)WGs etc., e.g. SC 27, SC 38, JTC 1 WG 10, to help them take into account any specificity relating to smart cities in their standards development work; and
- Liaison with other international standards bodies, in collaboration with the ISO/TMB/AG on Smart Cities, IEC/SEG 1, ITU-T/FG SSC, ISO/TC 268 etc. to identify gaps and ensure greater consistency between the standards being developed for Smart Cities.
- Provide a report with recommendations and potentially other deliverables to the 2015 JTC 1 Plenary.

7.12.2. ISO/IEC JTC 1/SC 28

General information			
Committee	ISO/IEC JTC 1/SC 28		Title
Creation date	1989		MEMBERS 
Secretariat	JISC (Japan)		
Secretary	Mr. Takashi Ito		
Chairperson	Mr. Akira Saito		
Organizations in liaison	CIE, Ecma International, ICC, WMO		
Office equipment	Participating Countries (11): Japan, Austria, China, Germany, Italy, Republic of Korea, Netherlands, Philippines, Russian Federation, United Kingdom, United States Observing Countries (21): Argentina, Belgium, Bosnia and Herzegovina, Czech Republic, Finland, France, Ghana, Hungary, India, Indonesia, Islamic Republic of Iran, Kazakhstan, Kenya, Malaysia, Poland, Romania, Saudi Arabia, Serbia, South Africa, Switzerland, Thailand		
Web site	http://www.iso.org/iso/standards_development/technical_committees/list_of_iso_technical_committees/iso_technical_committee.htm?commid=45314		
Scope	Standardization of basic characteristics, test methods and other related items, excluding such interfaces as user system interfaces, communication interfaces and protocols, of office equipment and products such as Printers, Copying Equipments, Digital scanners, Facsimile equipment and systems composed of combinations of office equipment.		
Structure	JTC 1/SC 28/AG JTC 1/SC 28/WG 2 JTC 1/SC 28/WG 3 JTC 1/SC 28/WG 4 JTC 1/SC 28/WG 5	Advisory Group Consumables Productivity Image quality assessment Office Colour	
Standardization work			
Published standards	Number of published ISO standards under the direct responsibility of JTC 1/SC 28 (number includes updates): 50		
Standards under development	6		
Involvement of Luxembourg			
NO (no registered delegate)			
Comments			
<p>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.</p> <p>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).</p>			

7.12.3. ISO/IEC JTC 1/SC 35

General information			
Committee	ISO/IEC JTC 1/SC 35	Title	User interfaces
Creation date	1998	MEMBERS 	Participating Countries (19): France, Canada, China, Denmark, Finland, Germany, Greece, India, Italy, Japan, Republic of Korea, Russian Federation, South Africa, Spain, Sweden, Switzerland, Ukraine, 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, New Zealand, Poland, Romania, Serbia
Secretariat	AFNOR (France)		
Secretary	Mr. Philippe Magnabosco		
Chairperson	Mr. Khalid Choukri		
Organizations in liaison	ITU, W3C		
Web site	http://www.iso.org/iso/standards_development/technical_committees/list_of_iso_technical_committees/iso_technical_committee.htm?commid=45382		
Scope	<p>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:</p> <ul style="list-style-type: none"> - 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. 		
Structure	JTC 1/SC 35/WG 1 JTC 1/SC 35/WG 2 JTC 1/SC 35/WG 4 JTC 1/SC 35/WG 5 JTC 1/SC 35/WG 6 JTC 1/SC 35/WG 7 JTC 1/SC 35/WG 8	Keyboards and input interfaces Graphical user interface and interaction User interfaces for mobile devices Cultural and linguistic adaptability User interfaces accessibility User interfaces object, actions and attributes User interfaces for remote interactions	
Standardization work			
Published standards	Number of published ISO standards under the direct responsibility of JTC 1/SC 35 (number includes updates): 59		
Standards under development	13		

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 pursuing work on Accessibility APIs (ISO/IEC 13066 series) and 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.

7.12.4. ISO/IEC JTC 1/SC 36

General information			
Committee	ISO/IEC JTC 1/SC 36	Title	Information technology for learning, education, and training
Creation date	1999	MEMBERS 	Participating Countries (26): Republic of Korea, Algeria, Australia, Canada, China, Denmark, Finland, France, Germany, India, Italy, Jamaica, Japan, Kenya, Luxembourg , Netherlands, Norway, Portugal, Russian Federation, Slovakia, South Africa, Spain, Tunisia, Ukraine, United Kingdom, United States Observing Countries (20): Argentina, Belgium, Bosnia and Herzegovina, Colombia, Czech Republic, Ghana, Hong Kong, Hungary, Indonesia, Islamic Republic of Iran, Ireland, Kazakhstan, Malaysia, New Zealand, Romania, Saudi Arabia, Serbia, Sweden, Switzerland, Turkey
Secretariat	KATS (Republic of Korea)		
Secretary	Ms. Eunsook Kim		
Chairperson	Mr. Erlend Øverby		
Organizations in liaison	ADL, AICC, AUF, IMS, Infoterm, LETSI, LTSC, Cartago Alliance, INLAC		
Web site	http://www.iso.org/iso/standards_development/technical_committees/list_of_iso_technical_committees/iso_technical_committee.htm?commid=45392		
Scope	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: The SC shall not create standards or technical reports that define educational standards, cultural conventions, learning objectives, or specific learning content. In the area of work of this SC, standards and technical reports will not duplicate 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 specialty topics such as multimedia, web content, cultural adaptation, and security.		
Structure	JTC 1/SC 36/AG 1 JTC 1/SC 36/WG 1 JTC 1/SC 36/WG 2 JTC 1/SC 36/WG 3 JTC 1/SC 36/WG 4 JTC 1/SC 36/WG 5 JTC 1/SC 36/WG 6 JTC 1/SC 36/WG 7 JTC 1/SC 36/WG 8	Business planning and communications Vocabulary Collaborative technology Learner information Management and delivery of learning, education and training Quality assurance and descriptive frameworks Platform, Services, and specification integration ITLET - Culture, language and individual needs Learning Analytics Interoperability	
Standardization work			
Published standards	Number of published ISO standards under the direct responsibility of JTC 1/SC 36 (number includes updates): 36		
Standards under development	27		

Involvement of Luxembourg


1 delegate

- Mrs. Marie-Rose Decker Luxair S.A.

Comments


SC36 is currently focused on studying and reviewing technologies in the areas such as of mobile learning, concept mapping, integration of automated processes for supporting collaborative activities, managing and exchanging participant information (e-portfolio implementation; semantic information models), and e-Assessment with particular focus on e-Testing, quality of e-Assessments, and quality and validation of single e-Assessment items.

7.12.5. CEN/TC 247


General information			
Committee	CEN/TC 247	Title	Building Automation, Controls and Building Management
Creation date	1990	MEMBERS 	33 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 and the primary integration measures including application interfaces, systems and services to ensure an efficient technical, commercial and infrastructural building management.		
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	22		
Standards under development	17		
Involvement of Luxembourg			
NO (no registered delegate)			
Comments			
<p>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.</p> <p>The CEN/TC 247 has currently the following work program:</p> <ul style="list-style-type: none"> - 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 strongly involved in the different EU-Directives regarding energy performance of buildings. A standard have been developed (EN 15232) under the Mandate M 343 to CEN for the elaboration and adoption of standards for a methodology calculating the integrated energy performance of buildings and estimating the environmental impact;
- CEN/TC 247 participates in the Sector Forum for Energy and fosters horizontal information exchange with EN ISO 50001.


7.12.6. CEN/TC 251

General information			
Committee	CEN/TC 251	Title	Health Informatics
Creation date	1990	MEMBERS 	33 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 CEN/TC 251/WG 2 CEN/TC 251/WG 3 CEN/TC 251/WG 4	Information models Terminology and knowledge representation Security, safety and quality Technology for interoperability	
Standardization work			
Published standards	97		
Standards under development	35		
Involvement of Luxembourg			
NO (no registered delegate)			
Comments			
<p>The CEN/TC 251 Health Informatics will continue stimulate the development of ISO 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 new EU OpenMedicine project.</p> <p>Specifically, CEN/ TC 251 will work 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.</p>			


7.12.7. CEN/TC 287

General information			
Committee	CEN/TC 287	Title	Geographic Information
Creation date	1991	MEMBERS 	33 members of CEN/CENELEC
Secretariat	BSI (United Kingdom)		
Secretary	Mr. Martin Ford		
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	49		
Standards under development	8		
Involvement of Luxembourg			
NO (no registered delegate)			
Comments			
<p>The main objective is to facilitate the development and usage of geographical information in Europe by:</p> <ul style="list-style-type: none"> - 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. 			


7.12.8. CEN/TC 294

General information			
Committee	CEN/TC 294	Title	Communication systems for meters and remote reading of meters
Creation date	1991	MEMBERS 	33 members of CEN/CENELEC
Secretariat	DIN (Germany)		
Secretary	Mr. Benjamin Hein		
Chairperson	Mr. Ortwin Pfaff		
Organizations in liaison	AQUA, DLMS UA, ECOS, ESMIG, ETSI, EUREAU, E.V.V.E., FARECOGAZ, KNX Association, Marcogaz, ZigBee Alliance		
Web site	http://standards.cen.eu/dyn/www/?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.		
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	7		
Standards under development	6		
Involvement of Luxembourg			
NO (no registered delegate)			
Comments			
<p>CEN/TC 294 already specified a set of standards which are to be maintained and extended according market needs and new technologies t and to maintain the state of the art.</p> <p>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.</p>			

7.12.9. CEN/TC 428

General information			
Committee	CEN/TC 428	Title	Project Committee - e-competences and ICT Professionalism
Creation date	2007	MEMBERS 	33 members of CEN/CENELEC
Secretariat	UNI (Italy)		
Secretary	Ms. Veronica Salsano		
Chairperson	Mr. Fabio Massimo		
Organizations in liaison	/		
Web site	http://standards.cen.eu/dyn/www/f?p=204:7:0:::FSP_ORG_ID:1218399&cs=1600F0DD849DA04F3E3B900863CB58F72		
Scope	Standardization of ICT competences (demonstrated ability to apply knowledge, skills and attitudes to achieve observable results) as needed by organizations, professions and professionals in the ICT domain. The competences are designed for application by ICT service, demand and supply organizations, companies, managers and HR departments, for education institutions and training bodies including higher education, for market watchers and policy makers, for public and private sectors.		
Structure	/		
Standardization work			
Published standards	0		
Standards under development	2		
Involvement of Luxembourg			
NO (no registered delegate)			
Comments			
<p>The CEN/TC 428 is currently developing two standards:</p> <ul style="list-style-type: none"> - prEN 16234-1, E-Competence Framework (e-CF) - Part 1: Framework; - prCEN/TR 16234-2, E-Competence Framework (e-CF) - Part 2: User guide. <p>It will provide 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.</p>			

7.12.10. CEN/TC 434

General information			
Committee	CEN/TC 434	Title	Project Committee - Electronic Invoicing
Creation date	2014	MEMBERS 	33 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	The Project Committee on Electronic Invoicing will develop the deliverables that will be described in the (final version of the) standardization request by the European Commission (in support of the implementation of the 'proposal for a Directive on electronic invoicing in public procurement'). These deliverables are needed to support the exchange of information by electronic means in support of business processes in the trade of goods and services		
Structure	CEN/TC 434/WG 1 CEN/TC 434/WG 2 CEN/TC 434/WG 3 CEN/TC 434/WG 4 CEN/TC 434/WG 5 CEN/TC 434/WG 6 CEN/TC 434/WG 7 CEN/TC 434/WG 8	Definition Standards EU projects input and evaluation of requirements list List of syntaxes Syntax bindings Guidelines at transmission level Extension methodology Test methodology and test results	
Standardization work			
Published standards	0		
Standards under development	0		
Involvement of Luxembourg			
NO (no registered delegate)			
Comments			
<p>On 6 May 2014, the Directive 2014/55/EU⁹² 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')".</p> <p>In this context, CEN/TC 434 has been created. The draft standardization request contains a very tight timeframe - end of 2016 at the latest - for the development and the adoption the European standard and its ancillary European standardization deliverables.</p> <p>During its January plenary meeting, CEN/TC 434 decides to adopt the following work items, which constitute the</p>			

⁹² <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32014L0055>

current work program of the committee:

- WI 002 List of syntaxes that comply with the EN on the semantic data model for the core elements of an electronic invoice;
- WI 003 Syntax bindings – guidelines on how the semantic data model could be represented in the listed syntaxes (formats) and their automatic validation artefacts;
- WI 004 Guidelines on interoperability of electronic invoices at the transmission level;
- WI 005 Guidelines on the use of sector or country extensions in conjunction with the European standard, including a methodology to be applied in the real environment;
- WI 006 Result of the test of the European standard with respect to its practical application for an end user.

7.13. FORA/CONSORTIA

As acknowledged by CEN, many standardization activities in the ICT field are carried out by industry consortia. ICT fora and consortia are developing de facto standards widely spread in the ICT sector.

This work does not pretend to be exhaustive and the fora/consortia analyzed are a selection of the most relevant for the national market. It is important to note that ICT is certainly one of the sectors having the highest number of active SDO. It is thus not realistic to detail and analyze them all.

This section includes:

- *Organizations which have a Category A liaison with ISO/IEC JTC 1. These organizations may 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;*
- *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 standards⁹³;*
- *Organizations which have signed a Partner Standards Development Organization (PSDO) Cooperation Agreement (e.g. IEEE-SA). 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.*


⁹³ [List of approved JTC 1 PAS Submitters](#)

7.13.1. DMTF - Distributed Management Task Force

General information			
Forum / Consortium	DMTF	Title	Distributed Management Task Force
Creation date	1992	MEMBERS 	157 member companies and organizations
Chairperson	Mr. Jon Hass		
Involvement of Luxembourg	/		
Web site	http://www.dmtf.org/		
Scope	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.		
Executive summary	DMTF's technologies are designed to work together to address the industry's needs and requirements for interoperable distributed management. These standards provide well-defined interfaces that build upon each other, delivering end-to-end management capabilities and interoperability.		
Structure	<p>Working Groups:</p> <ul style="list-style-type: none"> - Architecture Working Group (Arch) - Common Information Model for REST Services Working Group (CIM-RS) - CIM-XML - Cloud Auditing Data Federation Working Group (CADFWG) - Cloud Management Working Group (CMWG) - Diagnostics Working Group (Diag) - Network Services Management Work Group (NSM) - Open Virtualization Format Working Group (OVFWG) - Platform Management Components Intercommunication (PMCI) - Policy Working Group (Policy) - Schema Working Group (Schema) - Security Working Group (Security) - Server Desktop Mobile Platforms Working Group (SDMPWG) - System Management BIOS (SMBIOS) - Software Entitlement Working Group (SEWG) - Web Services Management (WS-MAN) <p>Forums:</p> <ul style="list-style-type: none"> - Common Diagnostic Model Forum (CDM) - System Management Forum (SMF) - Scalable Platforms Management Forum (SPMF) - Virtualization and Cloud Management Forum (VCMF) <p>Incubators:</p> <ul style="list-style-type: none"> - Open Software Defined Data Center Incubator (OSDDC) 		
Standardization work			
Published standards	469		

⁹⁴ The DMTF makes available certain specifications for a limited period of time as a Work in Progress

7.13.2. Ecma International (previously called ECMA)

General information			
Forum / Consortium	Ecma International	Title	Ecma International
Creation date	1961		72 member organizations
Chairperson	Mr. K. Yamashita		
Involvement of Luxembourg	/		
Web site	http://www.ecma-international.org/		
Scope	Standardization of Information and Communication Technology (ICT) and Consumer Electronics (CE).		
Executive summary	<p>The aims of Ecma are:</p> <ul style="list-style-type: none"> - To develop, in cooperation with the appropriate national, European and international organizations Standards and Technical Reports in order to facilitate and standardize the use of Information Communication Technology (ICT) and Consumer Electronics (CE); - To encourage the correct use of Standards by influencing the environment in which they are applied; - To publish these Standards and Technical Reports in electronic and printed form; the publications can be freely copied by all interested parties without restrictions. <p>For over forty years Ecma has actively contributed to world-wide standardization in information technology and telecommunications. More than 400 Ecma Standards and 100 Technical Reports of high quality have been published, more than 2/3 of which have also been adopted as International Standards and/or Technical Reports.</p>		
Structure	<ul style="list-style-type: none"> - TC 12 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 - TC 50 Close Proximity Electric Induction Data Transfer - TC 51 Access Systems - TC 52 Dart 		
Standardization work			
Published standards	326		
Standards under development	Unknown		

7.13.3. GS1 - Global Standards


General information			
Forum / Consortium	GS1	Title	Global Standards
Creation date	1973		More than 1100 individual members representing 424 companies from every corner of the world
Chairperson	Mr. Mike McNamara		
Involvement of Luxembourg	/		
Web site	http://www.gs1.org/		
Scope	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.		
Executive summary	The GS1 System is an integrated system of global standards that provides for accurate identification and communication of information regarding products, assets, services and locations. It is the most implemented supply chain standards system in the world. It is the foundation of a wide range of efficiency-building supply chain applications and solutions and is composed of the following areas:		
Structure	<p><u>Standards Maintenance Groups (SMGs):</u></p> <ul style="list-style-type: none"> - GSMP BarCodes SMG - GSMP Data Accuracy SMG - GSMP eCom SMG - GSMP Global Master Data (GMD) SMG - GSMP Global Product Classification (GPC) SMG - GSMP Identification SMG - GSMP Traceability and Event Sharing SMG <p><u>Mission-specific Work Groups (MSWGs):</u></p> <ul style="list-style-type: none"> - GSMP B2C Trusted Source of Data (TSD) MSWG - GSMP EPC Information Service (EPCIS) 1.1 and Core Business Vocabulary (CBV) MSWG - GSMP Event Based Traceability MSWG - GSMP GLN Allocation Rules Update MSWG - GSMP GTIN+ on the Web MSWG - GSMP Mobile Scanning & Digital Shelf (MDID) aka Next Generation Product Identification (NGPI) MSWG - GSMP Tagged Item Performance Protocol (TIPP) MSWG - GSMP UHF Air Interface 1and2 Work Group 		
Standardization work			
Published standards	Unknown		
Standards under development	Unknown		

7.13.4. IEEE-SA - Institute of Electrical and Electronics Engineers Standards Association


General information			
Forum / Consortium	IEEE-SA	Title	Institute of Electrical and Electronics Engineers Standards Association
Creation date	1963	MEMBERS 	About 200 corporate members
Chairperson	Ms. Bruce Kraemer		
Involvement of Luxembourg	/		
Web site	http://standards.ieee.org/		
Scope	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.		
Executive summary	<p>The IEEE Standards Association (IEEE-SA) is a leading consensus building organization that nurtures, develops and advances global technologies, through IEEE external link. It brings together a broad range of individuals and organizations from a wide range of technical and geographic points of origin to facilitate standards development and standards related collaboration. With collaborative thought leaders in more than 160 countries, it promotes innovation, enables the creation and expansion of international markets and helps protect health and public safety. Collectively, its work drives the functionality, capabilities and interoperability of a wide range of products and services that transform the way people live, work and communicate.</p> <p>Among the most important standards of IEEE are: IEEE 802 family of standards dealing with local area networks and metropolitan area networks, IEEE P1901 dealing with power line communications, IEEE Standard for Floating-Point Arithmetic (IEEE 754), IEEE 1394 interface ("FireWire"), etc.</p>		
Structure	<p>Topics:</p> <ul style="list-style-type: none"> - Aerospace Electronics - Antennas & Propagation - Batteries - Communications - Computer Technology - Consumer Electronics - Electromagnetic Compatibility - Green & Clean Technology - Healthcare IT - Industry Applications - Instrumentation & Measurement - Nanotechnology - National Electrical Safety Code - Nuclear Power - Power & Energy - Power Electronics - Smart Grid - Software & Systems Engineering - Transportation - Wired & Wireless 		

Standardization work	
Published standards	1876
Standards under development	647

7.13.5. IETF - Internet Engineering Task Force

General information			
Forum / Consortium	IETF	Title	Internet Engineering Task Force
Creation date	1986	MEMBERS 	No formal membership
Chairperson	Jari Arkko		
Involvement of Luxembourg	No membership		
Web site	http://www.ietf.org/		
Scope	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.		
Executive summary	<p>The IETF is a large open international community of network designers, operators, vendors, and researchers concerned with the evolution of the internet architecture and the smooth operation of the internet.</p> <p>The IETF does not standardize transmission hardware (they leave that to organizations like the IEEE and the ITU) and does not standardize specialized application layer protocols. For example, they leave HTML and XML standards to the World-Wide Web Consortium. But the IETF does standardize all the protocol layers in between, from IP itself up to general applications like email and HTTP.</p> <p>Documents published by the IETF are RFC (Request For Comments). Some of the main RFC are: RFC 821 - Simple Mail Transfer Protocol, RFC 2616 - Hypertext Transfer Protocol -- HTTP/1.1, RFC 1738 - Uniform Resource Locators (URL), RFC 959 - File Transfer Protocol, RFC 1510 - The Kerberos Network Authentication Service (V5), etc.</p>		
Structure	<p>Areas :</p> <ul style="list-style-type: none"> - Applications and Real-Time Area (art) - General Area (gen) - Internet Area (int) - Operations and Management Area (ops) - Routing Area (rtg) - Security Area (sec) - Transport Area (tsv) 		
Standardization work			
Published standards	<p>96 Internet Standards (a specification for which significant implementation and successful operational experience has been obtained may be elevated to the Internet Standard level)</p> <p>2468 Proposed Standards (a proposed Standard specification is stable, has resolved known design choices, has received significant community review, and appears to enjoy enough community interest to be considered valuable)</p>		
Standards under development	83 draft standards		

7.13.6. ISOC - The Internet Society

General information			
Forum / Consortium	ISOC	Title	The Internet Society
Creation date	1992		More than 65,000 members and supporters, 100 Chapters around the world, as well as more than 145 Organization members
Chairperson	Ms. Kathryn Brown		
Involvement of Luxembourg	91 members ⁹⁵		
Web site	http://www.internet-society.org/		
Scope	<p>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:</p> <ul style="list-style-type: none"> - 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. 		
Executive summary	<p>The Internet Engineering Task Force (IETF) is an organized activity of ISOC, which works to facilitate the smooth operation of and growing participation in Internet standards through the IETF. ISOC organizes briefing panels at nearly all IETF meetings, and publishes the <i>IETF Journal</i> three times a year in advance of each IETF meeting.</p>		
Structure	/		
Standardization work			
Published standards	/		
Standards under development	/		

⁹⁵ <http://www.isoc.lu/l-association/les-membres>

7.13.7. OASIS - Organization for the Advancement of Structured Information Standards

General information			
Forum / Consortium	OASIS	Title	Organization for the Advancement of Structured Information Standards
Creation date	1993	MEMBERS 	More than 5000 participants representing over 600 organizations and individual members in more than 65 countries
Chairperson	Mr. Frederick Hirsch		
Involvement of Luxembourg	/		
Web site	http://www.oasis-open.org/		
Scope	OASIS promotes industry consensus and produces worldwide standards for security, Internet of Things, Cloud computing, energy, content technologies, emergency management and other areas.		
Executive summary	<p>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.</p> <p>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.</p>		
Structure	<p><u>OASIS Committee Categories:</u></p> <ul style="list-style-type: none"> - Big Data - Cloud - Conformance - Content Technologies - e-Commerce - e-Invoicing - eGov/Legal - Emergency Management - Government/Legal - Healthcare - IoT/M2M - Lifecycle Integration - Localization - Messaging - Privacy/Identity - Security - SOA - Standards Adoption - Supply Chain - Sustainability - Web Services 		
Standardization work			
Published standards	130		
Standards under development	Unknown		

7.13.8. OGC - The Open Geospatial Consortium

General information			
Forum / Consortium	OGC	Title	The Open Geospatial Consortium
Creation date	1994	 MEMBERS	518 companies, government agencies and universities
Chairperson	Mr. Jeffrey Harris		
Involvement of Luxembourg	1 member (LIST)		
Web site	http://www.opengeospatial.org/		
Scope	<p>The OGC provides a consensus process that communities of interest use to solve problems related to the creation, 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.</p>		
Executive summary	<p>The Forum's goals are to provide free and openly available standards to the market, tangible value to Members, and measurable benefits to users; to lead worldwide in the creation and establishment of standards that enable global infrastructures for delivery and integration of geospatial content and services into business and civic processes. The OGC wants to facilitate the adoption of open, spatially enabled reference architectures in enterprise environments worldwide; to advance standards to support the formation of new and innovative markets and applications for geospatial technologies and to accelerate market assimilation of interoperability research through collaborative consortium processes.</p> <p>The OGC mission is finally to advance the development and use of international standards and supporting services that promote geospatial interoperability and to meet its mission OGC act as a global forum for the collaboration of developers and users of spatial data products and services.</p>		
Structure	<p>Standards Working Groups:</p> <ul style="list-style-type: none"> - 3D Portrayal SWG (3DP SWG) - Catalogue Services 3.0 SWG (Cat 3.0 SWG) - CityGML SWG (CityGML SWG) - Common DataBase (CDB) SWG (CDB SWG) - CRS Well Known Text SWG (CRS WKT SWG) - Discrete Global Grid Systems SWG (DGGS SWG) - ebRIM AP of CSW SWG (ebRIM AP of CSW) - ebXML RegRep SWG (ebXMLRegRepSWG) - EO Product Metadata and OpenSearch SWG (EO PMOS SWG) - GeoAPI 3.0 SWG (GeoAPI 3.0 SWG) - GeoPackage SWG (GeoPackage SWG) - GeoSciML SWG (GeoSciML SWG) - Geospatial User Feedback SWG (GUFswg) - GeoSynchronization 1.0 SWG (Geosync SWG) - GeoTIFF SWG (GeoTIFF SWG) - GeoXACML SWG (GeoXACML SWG) - GML 3.3 SWG (GML 3.3 SWG) - GMLJP2 SWG (GMLJP2-SWG) - I15 (Cataloging of ISO19115 Metadata) Extension Package of ebRIM Profile of CS-W 		

- 1.0 SWG (I15 SWG)
- IndoorGML SWG (IndoorGML SWG)
- KML 2.3 SWG (KML SWG)
- Land and Infrastructure SWG (LandInfraSWG)
- Moving Features SWG (MovFeat SWG)
- NetCDF SWG (NetCDFSWG)
- O&M 2.0 SWG (OM 2.0 SWG)
- OLS 1.3 SWG (OLS 1.3 SWG)
- OWS Common 1.2 SWG (OWSCommon1.2SWG)
- OWS Context SWG (OWScontextSWG)
- PipelineML SWG (PipeML SWG)
- Points of Interest SWG (PoI SWG)
- PubSub SWG (PubSub SWG)
- RESTful Services Policy SWG (RESTful SWG)
- Sensor Model Language (SensorML) 2.0 SWG (SensorML2.0SWG)
- SensorThings SWG (SensorThings)
- Simple Features SWG (SF SWG)
- Styled Layer Descriptor and Symbology Encoding 1.2 SWG (SLDSE 1.2 SWG)
- WaterML 2.0 SWG (WaterML2.0SWG)
- Web Coverage Service (WCS) SWG (WCS.SWG)
- Web Mapping Service 1.4 SWG (WMS 1.4 SWG)
- Web Processing Service 2.0 SWG (WPS 2.0 SWG)
- WFS Gazetteer Profile 1.0 SWG (WFSgaz1.0 SWG)
- WFS/FES SWG (WFS/FES SWG)

Standardization work

Published standards

87

Standards under development

Unknown

7.13.9. OMA - The Open Mobile Alliance

General information			
Forum / Consortium	OMA	Title	The Open Mobile Alliance
Creation date	2002		103 organizations
Chairperson	Mr. Gary K. Jones		
Involvement of Luxembourg	/		
Web site	http://openmobilealliance.org/		
Scope	<ul style="list-style-type: none"> - Deliver high quality, open technical specifications based upon market requirements that drive modularity, extensibility, and consistency amongst enablers to reduce industry implementation efforts; - Ensure OMA service enabler specifications provide interoperability across different devices, geographies, service providers, operators, and networks; facilitate interoperability of the resulting product implementations; - Be the catalyst for the consolidation of standards activity within the mobile data service industry; working in conjunction with other existing standards organizations and industry fora to improve interoperability and decrease operational costs for all involved; - Provide value and benefits to members in OMA from all parts of the value chain including content and service providers, information technology providers, mobile operators and wireless vendors such that they elect to actively participate in the organization. 		
Executive summary	<p>OMA is the focal point for the development of mobile service enabler specifications, which support the creation of interoperable end-to-end mobile services. OMA drives service enabler architectures and open enabler interfaces that are independent of the underlying wireless platforms. Toward that end, OMA has developed programs that allow implementers the opportunity to test their products to ensure industry-wide interoperability.</p>		
Structure	<p><u>Committees:</u></p> <ul style="list-style-type: none"> - Release Planning and Management Committee (REL) <p><u>Working groups:</u></p> <ul style="list-style-type: none"> - Architecture (OMA ARC WG) - Communications (OMA COM WG) - Content Delivery (OMA CD WG) - Device Management (OMA DM WG) - Interoperability (OMA IOP WG) - Location (OMA LOC WG) - Requirements (OMA REQ WG) 		
Standardization work			
Published standards	177		
Standards under development	Unknown		

7.13.10. OMG - Object Management Group

General information			
Forum / Consortium	OMG	Title	Object Management Group
Creation date	1989	MEMBERS 	285 member organizations
Chairperson	Mr. Richard Soley		
Involvement of Luxembourg	/		
Web site	http://www.omg.org/index.htm		
Scope	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.		
Executive summary	OMG's mission is to develop technology standards that provide real-world value for thousands of vertical industries. OMG is also dedicated to bringing together its international membership of end-users, vendors, government agencies, universities and research institutions to develop and revise these standards as technologies throughout the years. OMG has especially developed the following standards: Unified Modeling Language™ (UML®), Common Object Request Broker Architecture (CORBA®), MOF™, and Interface Definition Language (IDL™).		
Structure	<p><u>Architecture Board</u></p> <ul style="list-style-type: none"> - Intellectual Property Policy Subcommittee - Liaison AB Subcommittee - Object and Reference Model AB Subcommittee - Specification Management AB Subcommittee - Architecture Ecosystem ABSIG - Business Architecture AB SIG - Model Interchange AB SIG <p><u>Domain Technology Committee</u></p> <ul style="list-style-type: none"> - 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 <p><u>Platform Technology Committee</u></p> <ul style="list-style-type: none"> - Analysis and Design PTF - Architecture-Driven Modernization PTF - Middleware and Related Services PTF - System Assurance PTF - Agent PSIG - Data Distribution Services PSIG - Ontology PSIG 		


Standardization work	
Published standards	232
Standards under development	Unknown

7.13.11. SNIA - Storage Networking Industry Association

General information			
Forum / Consortium	SNIA	Title	Storage Networking Industry Association
Creation date	1997	MEMBERS 	About 400 member companies
Chairperson	Mr. David Dale		
Involvement of Luxembourg	/		
Web site	http://www.snia.org		
Scope	<p>SNIA lead the storage industry worldwide in developing and promoting standards, technologies and educational services to empower organizations in the management of information.</p> <p>Underlying the mission are four supporting vision statements that will help the association deliver value back to the industry:</p> <ul style="list-style-type: none"> - 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 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 		
Executive summary	<p>As a not-for-profit association, the SNIA enables its members to develop robust solutions for storing and managing the massive volumes of information generated by today's businesses. For more than a decade SNIA has worked to bring recognition of storage issues to the ICT world, making storage less complicated for the end user. As a result, the SNIA has adopted the role of industry catalyst for the development of storage solution specifications and technologies, global standards and storage education.</p> <p>From vendors, to channel partners and to end-users, SNIA members are dedicated to providing the industry with a high level of knowledge exchange and thought-leadership. Its members also share a common goal: to promote acceptance, deployment and confidence in storage-related architectures, systems, services and technologies across ICT and business communities.</p>		
Structure	<p><u>Technical Work Groups (TWG)</u></p> <ul style="list-style-type: none"> - Cloud Storage TWG - Disk Resource Management 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 - Security TWG - SMI-S Core TWG - Solid State Storage TWG - Solid State Storage System TWG - Storage Media Library TWG 		

Standardization work	
Published standards	12
Standards under development	10

7.13.12. SPICE User Group

General information			
Forum / Consortium	SPICE User Group	Title	Software Process Improvement and Capability dEtermination User Group
Creation date	1993		Unknown
Chairperson	/		
Involvement of Luxembourg	/		
Web site	http://spiceforum.ninq.com/		
Scope	<p>The SPICE User Group:</p> <ul style="list-style-type: none"> - 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. 		
Executive summary	/		
Structure	/		
Standardization work			
Published standards	Unknown		
Standards under development	Unknown		

7.13.13. TCG - Trusted Computing Group

General information			
Forum / Consortium	TCG	Title	Trusted Computing Group
Creation date	2003	MEMBERS 	84 member organizations
Chairperson	Dr. Joerg Borchert		
Involvement of Luxembourg	/		
Web site	http://www.trustedcomputinggroup.org/		
Scope	<p>TCG develops standards to solve today's enterprise security challenges:</p> <ul style="list-style-type: none"> - Authentication; - Cloud Security; - Data Protection; - Mobile Security; - Network Access & Identity. 		
Executive summary	<p>The Trusted Computing Group (TCG) is a not-for-profit organization formed to develop, define and promote open, vendor-neutral, global industry standards, supportive of a hardware-based root of trust, for interoperable trusted computing platforms.</p> <p>Security is built into an increasing number of general purpose ICT products and security standards are fundamental to the integrity and sustainability of the global ICT infrastructure. TCG believes that open, interoperable and internationally vetted standards are critical for the success of trusted computing and that the multilateral approach to creating such standards is most effective.</p>		
Structure	<p>Workgroups</p> <ul style="list-style-type: none"> - 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 		
Standardization work			
Published standards	154		
Standards under development	Unknown		

7.13.14. TOG - The Open Group

General information			
Forum / Consortium	TOG	Title	The Open Group
Creation date	1996	MEMBERS 	492 members
Chairperson	Mr. Darrin Johnson		
Involvement of Luxembourg	2 members (LIST, University of Luxembourg)		
Web site	http://www.opengroup.org/		
Scope	The Open Group works with customers and suppliers of IT products and services as well as with <i>consortia</i> 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.		
Executive summary	<p>The Open Group is a global consortium that enables the achievement of business objectives through ICT standards. With more than 400 member organizations, the Open Group has a diverse membership that spans all sectors of the ICT community — customers, systems and solutions suppliers, tool vendors, integrators and consultants, as well as academics and researchers to:</p> <ul style="list-style-type: none"> - Capture, understand and address current and emerging requirements, and establish policies and share best practices; - Facilitate interoperability, develop consensus, and evolve and integrate specifications and open source technologies; - Offer a comprehensive set of services to enhance the operational efficiency of <i>consortia</i>; - Operate the industry's premier certification service. 		
Structure	<p>Subject Areas</p> <ul style="list-style-type: none"> - Enterprise Architecture - Cloud Computing - Enterprise Management - Platforms - Product Lifecycle - Real-time & Embedded Systems - Security - IT4IT - Service Oriented Architecture - Trusted Technology 		
Standardization work			
Published standards	266		
Standards under development	Unknown		

7.13.15. UPnP Forum

General information			
Forum / Consortium	UPnP Forum	Title	Universal Plug and Play Forum
Creation date	1999	MEMBERS 	More than 1000 companies
Chairperson	Mr. Scott Lofgren		
Involvement of Luxembourg	1 member (Actimage)		
Web site	http://www.upnp.org/		
Scope	UPnP technology targets home networks, proximity networks and networks in small businesses and commercial buildings. It enables data communication between any two devices under the command of any control device on the network. UPnP technology is independent of any particular operating system, programming language or network technology.		
Executive summary	<p>The Forum's goals are to allow devices to connect seamlessly and to simplify network implementation in the home and corporate environments. Toward this end, UPnP Forum members work together to define and publish UPnP device control protocols built upon open, internet-based communication standards.</p> <p>The UPnP architecture offers pervasive peer-to-peer network connectivity of PCs of all form factors, intelligent appliances and wireless devices. The UPnP architecture is a distributed, open networking architecture that leverages TCP/IP and the Web to enable seamless proximity networking in addition to control and data transfer among networked devices in the home, office and everywhere in between.</p>		
Structure	<p>Working Committees:</p> <ul style="list-style-type: none"> - Audio / Video Working Committee (AV) - Friendly Devices Working Committee (FRIENDLYDEVICES) - Multi-Screen Working Committee (MULTI-SCREEN) 		
Standardization work			
Published standards	118		
Standards under development	Unknown		

7.13.16. W3C - World Wide Web Consortium

General information			
Forum / Consortium	W3C	Title	World Wide Web Consortium
Creation date	1994	MEMBERS 	385 members
Chairperson	Mr. Tim Berners-Lee		
Involvement of Luxembourg	/		
Web site	http://www.w3.org/		
Scope	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.		
Executive summary	W3C standards define an Open Web Platform for application development that has the unprecedented potential to enable developers to build rich interactive experiences, powered by vast data stores, which are available on any device. Although the boundaries of the platform continue to evolve, industry leaders speak nearly in unison about how HTML5 will be the cornerstone for this platform. But the full strength of the platform relies on many more technologies that W3C and its partners are creating, including CSS, SVG, WOFF, the Semantic Web stack, XML and a variety of APIs.		
Structure	<p><u>Working Groups:</u></p> <ul style="list-style-type: none"> - Audio - Authoring Tool Accessibility Guidelines - Automotive - Browser Testing and Tools - Cascading Style Sheets (CSS) - CSV on the Web - Data on the Web Best Practices - Device APIs - Education and Outreach - Efficient XML Interchange - Evaluation and Repair Tools - Geolocation - HTML - Independent User Interface (Indie UI) - Internationalization - Linked Data Platform (LDP) - Math - Member Access - Multimodal Interaction - Pointer Events - Protocols and Formats - RDF Data Shapes - Research and Development - Second Screen Presentation - Social Web - SVG - System Applications - Timed Text - Tracking Protection - User Agent Accessibility Guidelines - Voice Browser 		

- Web Annotation
- Web Application Security
- Web Applications
- Web Content Accessibility Guidelines
- Web Cryptography
- Web Notification
- Web Performance
- Web Real-Time Communications
- WebFonts
- XML Core
- XML Processing Model
- XML Query
- XML Security
- XSLT

Interest Groups :

- Digital Publishing
- HTML5 Chinese
- Internationalization Tag Set (ITS)
- Patents and Standards
- Privacy
- Semantic Web Health Care and Life Sciences
- Semantic Web
- Social
- WAI
- Web and Mobile
- Web and TV
- Web of Things
- Web Payments
- Web Security

Coordination Groups :

- Data Activity
- WAI
- XML

Community and Business Groups: W3C has created Community and Business Groups to meet the needs of a growing community of Web stakeholders. Community Groups enable anyone to socialize their ideas for the Web at the W3C for possible future standardization. There are currently 216 community and business groups.

Permanent Groups :

- Technical Architecture Group (TAG)
- Advisory Board (AB)

Standardization work

Published standards	252
Standards under development	289

8. FOCUS ON SMART ICT STANDARDIZATION

The ICT technology is evolving to “smarter” services and devices. This technology has become an essential in business, education, government and others. Technology adoption and development can improve performance and productivity in an innovative way, while potentially delivering economic, environmental and social benefits. In the last years, high-speed communication networks, the development of smart devices, the affordability of Internet services, and the emergence of innovative applications have made the impact of ICT as an enabler more powerful. To support the adoption of smart ICT, technical standardization plays an important role and is a key enabler in the development of the ICT domain.

This chapter complements the ICT standards watch by presenting a more detailed overview of the standards landscape for some selected smart ICT domains. The chapter aims to facilitate the identification of relevant standards and projects in valuable areas of interest from a national perspective and particularly in the frame of the university certificate *Smart ICT for Business Innovation*.

In this frame, this chapter firstly provides an overview of the university certificate and its close relationship with concepts developed in the national standards analysis. Then, for each selected smart ICT domain, a dedicated subsection provides of the standards published and/or under development by the recognized SDOs and lists the relevant technical committees or other organizational initiatives.

8.1. UNIVERSITY CERTIFICATE *SMART ICT FOR BUSINESS INNOVATION*

8.1.1. General presentation

Technical standardization plays an important role in smart Information and Communication Technology, 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. Therefore, in the frame of developing a standardization culture at national level, specifically in an economically meaningful field, ILNAS, in partnership with the University of Luxembourg, has developed a smart ICT oriented certificate (lifelong learning program) at the end of 2014. UL will welcome the very first class this academic year in September 2015.

Intended for ICT professionals, the *Smart ICT for Business Innovation* certificate offers a broad view of smart ICT concepts and puts various tools at the disposal of students, so as to develop their sense of innovation. The focus will lie on important aspects of smart ICT and their applications, including development of smart cities, smart grid, big data and analytics, cloud computing and environmental issues related to ICT. Digital trust and ICT governance issues will likewise be addressed by international experts during the course. Technical standardization will remain at the core of the curriculum as an important source of knowledge in constant evolution. Also, standardization committees constituting the basis of smart ICT developments will be considered in this context as the unique platforms gathering manufacturers, researchers, business innovators and other stakeholders, making them the beating heart of ICT progress, and thus creating a conducive technical “ecosystem” for the certificate students.

The *Smart ICT for Business Innovation* certificate includes six different modules and an internship:

- **Smart ICT concepts:** foundations of Smart ICT;

- **Business innovation:** fundamental knowledge and tools concerning business innovation;
- **Technical standardization:** overview of ICT standardization and its economic benefits;
- **Digital intelligence:** inputs on technology trends, opportunities and challenges for Smart ICT
- **Smart platforms:** introduces a broad range of technological platforms that enable the creation of products and processes supporting current and future developments in the digital world (Cloud computing, Smart cities, Internet of Things, Green ICT);
- **Smart interactions:** focuses on interactions which enable smart interfaces taking into account environmental factors (Sensor networks, Big data and analytics, Digital trust);
- **Internship and Certificate report:** concrete learning outcomes for the student will be to transfer smart ICT knowledge (from the six modules above) directly into business innovation. This will be accomplished through the prism of the competitive and innovative tool of technical standardization, during the internship (inside the enterprise), and by presenting a related final report.

8.1.2. Common thread

The university certificate *Smart ICT for Business Innovation* relies on an innovative approach addressing two main dimensions.

The first part of this matrix concentrates on a horizontal convergence that combines information technologies, consumer electronics and telecommunications, also known as ICT. As we can foresee, the future of ICT will be “smart”, therefore the university certificate focuses on a holistic approach through technical standardization as an enabler of the horizontal development of ICT. Indeed, this “engine” will strengthen the horizontal convergence by bringing mainly: interoperability, compatibility, quality and compliance (specifications, requirements, common components, etc.). Moreover, this field provides the state of the art in each smart ICT domain (as illustrated by the next sections of this chapter), the knowledge expansion and the latest research and innovation developments (see chapters 9 and 10), answering directly to market needs, completely business driven and globally based on a broad consensus.

The second part of the matrix corresponds to a vertical convergence in order to address each economic sector (see Chapter 11). When the matrix is in place, the point of interaction between each of the two parts relies on technical standardization in a particular area: technical committee(s), more specifically one or more current technical standards, or technical standards in development.

In this framework, “technical standardization” is not only one specific module in the university certificate, but is present inside each module as a reference and as a key factor in support of innovation. This domain represents the general keystone of the university certificate.

From the matrix, that is the backbone of the different courses of the university certificate, the students will transfer “Smart ICT” concepts (through the information “received” from one or more specific technical standardization committees) into business innovation, in order to provide a real added value for the enterprise concerned (the outcome could be a new service, a new product, a new internal development, a new market to address, a new part of knowledge development for the enterprise, e.g. technology watch, a new certification scheme or a certification project, etc.). In this framework, each student is registered by ILNAS as a national technical standardization delegate, in one or more dedicated technical committees (the point of interaction of the matrix).

8.2. CLOUD COMPUTING

The standards landscape for cloud computing is extent, many standards developing organizations are active in the cloud computing subsector and many standards and specifications have been developed. As specified by the European commission in its European Cloud Computing Strategy⁹⁶, it is necessary to “cutting through the jungle of standards” in order to identify existing solutions, market needs and, finally, to increase cloud computing adoption.

Standards developing organizations have already analyzed the standards landscape and identified standardization gaps for cloud computing. This preparatory work allowed the definition of standards development priorities. Several reports have been published with this objective:

- ISO/IEC JTC 1/SC 38 Study Group on Cloud Computing (SGCC), [Study Group Report on Cloud Computing \(09/2011\)](#);
- [ETSI Cloud Standards Coordination Final Report \(11/2013\)](#).

Moreover, ETSI is currently working on a new set of reports in the frame of the Cloud Standards Coordination (CSC) Phase 2, which intends to investigate some specific aspects of the Cloud Computing Standardization landscape, in particular from the point of view of users. It will also generate a new “snapshot” of the state of standards.

- *ETSI DMI/NTECH-00030, NTECH STF 486 Identification of Cloud user needs;*
- *ETSI DMI/NTECH-00031, NTECH STF 486 Cloud Computing standards and open source;*
- *ETSI DMI/NTECH-00032, NTECH Cloud Computing interoperability, conformance: the case of security;*
- *ETSI DMI/NTECH-00033, NTECH Cloud Computing standards: snapshot 2.*

Standards developing organizations outlined priority topics for standardization and as a starting point they need to develop a common set of reference. It notably concerns terminology (e.g.: ISO/IEC 17788:2014) or reference architecture (e.g.: ISO/IEC 17789:2014). The main topics identified with a lack of standards and thus added at the top of standardization work programs are the following:

- Service Level Agreement (SLA) is a critical topic for the cloud and some of the main current challenges are to determine a common terminology and to define metrics to measure the service level objectives. Therefore, standards organizations are currently developing a framework (e.g.: ISO/IEC CD 19086-1) to help avoid confusion and facilitate common understanding between cloud service providers and cloud service customers;
- Security and privacy standards are also essential in the context of cloud computing. On one hand they will allow to ensure the confidentiality, integrity, and availability of information and information systems (e.g.: ITU-T Draft X.goscc). On the other hand these developments are necessary to improve the confidence of cloud consumers and facilitate the adoption of the cloud across the world;
- Interoperability and portability standards constitute fundamental challenge in the cloud. Standardization organizations have launched several projects in order to define unambiguously the terminology needed (e.g.: ISO/IEC AWI 19941). It will participate to the broad adoption of the cloud by enhancing its flexibility and automation.

⁹⁶ <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52012DC0529&from=EN>

8.2.1. Published standards

This section details the standards already published by the recognized SDO regarding cloud computing. The linked standards below are publicly available.

SDO	Reference	Title
ISO/IEC JTC 1 / ITU-T	ISO/IEC 17788:2014 / ITU-T Rec. Y.3500 (08/2014)	Information technology -- Cloud computing -- Overview and vocabulary
ISO/IEC JTC 1 / ITU-T	ISO/IEC 17789:2014 / ITU-T Y.3502 (08/2014)	Information technology -- Cloud computing -- Reference architecture
ISO/IEC JTC 1	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 JTC 1	ISO/IEC 17826:2012	Information technology -- Cloud Data Management Interface (CDMI)
ISO/IEC JTC 1	ISO/IEC 19831:2015	Cloud Infrastructure Management Interface (CIMI) Model and RESTful HTTP-based Protocol -- An Interface for Managing Cloud Infrastructure
ITU-T	ITU-T FG Cloud TR Part 1 (02/2012)	Technical Report: Part 1: Introduction to the cloud ecosystem: definitions, taxonomies, use cases and high-level requirements
ITU-T	ITU-T FG Cloud TR Part 2 (02/2012)	Technical Report: Part 2: Functional requirements and reference architecture
ITU-T	ITU-T FG Cloud TR Part 3 (02/2012)	Technical Report: Part 3: Requirements and framework architecture of cloud infrastructure
ITU-T	ITU-T FG Cloud TR Part 4 (02/2012)	Technical Report: Part 4: Cloud Resource Management Gap Analysis
ITU-T	ITU-T FG Cloud TR Part 5 (02/2012)	Technical Report: Part 5: Cloud security
ITU-T	ITU-T FG Cloud TR Part 6 (02/2012)	Technical Report: Part 6: Overview of SDOs involved in cloud computing
ITU-T	ITU-T FG Cloud TR Part 7 (02/2012)	Technical Report: Part 7: Cloud computing benefits from telecommunication and ICT perspectives
ITU-T	ITU-T Y.3501 (05/2013)	Cloud computing framework and high-level requirements (edition 2 under development)
ITU-T	ITU-T Y.3503 (05/2014)	Requirements for desktop as a service
ITU-T	ITU-T Y.3510 (05/2013)	Cloud computing infrastructure requirements (edition 2 under development)
ITU-T	ITU-T Y.3511 (03/2014)	Framework of inter-cloud computing
ITU-T	ITU-T Y.3512 (08/2014)	Cloud computing - Functional requirements of Network as a Service
ITU-T	ITU-T Y.3513 (08/2014)	Cloud computing - Functional requirements of Infrastructure as a Service
ITU-T	ITU-T Y.3520 (06/2013)	Cloud computing framework for end to end resource management (edition 2 under development)
ITU-T	ITU-T X.1601 (01/2014)	Security framework for cloud computing (edition 2 under development)

SDO	Reference	Title
ITU-T	ITU-T Q Suppl. 65 (07/2014)	Draft Q Supplement 65 to Q.39xx-series Recommendations (Q.Supp-CCI) Cloud computing interoperability activities
ETSI	ETSI TR 102 997 V1.1.1 (04/2010)	CLOUD; Initial analysis of standardization requirements for Cloud services
ETSI	ETSI TS 103 125 V1.1.1 (11/2012)	CLOUD; SLAs for Cloud services
ETSI	ETSI TR 103 126 V1.1.1 (11/2012)	CLOUD; Cloud private-sector user recommendations
ETSI	ETSI TS 103 142 V1.1.1 (04/2013)	CLOUD; Test Descriptions for Cloud Interoperability

8.2.2. Standards under development

This section details the standards under development regarding cloud computing in the recognized SDO.

SDO	Reference	Title
ISO/IEC JTC 1	ISO/IEC CD 19086-1	Information technology -- Cloud computing -- Service Level agreement (SLA) framework and Technology -- Part 1: Overview and concepts
ISO/IEC JTC 1	ISO/IEC WD 19086-2	Information technology -- Cloud computing -- Service Level agreement (SLA) framework and Technology -- Part 2: Metrics
ISO/IEC JTC 1	ISO/IEC WD 19086-3	Information Technology - Cloud Computing – Service Level Agreement (SLA) Framework – Part 3: Core Requirements
ISO/IEC JTC 1	ISO/IEC NP 19086-4	Information technology -- Cloud computing -- Service Level agreement (SLA) framework and Technology -- Part 4: Security and privacy
ISO/IEC JTC 1	ISO/IEC AWI 19941	Information Technology -- Cloud Computing -- Interoperability and Portability
ISO/IEC JTC 1	ISO/IEC AWI 19944	Information Technology - Cloud Computing - Data and their Flow across Devices and Cloud Services
ISO/IEC JTC 1	ISO/IEC CD 27036-4	Information technology -- Information security for supplier relationships -- Part 4: Guidelines for security of Cloud services
ISO/IEC JTC 1 / ITU-T	ISO/IEC DIS 27017 / ITU-T Draft X.1631	Information technology -- Security techniques -- Code of practice for information security controls based on ISO/IEC 27002 for cloud services
ITU-T	ITU-T Draft Y.DaaS-arch	Functional architecture of Desktop as a Service
ITU-T	ITU-T Draft Y.DaaS-RA	Reference architecture for Desktop as a Service
ITU-T	ITU-T Draft Y.CCNaaS	Cloud computing - Functional architecture of Network as a Service
ITU-T	ITU-T Draft Y.CCIC-arch	Cloud computing - Functional Architecture of inter-cloud computing
ITU-T	ITU-T Draft Y. BigData-reqts	Requirements and capabilities for cloud computing based big data
ITU-T	ITU-T Draft Y.BDaaS-arch	Functional architecture of Big Data as a Service
ITU-T	ITU-T Draft M.occm	Overview of Cloud Computing Management
ITU-T	ITU-T Draft M.rcsm	Requirements for Cloud Service Management in Cloud-

SDO	Reference	Title
		Integrated Telecom BSS/OSS
ITU-T	ITU-T Draft M.mivrcc	Requirements and analysis for management interface of virtualized resources in cloud computing
ITU-T	ITU-T Draft Y.e2ecslm-Req	End-to-end cloud service lifecycle management
ITU-T	ITU-T Draft Y.e2ecm	Common Model for End-to-End Cloud Computing Resource Management
ITU-T	ITU-T Draft X.CSCDataSec	Guidelines for cloud service customer data security
ITU-T	ITU-T Draft X.goscc	Guidelines of operational security for cloud computing
ITU-T	ITU-T Draft X.sfcse	Security requirements for SaaS application environments
ITU-T	ITU-T Draft Y.cctic	Cloud computing trusted inter-cloud
ITU-T	ITU-T Draft Y.cloudSECasaservice	Framework for security as a cloud service
ITU-T	ITU-T Draft Y.cloudtrustmodels	Framework for cloud security trust and risk management
ITU-T	ITU-T Draft Y.clouduse&req	Cloud security use cases and requirements
ITU-T	ITU-T Draft Y.inter-cloud-sec	Security Aspects of Inter-Cloud Computing
ITU-T	ITU-T Draft Q.FW-Cloud-iop	The framework and overview of Cloud Computing interoperability testing

8.2.3. Technical committees and other initiatives

This section lists the main technical committees and organizations that are working on cloud computing standardization.

International level

Technical committees

[ISO/IEC JTC 1/SC 27](#) - IT Security techniques
[ISO/IEC JTC 1/SC 38](#) - Cloud Computing and Distributed Platforms
[ITU-T/SG 2](#) - Operational aspects
[ITU-T/SG 11](#) - Protocols and test specifications

[ITU-T/SG 13](#) - Future networks including cloud computing, mobile and next-generation networks
[ITU-T/SG 17](#) - Security

Other initiatives

[ITU-T FG CLOUD](#) - *ITU-T Focus Group on Cloud Computing* (terminated)
[ATIS](#) - Alliance for Telecommunications Industry Solutions
[CSA](#) - Cloud Security Alliance
[CSCC](#) - Cloud Standards Customer Council
[DMTF](#) - Distributed Management Task Force
[IEEE](#) - Institute for Electrical and Electronics Engineers
[IETF](#) - Internet Engineering Task Force
[NIST](#) - National Institute of Standards and Technology

[OASIS](#) - Organization for the Advancement of Structured Information Standards
[ODCA](#) - Open Data Center Alliance
[OGF](#) - Open Grid Forum
[OMG](#) - Object Management Group
[SNIA](#) - Storage Networking Industry Association
[TIA](#) - Telecommunications Industry Association
[TMF](#) - TeleManagement Forum
[TOG](#) - The Open Group

European level

Technical committees

ETSI/TC CLOUD – Technical Committee Cloud Computing (terminated)

[ETSI/TC NTECH](#) - Technical Committee Network Technologies

Other initiatives

[CSC](#) – Cloud Standard Cooperation initiative (EC and ETSI)

8.3. BIG DATA

ISO/IEC JTC 1 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” (ISO/IEC JTC 1 Big data – Preliminary Report 2014). Indeed, the exponential growing of data, particularly generated by an increasing number of connected things, offers new challenges and possibilities in the ICT sector. Big data has the potential to benefit to all economic stakeholders through an increasing of productivity and competitiveness but also with prospective analysis possibilities offer by the new analytics tools.

Big data is still an emerging topic from the standardization point of view. Standards for Big Data are important to improve, for example, the interoperability between the various applications and prevent vendor lock in. Different standard initiatives are being developed by recognized SDOs and industry consortia. For example, a new working group on big data has been created in ISO/IEC JTC 1 in November 2014 (ISO/IEC JTC 1/WG 9) and reports have been published to identify existing standards and potential standardization gaps:

- [ISO/IEC JTC 1 Big data – Preliminary Report 2014](#) (02/2015);
- [ISO/IEC JTC 1/SC 32 Report of study group on next generation analytics and big data](#) (06/2013);
- [ITU-T Technology Watch Report - Big Data: Big today, normal tomorrow](#) (11/2013).

The definition of big data reference architecture (e.g.: ISO/IEC 20547) is currently one of the most important standardization topic due to the broad variety of frameworks and ecosystems already associated with big data and the need to make them become interoperable. It will provide a technical reference to facilitate a common understanding of the concept. This work will also be completed by the definition of a common vocabulary (e.g.: ISO/IEC NP 20546)

At the same time, ITU-T started to define relationships between cloud computing and big data and to identify its requirements, capabilities and use cases (ITU-T Draft Y.3600). ITU-T also develops a standard to engage discussions on challenges of big data in the context of IoT (ITU-T Draft Y.IoT-BigData-reqts), and notably the specific requirements and capabilities that the IoT is expected to support in order to address the challenges related to Big Data. This work will constitute a basis for further standardization work concerning big data in the IoT.

Other potential standardization gaps that should be quickly addressed by SDO in the context of big data concern for example security and privacy, query languages, interfaces between SQL and NoSQL data stores, etc.

8.3.1. Standards under development

This section details the standards under development regarding big data in the recognized SDO.

SDO	Reference	Title
ISO/IEC JTC 1	ISO/IEC NP 20546	Information technology -- Big Data -- Overview and Vocabulary
ISO/IEC JTC 1	ISO/IEC NP 20547-1	Information technology -- Big Data -- Reference Architecture - - Part 1: Framework and Application Process
ISO/IEC JTC 1	ISO/IEC NP 20547-2	Information technology – Big Data Reference Architecture -- Part 2: Use Cases and Derived Requirements
ISO/IEC	ISO/IEC NP 20547-3	Information technology -- Big Data Reference Architecture –

SDO	Reference	Title
JTC 1		Part 3: Reference Architecture
ISO/IEC JTC 1	ISO/IEC NP 20547-4	Information technology -- Big Data Reference Architecture -- Part 4: Security and Privacy Fabric
ISO/IEC JTC 1	ISO/IEC NP 20547-5	Information technology -- Big Data Reference Architecture -- Part 5: Standards Roadmap
ITU-T	ITU-T Draft Y.BigDataEX-reqts	Big data exchange framework and requirements
ITU-T	ITU-T Draft Y.Suppl.BigData-RoadMap	Supplement on Big Data Standardization Roadmap
ITU-T	ITU-T Draft Y.3600	Requirements and capabilities for cloud computing based big data
ITU-T	ITU-T Draft Y.BDaaS-arch	Functional architecture of Big Data as a Service
ITU-T	ITU-T Draft Y.IoT-BigData-reqts	Specific requirements and capabilities of the IoT for Big Data

8.3.2. Technical committees and other initiatives

This section lists the main technical committees and organizations that are working on big data standardization.

International level

Technical committees

[ISO/IEC JTC 1/WG 9](#) - Big Data

[ISO/IEC JTC 1/SC 32](#) - Data Management and Interchange

[ITU-T/SG 13](#) - Future networks including cloud computing, mobile and next-generation networks

Other initiatives

[CSA / BDWG](#) - Cloud Security Alliance / Big Data Working Group

[CSCC / BDWG](#)- Cloud Standards Customer Council / Big Data in the Cloud Working Group

[NBD-PWG](#) - NIST Big Data Public Working Group

[OASIS](#) - Organization for the Advancement of Structured Information Standards

[OGC Big Data DWG](#) - Open Geospatial Consortium Big Data Domain Working Group

[W3C](#) - World Wide Web Consortium

8.4. GREEN DATA CENTERS

Data centers are essential for the development of the digital economy, particularly with the ever more important use of cloud computing and the development of the Internet of Thing. But correlatively, energy demand is growing increasingly and data centers have an ever stronger impact on the environment. In this context, standards developing organizations are particularly working to improve energy efficiency of data centers or to increase the use of renewable resources. At the European level, the CEN/CENELEC/ETSI Coordination Group on Green Data Centres (CEN/CLC/ETSI CG GDC) is working on this topic and is maintaining valuable reports providing a standards landscape and a gap analysis regarding energy management and environment viability of data centers:

- CEN/CENELEC/ETSI CG GDC [Standardization landscape report](#);
- CEN/CENELEC/ETSI CG GDC [brochure on Review of standardization activities: Energy Management and Environmental Viability of Data Centres](#);

One of the main standardization works currently led by standardization organizations concerns the definition of key performance indicators (KPI), which intends the efficient use of resources by data centers. They will address different aspects such as the minimization of energy consumption (e.g.: ISO/IEC DIS 30134-2), the use of renewable energy (e.g.: ISO/IEC DIS 30134-3) or the effectiveness of the ICT load (e.g.: ISO/IEC DIS 30134-5). These standards will allow a measurement and a monitoring of data centers performances regarding environment effectiveness and will thus justify investments and allow a continuous improvement of the environmental performances.

8.4.1. Published standards

This section details the standards already published by the recognized SDO regarding green data centers. The linked standards below are publicly available.

SDO	Reference	Title
ISO/IEC JTC 1	ISO/IEC 19395:2015	Information technology -- Sustainability for and by information technology -- Smart data centre resource monitoring and control
ITU-T	ITU-T L.1300 (06/2014)	Best practices for green data centres
ITU-T	ITU-T L.1301 (05/2015)	Minimum data set and communication interface requirements for data centre energy management
ITU-T	ITU-T L.1320 (03/2014)	Energy efficiency metrics and measurement for power and cooling equipment for telecommunications and data centres
ITU-T	ITU-T L Suppl. 6 (12/2014)	ITU-T L.1300 - Supplement on a validation test of a data centre cooling method using renewable energy in a cold region
ITU-T	ITU-T L Suppl. 7 (12/2014)	ITU-T L.1300 - Supplement on rationale for minimum data set for evaluating energy efficiency and for controlling data centre equipment in view of power saving
ITU-T	ITU-T L Suppl. 8 (12/2014)	ITU-T L.1300 - Supplement on potential for primary energy savings in TLC/ICT centres through free cooling
ITU-T	ITU-T L Suppl. 9 (12/2014)	ITU-T L.1300 - Supplement on case study of reduction of air-conditioning energy by optical fibre based thermometry
ITU-T	ITU-T L Suppl. 10 (12/2014)	ITU-T L.1300 - Supplement on verification experiments related to increase of efficiency of air-conditioning and control technologies at a data centre
ITU-T	ITU-T L Suppl. 11 (12/2014)	ITU-T L.1300 - Supplement on verification test and feasibility study of energy and space efficient cooling systems for data

SDO	Reference	Title
		centres with high density ICT devices
ITU-T	ITU-T L Suppl. 12 (12/2014)	ITU-T L.1300 - Supplement on experimental studies on plates and ducts installed at equipment inlets and outlets
CENELEC	EN 50600-1:2012	Information technology - Data centre facilities and infrastructures - Part 1: General concepts
CENELEC	EN 50600-2-1:2012	Information technology - Data centre facilities and infrastructures - Part 2-1: Building construction
CENELEC	EN 50600-2-2:2014	Information technology - Data centre facilities and infrastructures - Part 2-2: Power distribution
CENELEC	EN 50600-2-3:2014	Information technology - Data centre facilities and infrastructures - Part 2-3: Environmental control
CENELEC	EN 50600-2-4:2015	Information technology - Data centre facilities and infrastructures - Part 2-4: Telecommunications cabling infrastructure
ETSI	ETSI TS 105 174-2-2 (10/2009)	Access, Terminals, Transmission and Multiplexing (ATTM); Broadband Deployment - Energy Efficiency and Key Performance Indicators; Part 2: Network sites; Sub-part 2: Data centres
ETSI	ETSI ES 205 200-1 (03/2014)	Access, Terminals, Transmission and Multiplexing (ATTM); Energy management; Global KPIs; Operational infrastructures; Part 1: General requirements
ETSI	ETSI ES 205 200-2-1 (03/2014)	Access, Terminals, Transmission and Multiplexing (ATTM); Energy management; Global KPIs; Operational infrastructures; Part 2: Specific requirements; Sub-part 1: Data centres
ETSI	ETSI GS OEU 001 (10/2014)	Operational energy Efficiency for Users (OEU); Global KPIs for Data Centres

8.4.2. Standards under development

This section details the standards under development regarding green data centers in the recognized SDO.

SDO	Reference	Title
ISO/IEC JTC 1	ISO/IEC NP 30131	Information technology -- Data Centres -- Taxonomy and Maturity Model
ISO/IEC JTC 1	ISO/IEC AWI TR 30133	Information technology -- Data centres -- Guidelines for resource efficient data centres
ISO/IEC JTC 1	ISO/IEC DIS 30134-1	Information Technology -- Data Centres -- Key performance indicators -- Part 1: Overview and general requirements
ISO/IEC JTC 1	ISO/IEC DIS 30134-2	Information Technology -- Data Centres -- Key performance indicators -- Part 2: Power usage effectiveness (PUE)
ISO/IEC JTC 1	ISO/IEC DIS 30134-3	Information Technology -- Data Centres -- Key Performance Indicators -- Part 3: Renewable Energy Factor (REF)
ISO/IEC JTC 1	ISO/IEC CD 30134-4	Information Technology -- Data Centres -- Key performance indicators -- Part 4: IT Equipment Energy Efficiency for Servers (ITEE)
ISO/IEC	ISO/IEC CD 30134-5	Information Technology -- Data Centres -- Key Performance

SDO	Reference	Title
JTC 1		Indicators -- Part 5: IT Equipment Utilization for Servers (ITEUsv)
ITU-T	ITU-T Draft L.assDC	Assessment of energy efficiency on infrastructure in data center and telecom center
ITU-T	ITU-T Draft L.green_mgm_DC	Functionality requirements and framework of green data center energy-saving management system
CENELEC	prEN 50600-2-5:2015	Information technology - Data centre facilities and infrastructures - Part 2-5: Security systems
CENELEC	FprEN 50600-3-1:2015	Information technology - Data centre facilities and infrastructures - Part 3-1: Management and operational information
CENELEC	CLC/prTR 50600-99-1	Information technology - Data centre facilities and infrastructures - Part 99-1: Recommended practices for energy management
CENELEC	prEN 50600-4-1	Information technology - Data centre facilities and infrastructures - Part 4-1: Overview and general requirements for key performance indicators (equivalent to ISO/IEC 30134-1)
CENELEC	prEN 50600-4-2	Information technology - Data centre facilities and infrastructures - Part 4-2: Key performance indicator PUE (equivalent to ISO/IEC 30134-2)
CENELEC	prEN 50600-4-3	Information technology - Data centre facilities and infrastructures - Part 4-3: Key performance indicator REF (equivalent to ISO/IEC 30134-3)
ETSI	ETSI TS 105 174-2	Access, Terminals, Transmission and Multiplexing (ATTM); Broadband Deployment and Energy Management; Part 2: ICT sites
ETSI	ETSI GS OEU 005	Operational energy Efficiency for Users (OEU); Monitoring of Global KPI of Green Data Centres

8.4.3. Technical committees and other initiatives

This section lists the main technical committees and organizations that are working on green data centers standardization.

International level

Technical committees

[ISO/IEC JTC 1/SC 39](#) - Sustainability for and by Information Technology

[ITU-T/SG 5](#) - Environment and climate change

Other initiatives

[ASHRAE](#) - American Society of Heating, Refrigerating and Air-Conditioning Engineers

[TGG](#) - The Green Grid

European level

Technical committees

[CLC/TC 215](#) - Electrotechnical aspects of telecommunication equipment

[ETSI/ISG OEU](#) - Industry Specification Group on Operational energy Efficiency for Users

[ETSI - TC ATTM/WG AT2](#) - Technical Committee Access, Terminals, Transmission and Multiplexing / Working Group Infrastructure, Physical Networks & Communication Systems

Other initiatives

[CEN/CENELEC/ETSI CG GDC](#) - CEN/CENELEC/ETSI Coordination Group on Green Data Centres

9. TURNING TECHNOLOGY TRENDS INTO STANDARDIZATION

This chapter focuses on how standardization can be an incubator to transform technology trends into effective standardization activities.

It has long been demonstrated and accepted that ICT contributes to increasing productivity, competitiveness and thus constitutes a major source of leverage for the modern economy. However, beyond economic stakes, ICT also represents an effective solution to meet current societal and environmental challenges. In this frame, standardization plays a key role in defining the future of ICT as an important source of knowledge and good practices.

In accordance with the “Luxembourg’s Policy on ICT technical standardization 2015-2020”⁹⁷, and in the frame of the university certificate *Smart ICT for Business Innovation* (see section 8.1) ANEC GIE, participates directly in technical standardization committees and notably in the most innovative ones, dealing with emerging or recent smart ICT concepts, in order to provide the most valuable information to the national ICT standardization community. To achieve this mission ANEC GIE is particularly involved in the ISO/IEC JTC 1/SWG-P (Special Working Group on Planning), which actively participate in exploring the potential of new technologies and their needs in terms of standards.

❖ ISO/IEC JTC 1/SWG-P tools

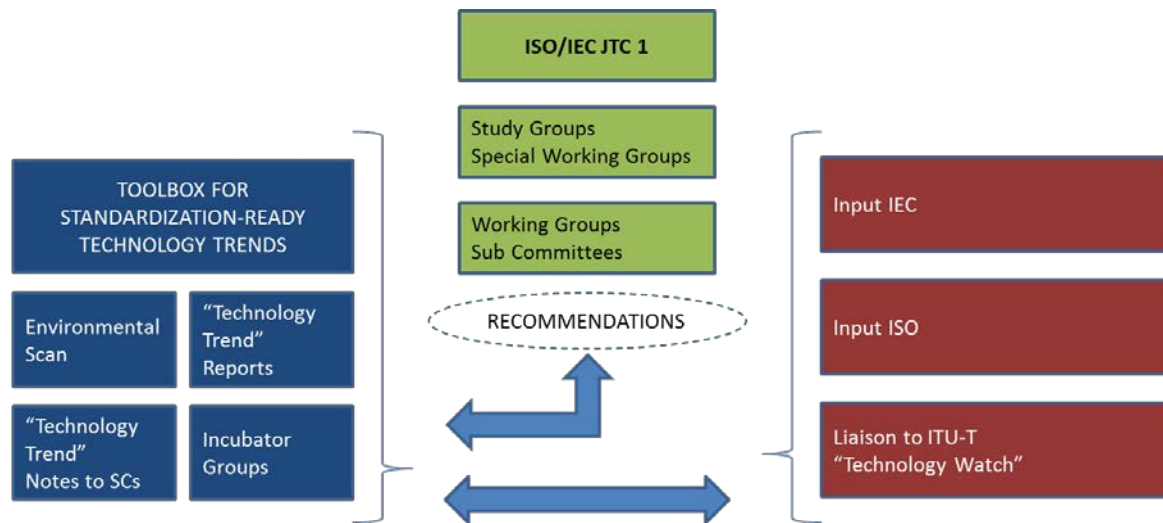
ISO, IEC and ITU-T have developed processes to guarantee a successful standardization roadmap in line with the market needs. In this frame, they have also established working groups intended to identify technology trends defined as “mature” for standardization work. The most relevant group for ICT related works is the ISO/IEC JTC 1/SWG-P which leads the following activities in this innovation context:

- Perform the Environmental Scanning activity to identify new work areas of interest to ISO/IEC JTC 1;
- Initiate “Technology Trend” reports with regard to dedicated topics to identify standardization environment and gaps;
- Establish and maintain a working relationship with the ITU-T Technology Watch function;
- Support the ISO/IEC JTC 1 Incubator function.

SWG-P has developed a toolkit to support perspective setting regarding standardization-ready technology trends, which can be summarized as presented in Figure 5:

⁹⁷ http://www.portail-qualite.public.lu/fr/publications/normes-normalisation/orientations-strategiques/politique-luxembourgaise-pour-la-normalisation-technique-des-TIC-2015-2020/Policy-on-ICT-technical-standardization-2015-2020_.pdf

Figure 5: ISO/IEC JTC 1/SWG-P tools to support perspective setting regarding standardization-ready technology trends⁹⁸



- Environmental Scan: by conducting an environmental scan (online survey), SWG-P is expected to identify relevant technology trends, to highlight challenges and opportunities for ISO/IEC JTC 1 and to make them recommendations on what actions it should pursue;
- Technology Trend Reports: relevant technological areas, identified by Environmental Scan, National Body or expert proposal, could be subject of further research. Maturity aspects and business relevance are important criteria;
- Technology Trend Notes to SCs: SWG-P provides notes to relevant subcommittees, regarding a studied technological area, in order to obtain feedbacks on effective and needed standardization work;
- Incubator Groups: they can be created to study the standardization potential of a specific technological area based on a minimal set of formal rules to avoid any restriction of collaboration;
- Liaisons between SWG-P, ISO, IEC and ITU-T ensure the coordination of the future standardization work, thanks to exchanges on technology trends;
- SWG-P provides recommendations to ISO/IEC JTC 1 and its SCs and SGs in order to develop the standards needed in link with technology trends identified.

❖ Standardization developments

In connection with the process described previously, ISO/IEC JTC 1 has established, during its last Plenary Meeting (in November 2014), two new Working Groups, respectively on Big Data and Internet of Things.

Moreover, JTC 1 reconstituted the Study Group (SG) on Smart Cities for consideration of activities in these fields across all of ISO/IEC JTC 1 and to provide a report with recommendations, and potentially other deliverables, to the 2015 ISO/IEC JTC1 Plenary.

Furthermore, SWG-P has been requested to investigate the following areas and develop Technology Trend Reports providing recommendations until the next JTC 1 Plenary Meeting:

- 3D Scanning and Printing;
- Smart Machines.

⁹⁸ Source: ISO/IEC JTC 1/SWG-P

Moreover, chapter 10 gives an overview of existing standardization activities in these areas.

❖ **Results of the Environmental Scan 2015**

The Environmental Scan 2015 final results have been unveiled and they provide a first indication of possible future developments:

- Cloud Computing / Mobile computing everywhere, Big Data / Advanced Analytics, Risk-Based Security and Self Protection are respectively the three first topics that should be considered for future work in JTC 1;
- Privacy Management Tools, Cloud Computing / Mobile computing everywhere and Risk-Based Security and Self Protection are respectively the three first most relevant trends to JTC 1.

The results will be deeply analyzed by the ISO/IEC JTC 1/SWG-P and it will prepare a report and recommendations for the next JTC 1 Plenary Meeting, which will take place at the end of October 2015 in China.

10. HIGH POTENTIAL TECHNOLOGIES AND STANDARDIZATION


This chapter focuses on recent technologies, which could significantly and deeply change our economy and society due to the highly impact they will have on our lifestyles: additive manufacturing (3D printing), intelligent transport systems, unmanned aircraft systems (drones) and robotics. A standards watch has been performed on these topics in order to provide a mapping of existing standardization developments and facilitate the implication of all interested parties.

10.1. ADDITIVE MANUFACTURING / 3D PRINTING

Additive manufacturing (AM) or 3D printing consists in the process of joining materials to make objects from 3D model data, usually layer upon layer, as opposed to subtractive manufacturing methodologies.


The American Society for Testing and Materials (ASTM) has been working for several years on additive manufacturing standardization. This effort has been enlarged to develop common ISO and ASTM standards in the technical committee ISO/TC 261. At the European level, a new technical committee, CEN/TC 438, has been created in 2015 in order to develop European standards based, as far as possible, on international standardization work in order to ensure consistency and harmonization, strengthen the link with European research programs and ensure that European stakeholder's needs are taken into account in standards development.

10.1.1. ISO/TC 261

General information			
Committee	ISO/TC 261	Title	Additive manufacturing
Creation date	2011	MEMBERS 	Participating Countries (20): Germany, Belgium, Canada, China, Denmark, Finland, France, Ireland, Italy, Japan, Republic of Korea, Netherlands, Norway, Poland, Singapore, Spain, Sweden, Switzerland, United Kingdom, United States Observing Countries (5): Czech Republic, Israel, New Zealand, Romania, South Africa
Secretariat	DIN (Germany)		
Secretary	Mr. Lutz Wrede		
Chairperson	Mr. Jörg Lenz		
Organizations in liaison	/		
Web site	http://www.iso.org/iso/home/standards_development/list_of_iso_technical_committees/iso_technical_committee.htm?commid=629086		
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/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 - ASTM F42 Steering group on JWG activities Coordination Group on JG activities Naming of standards 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	


	ISO/TC 261/JG 54 ISO/TC 261/JG 55	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
	ISO/TC 261/JG 56	Joint ISO/TC 261-ASTM F 42 Group: Standard Practice for Metal Powder Bed Fusion to Meet Rigid Quality Requirements
	ISO/TC 261/JG 57	Joint ISO/TC 261-ASTM F 42 Group: Specific design guidelines on powder bed fusion
	ISO/TC 261/JG 58	Joint ISO/TC 261-ASTM F 42 Group: Qualification, quality assurance and post processing of powder bed fusion metallic parts
	ISO/TC 261/JG 59	Joint ISO/TC 261-ASTM F 42 Group: NDT for AM parts
Standardization work		
Published standards		5
Standards under development		4
Involvement of Luxembourg		
NO (no registered delegate)		
Comments		
<p>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).</p> <p>ISO/TC 261 work program includes the following projects:</p> <ul style="list-style-type: none"> - ISO/PRF 17296-1, Additive manufacturing -- General principles -- Part 1: Terminology; - ISO/ASTM NP 20194, Additive manufacturing -- General principles -- Requirements for purchased AM parts; - ISO/ASTM DIS 20195, Standard Practice -- Guide for Design for Additive Manufacturing; - ISO/ASTM FDIS 52915, Specification for additive manufacturing file format (AMF) Version 1.2. 		

10.1.2. CEN/TC 438

General information			
Committee	CEN/TC 438	Title	Additive manufacturing
Creation date	2015	MEMBERS 	33 members of CEN/CENELEC
Secretariat	AFNOR (France)		
Secretary	Mr. Olivier Coissac		
Chairperson	/		
Organizations in liaison	/		
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	/
Standards under development	/
Involvement of Luxembourg	
NO (no registered delegate)	
Comments	
<p>CEN/TC 438 has three main goals:</p> <ul style="list-style-type: none"> - 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. <p>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.</p> <p>This TC is still under construction and all the information regarding its activities is not yet available.</p>	

10.1.3. ASTM F42

General information			
Forum / Consortium	ASTM F42	Title	Committee F42 on Additive Manufacturing Technologies
Creation date	2009	MEMBERS 	More than 320 members from 22 countries
Chairperson	Mr. Carl Dekker		
Involvement of Luxembourg	No		
Web site	http://www.astm.org/COMMITTEE/F42.htm		
Scope	The promotion of knowledge, stimulation of research and implementation of technology through the development of standards for additive manufacturing technologies. The work of this Committee will be coordinated with other ASTM technical committees and other national and international organizations having mutual or related interests.		
Structure	F42.01	Test Methods	
	F42.04	Design	
	F42.05	Materials and Processes	
	F42.90	Executive	
	F42.91	Terminology	
	F42.94	Strategic Planning	
	F42.95	US TAG to ISO TC 261	
Standardization work			
Published	11		


standards	
Standards under development	11
Comments	
<p>ASTM F42 work program includes the following projects:</p> <ul style="list-style-type: none"> - WK49798 New Guide for Intentionally Seeding Flaws in Additively Manufactured (AM) Parts; - WK49229 New Guide for Anisotropy Effects in Mechanical Properties of AM Parts; - WK49230 New Guide for Conducting Round Robin Studies for Additive Manufacturing; - WK49272 New Test Methods for Characterization of Powder Flow Properties for AM Applications; - WK38342 New Guide for Design for Additive Manufacturing; - WK48549 New Specification for AMF Support for Solid Modeling: Voxel Information, Constructive Solid Geometry Representations and Solid Texturing; - WK37654 New Guide for Directed Energy Deposition of Metals; - WK46188 New Practice for Metal Powder Bed Fusion to Meet Rigid Quality Requirements; - WK48732 New Specification for Additive Manufacturing Stainless Steel Alloy (UNS S31603) with Powder Bed Fusion; - WK48789 New Specification for Additive Manufacturing Stainless Steel 17-4PH (UNS S17400) with Powder Bed Fusion; - WK48790 New Specification for Additive Manufacturing Stainless Steel 15-5PH (UNS S15500) with Powder Bed Fusion. 	

10.2. INTELLIGENT TRANSPORT SYSTEMS

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”⁹⁹.

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 convenient of transport¹⁰⁰.

10.2.1. ISO/TC 204

General information			
Committee	ISO/TC 204	Title	Intelligent Transport Systems
Creation date	1992	MEMBERS 	Participating Countries (26): United States, Australia, Austria, Belarus, Belgium, Canada, China, Czech Republic, France, Germany, Hungary, India, Italy, Japan, Republic of Korea, Malaysia, Netherlands, New Zealand, Norway, Russian Federation, Sierra Leone, South Africa, Spain, Sweden, Switzerland, United Kingdom Observing Countries (27): Algeria, Brazil, Bulgaria, Chile, Colombia, Croatia, Cuba, Cyprus, Denmark, Egypt, Finland, Greece, Hong Kong, Indonesia, Islamic Republic of Iran, Ireland, Israel, Montenegro, Pakistan, Philippines, Poland, Romania, Serbia, Singapore, Slovakia, Thailand, Turkey
Secretariat	ANSI (United States)		
Secretary	Ms. Patty Fusaro		
Chairperson	Mr. Dick Schnacke		
Organizations in liaison	APEC, ETSI, IEEE, ITU, OGC, TISA, SAE		
Web site	http://www.iso.org/iso/home/standards_development/list_of_iso_technical_committees/iso_technical_committee.htm?commid=54706		
Scope	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.		
Structure	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	

⁹⁹ International Standard ISO 17465-1:2014, Intelligent transport systems -- Cooperative ITS -- Part 1: Terms and definitions (developed by ISO/TC 204)

¹⁰⁰ CEN/TC 278 Brochure (<http://www.itsstandards.eu/images/files/CEN%20TC%20278%20Brochure.pdf>)


	ISO/TC 204/WG 18	Cooperative systems
Standardization work		
Published standards		198
Standards under development		106
Involvement of Luxembourg		
NO (no registered delegate)		
Comments		
<p>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 programme in this field including the schedule for standards development, taking into account the work of existing international standardization bodies.</p>		

10.2.2. CEN/TC 278

General information			
Committee	CEN/TC 278	Title	Intelligent transport systems
Creation date	1991	MEMBERS 	33 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 CEN/TC 278/WG 2 CEN/TC 278/WG 3 CEN/TC 278/WG 4 CEN/TC 278/WG 5 CEN/TC 278/WG 7 CEN/TC 278/WG 8 CEN/TC 278/WG 9 CEN/TC 278/WG 10 CEN/TC 278/WG 12	Electronic fee collection and access control (EFC) Man-machine interfaces (MMI) Automatic Vehicle Identification and Automatic Equipment Identification (AVI/AEI) Architecture and terminology After theft systems for the recovery of stolen vehicles eSafety Cooperative ITS Freight, Logistics and Commercial Vehicle Operations Public transport (PT) Traffic and traveller information (TTI)	


	CEN/TC 278/WG 13 CEN/TC 278/WG 14 CEN/TC 278/WG 15 CEN/TC 278/WG 16	Traffic control (TC) ITS spatial data Road traffic data (RTD) Dedicated Short Range Communication (DSRC)
Standardization work		
Published standards		142
Standards under development		51
Involvement of Luxembourg		
NO (no registered delegate)		
Comments		
<p>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."</p> <p>Based on the considerations above, CEN/TC 278 proposes the following objectives and strategic directions for its future work:</p> <ul style="list-style-type: none"> - 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. 		

10.2.3. ETSI/TC ITS

General information			
Committee	ETSI/TC ITS	Title	Intelligent Transport Systems
Creation date	2007	MEMBERS 	/
Chairperson	Mr. Andersen Niels Peter Skov		
Organizations in liaison	APT, ARIB, CCSA, CEN, CENELEC, CEPT, ECC, ENISA, ERA, ERTICO, IEEE, IPv6 Forum, ISO, ISOC/IETF, ITU, OST-R, SAE International, TISA, 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		

	<p>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.</p> <p>Scope includes communication media, and associated physical layer, transport layer, network layer, security, lawful intercept and the provision of generic web services.</p>
Structure	<p>TC ITS/WG 1 Application Requirements and Services</p> <p>TC ITS/WG 2 Architecture and Cross Layer</p> <p>TC ITS/WG 3 Transport and Network</p> <p>TC ITS/WG 4 Media and Medium Related</p> <p>TC ITS/WG 5 Security</p>
Standardization work	
Published standards	165
Standards under development	55
Involvement of Luxembourg	
NO (no registered delegate)	
Comments	
<p>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. The coordination of the work programs is handled by the ITS Coordination Group (ITS-CG).</p>	

10.2.4. IEEE SCC42

General information			
Forum / Consortium	IEEE SCC42	Title	IEEE Standards Coordinating Committee on Transportation
Creation date	2014	MEMBERS 	Unknown
Chairperson	Dr. Yu Yuan		
Involvement of Luxembourg	No		
Web site	http://standards.ieee.org/		
Scope	<p>Leads the coordination of IEEE standardization activities for technologies related to transportation, especially in the areas of connected vehicles, autonomous/automated vehicles, inter- and intra-vehicle communications, and other types of transportation electrification. These technologies include but are not limited to Mobile Apps, Sensor Networks, and Communications that allow human to vehicle, vehicle to vehicle, vehicle to infrastructure, vehicle to platform, and vehicle to everything exchange of information and data. Where standardization needs exist, the SCC will develop guides, recommended practices, standards, and common definitions of terms.</p>		
Structure	WG2040	Standard for Connected, Automated and Intelligent Vehicles: Overview and Architecture Working Group	


	WG2040.1	Standard for Connected, Automated and Intelligent Vehicles: Taxonomy and Definitions Working Group
	WG2040.2	Standard for Connected, Automated and Intelligent Vehicles: Testing and Verification Working Group
	TF1	Cybersecurity in Transportation Task Force
	TF2	Road Electrification Task Force
	TF3	Unmanned Airborne Vehicles in Transportation Task Force
	AG1	Global Policy Advisory Group
Standardization work		
Published standards		45
Standards under development		20
Comments		
/		

10.3. UNMANNED AIRCRAFT SYSTEMS / DRONES

An Unmanned Aircraft System (UAS), commonly named Drone, is an aircraft and its associated elements which are operated with no pilot on board¹⁰¹.


In this context, standards are fundamental to create a global commercial market. Standards developing organizations notably need to address the challenge of defining a harmonized and global airspace for UAS access. It will allow the development of the commercial opportunities without compromising on safety and overall airspace efficiency.

10.3.1. ISO/TC 20/SC 16

General information			
Committee	ISO/TC 20/SC 16	Title	Unmanned aircraft systems
Creation date	2014	MEMBERS 	Participating Countries (8): United States, China, France, Germany, Japan, Russian Federation, Ukraine, United Kingdom Observing Countries (4): Islamic Republic of Iran, Republic of Korea, Luxembourg, New Zealand
Secretariat	ANSI (United States)		
Secretary	Mr. Courtney Robinson		
Chairperson	Mr. John Walker		
Organizations in liaison	/		
Web site	http://www.iso.org/iso/iso_technical_committee?commid=5336224		
Scope	Not yet available.		
Structure	Not yet available.		
Standardization work			
Published standards	0		
Standards under development	0		
Involvement of Luxembourg			
1 delegate			
-	Mr. Richard Foersom (Acting as Chairman)	Foersom Sàrl	
Comments			
ISO/TC 20/SC 16 organized its inaugural meeting in June 2015. The technical committee is currently clarifying its scope, which should only cover commercial and civil Unmanned Aircraft Systems (UAS), and studying the potential work items (e.g.: classification and terminology, performance, reliability, safety, flight operations).			

¹⁰¹ [ICAO Cir 328, Unmanned Aircraft Systems \(UAS\)](#)

10.3.2. ASTM F38

General information			
Forum / Consortium	ASTM F38	Title	Committee F38 on Unmanned Aircraft Systems
Creation date	2009	MEMBERS 	More than 320 members from 22 countries
Chairperson	Mr. Carl Dekker		
Involvement of Luxembourg	No		
Web site	http://www.astm.org/COMMITTEE/F38.htm		
Scope	<p>The development of standards and guidance materials for unmanned air vehicle systems.. The focus of the committee shall be the development of technical publications including (but not necessarily limited too):</p> <ul style="list-style-type: none"> - Minimum safety, performance, and flight proficiency requirements. - Quality assurance - to install manufacturing controls that will assure vehicles conform to design criteria. - Productions acceptance test and procedures assuring that the completed vehicle systems meet reported performance as demonstrated in the prototype vehicle system. This includes limits such as: empty weight and center of gravity, performance specifications, controllability and maneuverability trim, stability, stall speed and handling characteristics, engine cooling and operation characteristics, propeller limits, systems functions, and folding or removable lifting surfaces. - A baseline plan for continued airworthiness systems, including methods for monitoring and maintaining continued operational safety, and processes for identifying, reporting, and remedying safety-of-flight issues. 		
Structure	F38.01 F38.02 F38.03 F38.90	Airworthiness Flight Operations Personnel Training, Qualification and Certification Executive	
Standardization work			
Published standards	12		
Standards under development	10		
Comments			
<p>ASTM F38 work program includes the following projects:</p> <ul style="list-style-type: none"> - WK16285 New Specification for Specification for Design and Performance of an Unmanned Aircraft System-Class 1320 (550# Gross Weight to 1320# Gross Weight); - WK50655 New Practice for Software Dependability for sUAS; - WK27055 New Practice for the Registration and Marking of Unmanned Aircraft Systems; - WK31391 New Specification for Testing of a Small Unmanned Aircraft System (sUAS); - WK49620 New Practice for Extended/Beyond Visual Line of Sight Operations; - WK49619 New Practice for Operational Risk Assessment (ORA); - WK28019 New Practice for Selecting sUAS Launch and Recovery; - WK37164 New Specification for Operations Over People; - WK11425 New Practice for Private Unmanned Aircraft System (UAS) Pilot Practical Test Standards for 			

- Unmanned Aircraft Single-Engine Land (SEL) Remote Control and Autonomous/Semiautonomous;
- WK29229 New Practice for Certification of Pilots, Visual Observers, and Instructor Pilots and Training courses for Small Unmanned Aircraft Systems (sUAS).

10.4. ROBOTICS

Robotics refers to the science and practice of designing, manufacturing, and applying robots, where robots are actuated mechanism programmable in two or more axes with a degree of autonomy, moving within its environment, to perform intended tasks.

In the context of robotics, this section also includes robotic devices which consist in actuated mechanisms fulfilling the characteristics of an industrial robot or a service robot, but lacking either the number of programmable axes or the degree of autonomy¹⁰².

Several SDO are currently developing standards in the field of robotics and particularly ISO (ISO/TC 184/SC 2), CEN (CEN/TC 310) and IEEE (IEEE RAS SC53), which are detailed below through ID-Cards. Moreover, the Standardization Management Board (SMB) of IEC, which is in charge of the management and supervision of the IEC's standardization work, has set up a new Advisory Committee (AG) on Applications of Robotic Technology (ACART)¹⁰³ in June 2015. The tasks of ACART include:

- Coordinating common aspects of robotic technology such as vocabulary and symbols;
- Preparing a guideline that outlines the critical aspects 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;
- Strong collaboration with the IEC CAB.

10.4.1. ISO/TC 184/SC 2

General information			
Committee	ISO/TC 184/SC 2	Title	Robots and robotic devices
Creation date	/	MEMBERS 	Participating Countries (22): Sweden, Austria, Canada, China, Czech Republic, Denmark, France, Germany, Hungary, India, Ireland, Italy, Japan, Republic of Korea, Netherlands, Portugal, Romania, Russian Federation, Spain, Switzerland, United Kingdom, United States Observing Countries (7): Belgium, Bulgaria, Finland, Norway, Poland, Serbia, Slovakia
Secretariat	SIS (Sweden)		
Secretary	Mrs. Katarina Widström		
Chairperson	Mr. Henrik Jerregård		
Organizations in liaison	IEEE, IFR, OMG		
Web site	http://www.iso.org/iso/iso_technical_committee?commid=54138		
Scope	The scope of the committee, in the area of robots and robotic devices, covers standardization of: <ul style="list-style-type: none"> - Definition – characterization; - Terminology; - Performance testing methods; - Safety; - Mechanical interfaces and end effectors; - Programming methods; 		


¹⁰² International Standard ISO 8373:2012, Robots and robotic devices -- Vocabulary [developed by ISO/TC 184/SC 2]

¹⁰³ http://www.iec.ch/dyn/www/f?p=103:41:0:::FSP_ORG_ID,FSP_LANG_ID:12602,25


	- Requirements for information exchange.	
	Standardization comprises the robot itself (the manipulator with actuators and the control system with hardware and software) and its end effectors.	
Structure	ISO/TC 184/SC 2/WG 1 ISO/TC 184/SC 2/WG 3 ISO/TC 184/SC 2/WG 7 ISO/TC 184/SC 2/WG 8 ISO/TC 184/SC 2/JWG 9 ISO/TC 184/SC 2/WG 10	Vocabulary and characteristics Industrial safety Personal care robot safety Service robots Joint ISO/TC 184/SC 2 - IEC/SC 62A: Safety for medical devices using robotic technology Modularity for service robots
Standardization work		
Published standards	12	
Standards under development	6	
Involvement of Luxembourg		
NO (no registered delegate)		
Comments		
<p>ISO/TC 184/SC 2 current objectives include the development of new safety standard for robots in personal care. The first step is non-medical applications while parallel preparations are being made on medical applications. In this context, the work program of ISO/TC 184/SC 2 includes the following projects:</p> <ul style="list-style-type: none"> - ISO/DTS 15066, Robots and robotic devices -- Safety requirements for industrial robots -- Collaborative operation; - ISO/DIS 18646-1, Robots and robotic devices -- Performance criteria and related test methods for service robot -- Part 1: Locomotion for wheeled robots; - ISO/WD 18646-2, Robots and robotic devices -- Performance criteria and related test methods for service robot -- Part 2: Navigation; - ISO/CD 19649, Robots and robotic devices --- Vocabulary for mobile robots; - 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. 		

10.4.2. CEN/TC 310

General information			
Committee	CEN/TC 310	Title	Advanced automation technologies and their applications
Creation date	1993	MEMBERS	33 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 standardisation 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 utilise 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 CEN/TC 310/WG 2 CEN/TC 310/WG 3	Systems architecture STEP Cad lib
Standardization work		
Published standards	11	
Standards under development	0	
Involvement of Luxembourg		
1 delegate		
-	Mrs. Wided Guedria	Luxembourg Institute of Science and Technology (LIST)
Comments		
<p>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.</p> <p>The specific objectives of CEN/TC 310 are to:</p> <ul style="list-style-type: none"> - 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. 		

10.4.3. IEEE RAS SCSA

General information			
Forum / Consortium	IEEE RAS SCSA	Title	IEEE Robotics and Automation Society's Standing Committee for Standards Activities
Creation date	2007	MEMBERS 	Unknown
Chairperson	Mr. Raj Madhavan		
Involvement of Luxembourg	No		
Web site	http://www.ieee-ras.org/industry-government/standards		
Scope	<p>To formally adopt and confirm best practices in robotics and automation as standards. The Standing Committee will work with interested members of RAS in supporting standards defining activities in both established, mature application areas and nascent, emerging technologies related to robotics and automation. Within this scope, the RAS Standing Committee for Standards Activities shall pursue the following objectives:</p> <ul style="list-style-type: none"> - Promote common measures and definitions in robotics and automation; - Promote measurability and comparability of robotics and automation technology; - Promote integrity, portability, and reusability of robotics and automation technology. 		
Structure	IEEE RAS SCSA/ORA WG IEEE RAS SCSA/MDR-WG	Ontologies for Robotics and Automation Map Data Representation	
Standardization work			
Published standards	1		
Standards under development	1		
Comments			
<p>The ORA WG aims to develop a standard ontology and associated methodology for knowledge representation and reasoning in robotics and automation, together with the representation of concepts in an initial set of application domains. The standard will provide a unified way of representing knowledge and will provide a common set of terms and definitions, allowing for unambiguous knowledge transfer among any group of humans, robots, and other artificial systems.</p> <p>The MDR-WG aims to standardize a common representation and encoding for the two-dimensional map data used for navigation by mobile robots. The encoding will be used when exchanging map data with other components and systems. The standard focuses on interchange of map data between components and systems, particularly those that may be supplied by different vendors. As well as the encoding, the standard aims to specify suitable APIs and protocols for the interchange process so that navigation-related components from multiple vendors may inter-operate.</p>			

11. ICT AND ECONOMIC INTERSECTORAL APPROACH

The ICT sector is a keystone of the global economy. Development of ICT infrastructure can attract investment and generate important fiscal revenues and more and more employment opportunities. The ICT service industry also contributes to the economy as another engine of job creation. In addition, by providing access to information, making markets more efficient, the ICT sector offers an innovative tool to benefits economy and society in general. ICT extends to other industry sectors increasing productivity. Companies are integrating more and more services and products into global production chains and markets. . The examples of sectors where ICT is a cornerstone are numerous: aeronautics, automotive, energy, biomedical, logistics, space, education, public sector management, finance and private sector, etc.

The following sections describe the link established between the ICT sector and other sectors. Sections 11.1 to 11.4 present sectors already analyzed by ANEC GIE, under the supervision of ILNAS, *via* a standards analysis, or carefully studied by the Digital trust department of ILNAS (archiving sector). Finally, section 11.5 is dedicated to potential sectors to be analyzed in the future *via* a standards analysis.

11.1. ICT AS A SUPPORTING SECTOR OF THE ARCHIVING SECTOR

11.1.1. Standardization in the archiving sector and ICT

Archiving can be defined as the process of identifying, indexing, classifying, accessing, selecting, exploiting, communicating, exchanging and preserving, paper-based and digital information¹⁰⁴. In general, archives consist of documents that have been selected for permanent or long-term preservation on grounds of their enduring cultural, historical or evidentiary value. This analysis focuses on digital archives.

Another important concept of this sector is records that are the evidence of what the organization does or has done in the past. They capture its business activities and transactions, such as contract negotiations, business correspondence, personnel files and financial statements, to name just a few. In order to comply with regulations or for management purpose, records have to keep their legal value. They need therefore to have the following properties: authenticity, reliability, integrity and usability.

“Technical regulation requirements and controls for certifying Digitisation or Archiving Service Providers (PSDCs)”¹⁰⁵ was published as a Grand-Ducal Regulation on July 25, 2015. This technical regulation sets out the requirements and controls required for an organization to set up an information security management system and an operational management system specifically for digitization and e-archiving processes. It is used for conformity assessments on organizations performing digitization or e-archiving processes. Based into the criteria of verification established by the law of July 25, 2015 related to electronic archiving¹⁰⁵ and by the *ad hoc* quality system of ILNAS (Digital trust department), ILNAS proceeds to the registration of the concerned organization in the PSDC list (mentioning the processes related to the supervision), thus establishing the “Qualified PSDC” status.

The “Qualified PSDC” status results from the verification by ILNAS (Digital trust department) of the compliance of the Digitization or Archiving Service Provider with the technical regulation requirements and controls certifying PSDCs. Such a verification being based on, e.g., the results of a

¹⁰⁴ ILNAS, White Paper “Digital Trust - Towards excellence in ICT”, Version 2.0, 2014

¹⁰⁵ <http://www.legilux.public.lu/leg/a/archives/2015/0150/a150.pdf>

conformity assessment performed by an accredited conformity assessment body, involves ILNAS (Digital trust department) granting the related organization one of the following digitization or e-archiving service provider statuses:

- Qualified PSDC-DC: Supervised digitization and e-archiving service provider;
- Qualified PSDC-D: Supervised digitization service provider;
- Qualified PSDC-C: Supervised e-archiving service provider.

11.1.2. Technical Committees related to ICT in the archiving sector

Two technical committees have been identified as very relevant for this subsector, both of them at the international level:

[ISO/TC 46](#) - Information and documentation

[ISO/TC 171](#) - Document management applications

Moreover, several organizations participate in these technical committees at the national level.

11.2. ICT AS A SUPPORTING SECTOR OF THE ENERGY SECTOR

11.2.1. Standardization in the energy sector and ICT

In relation with the global current challenges regarding energy and climate policies (e.g.: CO₂ emissions reduction, share of renewable energy, eco-innovation, etc.), the sector of energy has been identified as a carrier for the national economy¹⁰⁶. In this context, ILNAS conducted a standards watch of the energy sector, and a report was published in October 2013 to provide a standard analysis of the five subsectors defined in this frame:

- Energy management and energy efficiency;
- Fuels;
- Power engineering;
- Renewable energy;
- Smart grids.

Within the different subsectors of the energy sector, smart grids are at the intersection between energy and ICT. A smart grid "is an electricity network that can intelligently integrate the actions of all users connected to it – generators, consumers and those that do both – in order to efficiently deliver sustainable, economic and secure electricity supplies"¹⁰⁷. The term smart grid is often associated with the concept of smart meter that provides the consumer a fine-grained monitoring and billing of its energy consumption.

To reduce energy consumption, "smart" technology development is strongly encouraged. Smart grids should therefore reduce energy loss and improve security of supply by taking into account the behavior of producers and consumers. This is a transverse subsector, which can affect multiple energy sources.

On April 12, 2011, the European Commission published a communication planning to intervene in this area and ensure that standards were putted in place by the end of 2012, in the frame of the standardization mandate M/490 issued in March 2011. Besides the definition of a network code, the European Commission intends to ensure that when developing standards, the devices are well suited for smart grids. The mandate M/490 conducted the three European Standards Organizations (ESOs) – CEN, CENELEC and ETSI – to establish the Smart Grid Coordination Group (SG-CG) in June 2011.

A first set of reports intending to provide a consistent framework for smart grids were published in 2012 but the Smart Grid mandate M/490 was extended at the end of 2012 in order to fine-tune the Smart Grid methodology and to develop an extended set of standards supporting Smart Grid deployment in Europe. It led to the publication of the new mandated reports at the end of 2014, which concluded the work of the SG-CG: *Extended Set of Standards support Smart Grids deployment, Overview Methodology, Smart Grid Interoperability and Smart Grid Information Security*¹⁰⁸. Following the conclusion of the SG-CG, a Smart Energy Grid Coordination Group (SEG-CG) has been created to continue the work and especially to consolidate and disseminate the results of the SG-CG.

Moreover, the EC continues to monitor, at national and European level, the development of ICT standards to facilitate the implementation of smart grids and encourages greater regional

¹⁰⁶ <http://www.portail-qualite.public.lu/fr/publications/normes-normalisation/etudes-nationales/standards-analysis-energy-october-2013/standards-analysis-energy-sector-october-2013.pdf>

¹⁰⁷ IEC definition (<http://www.iec.ch/smartgrid/background/explained.htm>)

¹⁰⁸ <http://www.cenelec.eu/standards/Sectors/SustainableEnergy/SmartGrids/Pages/default.aspx>

cooperation and European integration, particularly through the European Network of Transmission System Operators for Electricity (ENTSO-E)¹⁰⁹.

11.2.2. Technical Committees related to ICT in the energy sector

Four technical committees have been selected as relevant for this subsector, respectively three at the international level and one at the European level.

International Level

Technical Committee

[IEC/SG 3](#) - Strategic Group on Smart Grid

[IEC/PC 118](#) - Smart grid user interface

[ISO/IEC JTC 1/WG 7](#) - Sensor Networks

ISO/IEC JTC 1/WG 7 has recently published an International Standard to characterize the requirements for sensor networks to support smart grid technologies for power generation, distribution, networks, energy storage, load efficiency, control and communications and associated environmental challenges:

- *ISO/IEC 30101:2014, Information technology -- Sensor Networks: Sensor Network and its interfaces for smart grid system.*

Furthermore, a multi-part standard (ISO/IEC 29182 - Part 1 to 7) concerning the Sensor Network Reference Architecture (RA) has been published by this WG from 2013 to 2015.

European Level

Technical Committee

[CEN/CENELEC/ETSI SEG-CG](#) – Smart Energy Grid Coordination Group

¹⁰⁹ <https://www.entsoe.eu/about-entso-e/Pages/default.aspx>

11.3. ICT AS A SUPPORTING SECTOR OF THE BIOMEDICAL TECHNOLOGIES SECTOR

11.3.1. Standardization in the biomedical technologies sector and ICT

ILNAS conducted a standards watch on the biomedical technologies sector and published a report in October 2013 to offer a summary of standards development in this sector and thus provide a competitive tool at the disposal of the national economy. Moreover, ICT is one pillar of the national biomedical strategy, particularly in the frame of the development of innovative solutions to store, protect and analyze data issued from biomedical research¹¹⁰. ICT is thus a facilitator and a multiplier serving the progress of the biomedical sector.

The biomedical technologies sector covers several areas: from pharmaceutical activities to medical devices and health informatics. Following discussions with public authorities, the scope was slightly reduced for the standards analysis conducted by ILNAS: while dentistry activities continue to be included, veterinary activities were excluded. Finally, the biomedical technologies sector, as defined in the dedicated standards analysis¹¹¹, covers five subsectors:

- Medical devices;
- Medical equipment;
- Medical services;
- Diagnostics;
- eHealth.

Within the different subsectors of the biomedical technologies sector, eHealth is at the intersection between biomedical technologies and ICT. It refers to the combined use of electronic communication and information technology in the health sector to enable better health and healthcare¹¹². The eHealth sector includes many dimensions, such as:

- *Telemedicine/Telehealth*: the use of medical information exchanged from one site to another *via* electronic communications (telecommunication and IT) to improve patients' health status (source: American Telemedicine Association);
- *Electronic health records*: electronic record of patient health information generated by one or more healthcare professionals (general practitioners, specialists, etc.) (source: HIMSS – Healthcare Information and Management Systems Society);
- *mHealth*: Global Observatory for eHealth defined mHealth or mobile health as medical and public health practice supported by mobile devices, such as mobile phones, patient, monitoring devices, personal digital assistants (PDA), and other wireless devices (source: Global Observatory for eHealth/WHO);
- And also Virtual healthcare teams, Consumer health informatics, Health knowledge management, Healthcare Information Systems, Medical research using Grids, etc.

11.3.2. Technical Committees related to ICT in the biomedical technologies sector

Four technical committees and four other initiatives have been selected as relevant for this subsector, respectively five at international level and three at European level.

International Level

¹¹⁰ <http://www.gouvernement.lu/4167184/technologies-sante>

¹¹¹ <http://www.portail-qualite.public.lu/fr/publications/normes-normalisation/etudes-nationales/standards-analysis-biomedica-l-october-2013/standards-analysis-biomedical-october-2013.pdf>

¹¹² ISO/TR 14639-1:2012, Health informatics -- Capacity-based eHealth architecture roadmap -- Part 1: Overview of national eHealth initiatives

Technical Committees

[ISO/TC 215](#) - Health informatics

[ISO/TC 276](#) - Biotechnology

[ITU-T/SG 16](#) - Multimedia (e-health and standardization)

Other International Initiatives

NEMA / [DICOM](#) - Digital imaging and communication in medicine

Health Level Seven International / [HL7](#)

HL7 is an ANSI-accredited standards developing organization dedicated to providing a comprehensive framework and related standards for the exchange, integration, sharing and retrieval of electronic health information. It has over 2300 members and includes approximately 500 corporate members, who represent more than 90% of the information systems vendors serving healthcare.

European Level

Technical Committees

[CEN/TC 251](#) - Health informatics *linked with ISO/TC 215*

Other Initiatives

[ETSI / eHEALTH](#) - ETSI Project Ehealth *linked with the "eHealth-INTEROP" project*

ETSI Project eHEALTH co-ordinates ETSI's activities in the Information Communication Technology (ICT)

[CEN/CENELEC/ETSI Project - eHealth-INTEROP](#)

This joint project addresses the requirements of the European Commission mandate to the European Standardization Organizations (ESOs) on standardization in the field of e-health. This mandate (M/403) aims to provide a consistent set of standards to address the needs of this rapidly evolving field for the benefit of future healthcare provision.

11.4. ICT AS A SUPPORTING SECTOR OF THE SPACE SECTOR

11.4.1. Standardization in the space sector and ICT

The analysis of European and international standards in the space sector has been initiated by ILNAS in order to develop an information and exchange network for space-related standardization knowledge in the Grand-Duchy of Luxembourg. The space sector, as defined in the dedicated standards analysis¹¹³, covers four subsectors:

- Aerospace equipment and infrastructure;
- Earth observation technologies;
- Telecommunications & Broadcasting;
- Space related technologies.

Within the different subsectors of this standards analysis, numerous technical committees of “Telecommunications & Broadcasting” and “Space related technologies” are at the intersection between space sector and ICT.

Indeed, on the one hand, the telecommunication sector, considered as part of ICT, is one of the main types of space application, currently the most important and the most dynamic market for this issue. On the other hand, space related technologies encompasses for example the services and value-added products and technologies that are derived from the use of space systems and/or data, and the provision of consulting and engineering services: the main part of these issues are directly linked with ICT.

11.4.2. Technical Committees related to ICT in the space sector

Seven international technical committees have been selected as relevant for this subsector:

[ITU-T/SG 13](#) - Future networks including cloud computing, mobile and next-generation networks

[ITU-T/SG 16](#) - Multimedia

[ISO/IEC JTC 1/SC 2](#) - Coded character sets

[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 27](#) - IT Security techniques

[ISO/IEC JTC 1/SC 29](#) - Coding of audio, picture, multimedia and hypermedia information

¹¹³ <http://www.portail-qualite.public.lu/fr/publications/normes-normalisation/etudes-nationales/standards-analysis-space-november-2013/standards-analysis-space-sector-november-2013.pdf>

11.5. OTHER SECTORS WHERE ICT ACTS AS A SUPPORTING SECTOR

ICT is a supporting sector for other sectors not currently covered by the sector-based standards analysis. After a systematic review of ISO, IEC, CEN and CENELEC technical committees, the following sectors have been identified as being ICT-supported, meaning that technical committees related to this sector develop ICT-related standards:

- **Financial sector**
 - o [ISO/TC 68](#) - Financial services
 - o [CEN/TC 263](#) - Secure storage of cash, valuables and data media
 - o ISO/IEC JTC 1/WG 7 - Sensor Networks (Automation of facilities management and security)

- **Automotive sector**
 - o [ISO/TC 22](#) - Road vehicles
 - o [ISO/TC 23](#) - Tractors and machinery for agriculture and forestry
 - o [ISO/TC 184](#) - Automation systems and integration
 - o [ISO/TC 204](#) - Intelligent transport systems
 - o [CEN/TC 278](#) - Intelligent transport systems
 - o [CEN/TC 337](#) - Road operation equipment and products
 - o [ETSI/TC ITS](#) - Intelligent Transport Systems
 - o ISO/IEC JTC 1/WG 7 - Sensor Networks (Intelligent transportation and traffic)

- **Railway sector**
 - o [CLC/TC 9X](#) - Electrical and electronic applications for railways
 - o [ETSI/TC RT](#) - Railways Telecommunications
 - o ISO/IEC JTC 1/WG 7 - Sensor Networks (Logistics and Supply Chain Management; Automation of facilities management and security)

- **Cinematography, photography, audio and graphic technology sector**
 - o [ISO/TC 36](#) - Cinematography
 - o [ISO/TC 42](#) - Photography
 - o [ISO/TC 130](#) - Graphic technology
 - o [IEC/TC 100](#) - Audio, video and multimedia systems and equipment
 - o [CLC/SR 100](#) - Audio, video and multimedia systems and equipment
 - o [CLC/TC 100X](#) - Audio, video and multimedia systems and equipment and related sub-systems

- **Geographic information/Geomatics sector**
 - o [ISO/TC 211](#) - Geographic information/Geomatics
 - o [CEN/TC 287](#) - Geographic Information

- **Ergonomics sector**
 - o [ISO/TC 159](#) - Ergonomics
 - o [CEN/TC 122](#) - Ergonomics

- **Processes, data elements and documents in commerce, industry and administration sector**
 - o [ISO/TC 154](#) - Processes, data elements and documents in commerce, industry and administration
 - o ISO/IEC JTC 1/WG 7 - Sensor Networks (Automation, monitoring, and control of industrial production processes)

- **Computer-aided design (CAD) sector**
 - o [ISO/TC 10](#) - Technical product documentation
 - o [CEN/SS F01](#) - Technical drawings

- **Maritime sector**
 - o [ISO/TC 8](#) - Ships and marine technology
 - o ISO/IEC JTC 1/WG 7 - Sensor Networks (Logistics and Supply Chain Management; Automation of facilities management and security; Ship tracking and container tracking; Ocean observing systems)
- **Manufacturing sector**
 - o [ISO/TC 29](#) - Small tools
 - o [IEC/TC 65](#) - Industrial-process measurement, control and automation
 - o [IEC/TC 22](#) - Power electronic systems and equipment
 - o [CEN/TC 310](#) - Advanced Automation Technologies and their Applications
 - o [CLC/TC 65X](#) - Industrial-process measurement, control and automation
 - o ISO/IEC JTC 1/WG 7 - Sensor Networks (Logistics and Supply Chain Management; Automated inventory management; Security systems and theft prevention; Automation, monitoring, and control of industrial production processes)
- **Safety sector**
 - o [IEC/TC 108](#) - Safety of electronic equipment within the field of audio/video, information technology and communication technology
 - o [CLC/TC 108X](#) - Safety of electronic equipment within the fields of Audio/Video, Information Technology and Communication Technology
 - o ISO/IEC JTC 1/WG 7 - Sensor Networks (Environment observation, forecasting, and protection)
- **Building sector**
 - o [CEN/TC 247](#) - Building Automation, Controls and Building Management
 - o ISO/IEC JTC 1/WG 7 - Sensor Networks (Remote habitat monitoring and automation; Smart homes)
- **Public sector**
 - o ISO/IEC JTC 1/WG 7 - Sensor Networks (Homeland security; Civil protection and public safety)
- **Agriculture sector**
 - o ISO/IEC JTC 1/WG 7 - Sensor Networks (Automation and control of agriculture processes)
- **Research, Development and Innovation sector**
 - o ISO/IEC JTC 1/WG 7 - Sensor Networks
- **E-commerce & e-business sector**
 - o [CEN/WS eCAT](#) - eCataloguing (Multilingual catalogue strategies for ecommerce and ebusiness)
 - o [CEN/ WS eBES](#) - eBusiness European Standardization, EDI and ebXML
 - o [CEN/WS GITB2](#) - Global eBusiness test bed methodologies phase2
 - o [CEN/TC 434](#) - Project Committee - Electronic Invoicing

12. CONCLUSION

Today, ICT is already one of the most active sectors both at national and international levels. It is evolving to smarter technology 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. Systems integration fields, such as IoT, Smart Cities, Smart Grids, which combine several ICT areas, are becoming more and more important. 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 2014-2020¹¹⁴, 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"¹¹⁵. 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 some world-leading ICT companies¹¹⁶ and with a market composed of many companies, associations, administrations and experts.

Finally, this analysis highlights the potential interest for the national stakeholders (Section 5.2) and the opportunities for the national market to participate in the standardization process (Chapter 6). 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 take a sensible position across the standardization landscape.

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

¹¹⁴ <http://www.portail-qualite.public.lu/fr/publications/normes-normalisation/orientations-strategiques/strategie-normative-2014-2020/luxembourg-standardization-strategy-2014-2020.pdf>

¹¹⁵ http://www.portail-qualite.public.lu/fr/publications/normes-normalisation/orientations-strategiques/politique-luxembourg-oise-pour-la-normalisation-technique-des-TIC-2015-2020/Policy-on-ICT-technical-standardization-2015-2020_.pdf

¹¹⁶ <http://ict.investinluxembourg.lu/ict/success-stories>

13. APPENDIX

13.1. PARTICIPATION IN THE STANDARDIZATION PROCESS

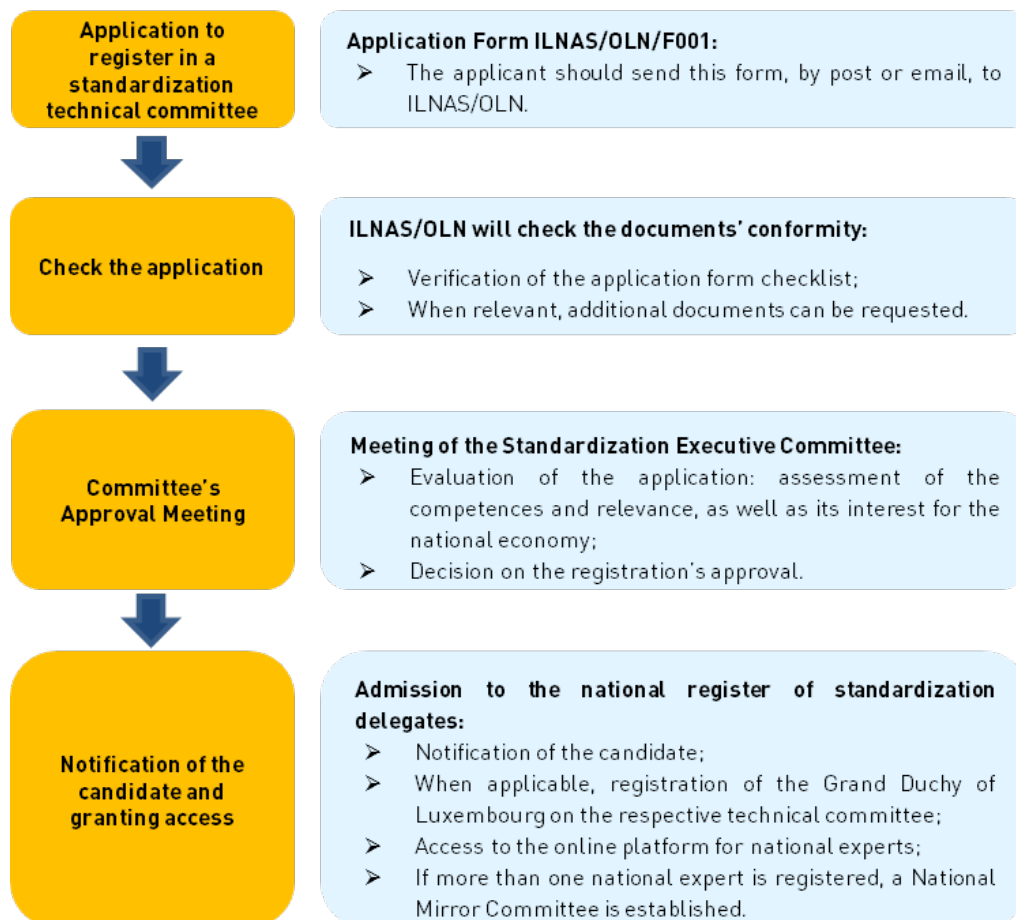
ILNAS, as the national standards body, is a member of European and international standardization organizations. In this frame, ILNAS *via* OLN can count with experts from administrations, public services, professional organizations, groups, associations or institutions interested in standardization, 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 "*Politique relative à la participation dans les comités techniques de normalisation*," is referenced as ILNAS/OLN/P001¹¹⁷.

❖ Registration process to participate in standardization technical committees

Figure 6 summarizes the process for registering as a national delegate to participate in a standardization technical committee.

Figure 6: Registration process to participate in standardization technical committees



¹¹⁷ <http://www.portail-qualite.public.lu/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:

<http://www.portail-qualite.public.lu/fr/normes-normalisation/developpement-normes/devenir-delegue-national/index.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:

<http://www.portail-qualite.public.lu/fr/publications/normes-normalisation/information-sensibilisation/ilnas-oln-registre-national-delegues-normalisation/index.html>

❖ **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/A003¹¹⁸);
- Commitment of nondisclosure of the technical committee’s documents to third parties;
- Participate 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 those want to anticipate future requirements and influence the market are welcome to join the standardization process. A simple registration form¹¹⁹ 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.

¹¹⁸ <http://www.portail-qualite.public.lu/fr/documentations/normes-normalisation/delegue-normalisation/ilnas-oln-A003-chart-e-utilisation-logo-ilnas-network/ilnas-oln-A003-charte-utilisation-logo-ilnas-network.pdf>

¹¹⁹ <http://www.portail-qualite.public.lu/fr/documentations/normes-normalisation/delegue-normalisation/ilnas-oln-F001-demande-inscription-comite-technique-de-normalisation/ilnas-oln-F001-demande-inscription-comite-technique-de-normalisation-EN.doc>

13.2. LIST OF ACRONYMS

ACRONYM	TITLE
3GPP	3rd Generation Partnership Project
AB	Advisory Board
ADL	Advanced Distributed Learning
AEI	Automatic Equipment Identification
AENOR	<i>Asociación Española de Normalización y Certificación</i>
AFNOR	<i>Association Française de Normalisation</i>
AGICOA	The Association for the International Collective Management of Audiovisual Works
AHG	Ad Hoc Group
AHS	Ad Hoc Group on Structure
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	<i>Agence pour la Normalisation et l'Economie de la Connaissance</i>
ANSI	American National Standards Institute
API	Application programming interface
APSI	<i>Association des Professionnels de la Société de l'Information</i>
ARC	Augmented Reality Continuum
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers
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	<i>Agence Universitaire de la Francophonie</i>
AVI	Automatic Vehicle Identification
AWI	Approved Work Item
BAC	Building Automation and Controls
BM	Building Management
BSI	British Standards Institute
CAB	Conformity Assessment Body
CAD	Computer-Aided Design
CCETT	Common Study Center of Telediffusion and Telecommunication
CCSDS	Consultative Committee for Space Data Systems
CD	Committee Draft
CEC	<i>Centre Européen des Consommateurs</i>
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

ACRONYM	TITLE
CIDOC	International Documentation Committee, International Council of Museums
CIE	International Commission on Illumination
CISAC	International Confederation of Societies of Authors and Composers
CLUSIL	<i>CLUb de la Sécurité de l'Information – Luxembourg</i>
CNPD	<i>Commission Nationale pour la Protection des Données</i>
COCIR	European Coordination Committee of the Radiological, Electromedical and Healthcare IT Industry
CRP	Public Research Center
CSA	Cloud Security Alliance
CSC	Cloud Standards Coordination
CSCC	Cloud Standards Customer Council
CSS	Cascading Style Sheets
CSSF	<i>Commission de Surveillance du Secteur Financier</i>
CWA	CEN Workshop Agreement
DAPS	Distributed Application Platforms and Services
DICOM	Digital Imaging and Communication in Medicine
DIN	<i>Deutsches Institut für Normung</i>
DIS	Draft International Standard
DMTF	Distributed Management Task Force
DNS	Domain Name System
DOI	International Digital Object Identifier Foundation
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
EIG	Economic Interest Grouping
EMC	ElectroMagnetic Compatibility
EMF	ElectroMagnetic field
EN	European Standard
ENISA	European Network and Information Security Agency
ENTSO-E	European Network of Transmission System Operators for Electricity
EPC	<i>Conseil Européen des Paiements</i>
EPUB	Electronic Publication
ERFA	European Rail Freight Association
ESI	Electronic Signatures and Infrastructures
ESMIG	European Smart Metering Industry Group

ACRONYM	TITLE
ESO	European Standardization Organizations
ETSI	European Telecommunications Standards Institute
EU	European Union
EUCOMED	The European Medical Technology Industry Association
EUREAU	European federation of national associations of drinking water suppliers and waste water services
FARECOGAZ	The European Association of Manufacturers of Gas Meters, Gas Pressure Regulators and associated Safety Devices and Stations
FedISA	<i>Fédération de l'ILM (Information Lifecycle Management), du Stockage et de l'Archivage</i>
FG	Focus Group
FIA	<i>Fédération Internationale de l'Automobile</i>
FIAPF	International Federation of Film Producers Associations
FNR	National Research Fund
GDP	Gross Domestic Product
GEO	Group on Earth Observations
GISIG	Geographical Information Systems International Group
GSM	Global System for Mobile Communications
HBES	Home and Building Electronic Systems
HTTP	Hypertext Transfer Protocol
HVAC	Heating, Ventilation and Air-Conditioning
IAEA	International Atomic Energy Agency
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
ICC	International Color Consortium
ICMA	International Card Manufacturers Association
ICS	International Classification for Standards
ICSTI	International Council for Scientific and Technical Information
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
IFLA	International Federation of Library Associations and Institutions
IG	Incubator Group
IIF	International Institute of Refrigeration
ILNAS	<i>Institut Luxembourgeois de la Normalisation, de l'Accréditation, de la Sécurité et qualité des produits et services</i>
ILO	International Labour Organization
ILR	<i>Institut Luxembourgeois de Régulation</i>
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

ACRONYM	TITLE
ISAN	International Standard Audiovisual Number
ISDN	Integrated Services Digital Network
ISMS	Information Security Management System
ISO	International Organization for Standardization
ISOC	Internet Society
ISSEA	International Systems Security Engineering Association
ISSN	International Standard Serial Number
ISUG	The International SGML/XML Users' Group
IT	Information Technology
ITES-BPO	IT Enabled Services-Business Process Outsourcing
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
iVDR	Information Versatile Disk for Removable usage
JFIF	JPEG File Interchange Format
JISC	Japanese Industrial Standards Committee
JMIR	Journal of Medical Internet Research
JTC	Joint Technical Committee
JWG	Joint Working Group
KATS	Korean Agency for Technology and Standards
LAN	Local Architecture Network
LDAP	Lightweight Directory Access Protocol
LETSI	International Federation for Learning-Education-Training Systems Interoperability
LTE	Long Term Evolution (4G LTE)
LTSC	IEEE Learning Technology Standards Committee
M2M	Machine-to-Machine communication
MDR	Metadata Registries
MFI	Metadata Framework for Interoperability
MIIM	Mobile Item Identification and Management
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
ODCA	Open Data Center Alliance
ODR	Online Dispute Resolution
OGC	Open Geospatial Consortium

ACRONYM	TITLE
OGF	Open Grid Forum
OLAS	<i>Office Luxembourgeois d'Accréditation et de Surveillance</i>
OLN	<i>Organisme luxembourgeois de normalisation</i>
OMA	The Open Mobile Alliance
O-member	Observing member
OMG	Open Management Group
OSI	Open systems interconnection
PAS	Public Available Specification
PC	Project Committee
PDA	Personal Digital Assistant
PKI	Public Key Infrastructures
PIA	Privacy Impact Assessment
PLC	Programmable Logic Controller
P-member	Participating member
PMI	Project Management Institute
PSC	<i>Prestataire de Services de Certification</i>
PSDC	<i>Prestataire de Services de Dématérialisation et/ou de Conservation</i>
PSF	<i>Prestataire de Services Financiers</i>
PUE	Power Usage Effectiveness
R&D	Research and Development
REF	Renewable Energy Factor
RFC	Request For Comments
RFID	Radio-Frequency Identification
RITA	Research and Innovative Technology Administration (U.S. Department of Transportation)
RMG	Registration Management Group
RTLS	Real-Time Locating Systems
RTP	Real-time Transport Protocol
SA	Standards Australia
SAML	Security assertion markup language
SC	Subcommittee
SCC	Standards Council of Canada
SCSI	Small Computer System Interface
SD	Standing Document
SDO	Standards Developing Organizations
SEDRIS	The Source for Environmental Data Representation & Interchange
SG	Strategic Group/Study Group
SGML	Standard Generalized Markup Language
SIP	Session Initiation Protocol
SLA	Service Level Agreement
SMB	Standardization Management Board
SMILE	<i>Security made in Lëtzebuerg</i>
SMPTE	Society of Motion Picture and Television Engineers
SNCH	<i>Société Nationale de Certification et d'Homologation</i>
SNIA	Storage Networking Industry Association

ACRONYM	TITLE
SNRA	Sensor Network Reference Architecture
SOA	Service Oriented Architecture
SQL	Structured Query Language
SSCD	Secure Signature-Creation Device
SVG	Scalable Vector Graphics
SWEBOK	Software Engineering Body of Knowledge
SWG	Special Working Group
SWIFT	Society for Worldwide Interbank Financial Telecommunication
TC	Technical Committee
TCG	Trusted Computing Group
TCP	Transmission Control Protocol
TGG	The Green Grid
TIA	Telecommunications Industry Association
TLS	Transport Layer Security
TMF	TeleManagement Forum
TOG	The Open Group
TR	Technical Report
TS	Technical Specification
TTA	Telecommunications Technology Association
TTC	Telecommunication Technology Committee
UAS	Unmanned Aircraft System
UCS	Universal Character Set
UI	User Interface
UIC	International Union of Railways
UITP	International Association of Public Transport
UL	University of Luxembourg
ULC	<i>Union Luxembourgeoise des Consommateurs</i>
UN	United Nations
UNCTAD	United Nations Conference on Trade and Development
UNECE	United Nations Economic Commission for Europe
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNI	<i>Ente Nazionale Italiano di Unificazione</i>
USB	Universal Serial Bus
UPnP	Universal Plug and Play
UPU	Universal Postal Union
URL	Uniform Resource Locator
VSE	Virtual Storage Extended
W3C	World Wide Web Consortium
WAI	Web Accessibility Initiative
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

ACRONYM	TITLE
XML	Extensible Markup Language
XMPP	Extensible Messaging and Presence Protocol

13.3. CONTACTS

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The logo for ILNAS features the letters 'ILNAS' in a serif font. The 'I' and 'L' are blue, while the 'N' and 'A' are orange, and the 'S' is blue. A horizontal line is positioned below the letters.

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