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STANDARDS ANALYSIS
ICT SECTOR
LUXEMBOURG

ILNAS
Institut luxembourgeois de la normalisation, de l'accréditation, de la sécurité et qualité des produits et services

ANEC
AGENCE POUR LA NORMALISATION ET L'ÉCONOMIE DE LA CONNAISSANCE

Executive summary

This analysis of European and international standards in the Information and Communication Technology (ICT) sector has been initiated in 2012 by the *"Institut Luxembourgeois de la Normalisation, de l'Accréditation, de la Sécurité et qualité des produits et services"* (ILNAS). This work 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 52 national delegates currently registered by ILNAS. Nevertheless, ILNAS is convinced that this sector could be even more active, especially since some ICT subsectors are not yet covered. 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 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 fourth 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-luxembourgeoise-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. ILNAS thus corresponds 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 relevant technical committees in the ICT field, including the joint standardization committee ISO/IEC JTC 1. 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-luxembourgeoise-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 services[4] 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" (updated in 2015) 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 2015-2020", 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. Driven by ILNAS, several activities have been set up[5] and 52 national delegates, meaning national experts registered and involved in a standardization committee, are currently participating in ICT standardization.

Initiated by ILNAS in 2012, this analysis is based on several years of experience in ICT standardization. This is the fourth 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.

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.

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

Chapter 8 highlights ICT as a sector that supports other economic sectors through standards. Technical committees that have drawn such a link are identified. To complete the standards analysis, the prospective and innovative role of standardization is described in **Chapter 9**.

Finally, the **conclusion** 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. 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 is a VOLUNTARY, CONSENSUS-driven activity, carried out by and for the interested parties themselves, based on openness and transparency within independent and recognized standards organizations leading to the adoption of standards with which compliance is voluntary[6]. It is the activity of establishing with regard to actual or potential problems, provision for common and repeated use, aimed at the achievement of the optimum degree of order in a given context[7].

❖ STANDARD:

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

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

❖ STANDARDS BODY:

A standards body can be defined as a standardizing body recognized at national, regional or international level whose main function is the preparation, approval or adoption of standards available to the public[7]. 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] Official Journal of the European Communities 2000/C141/01
[7] Based on the definition proposed in the standard EN 45020:2006 - Standardization and related activities – General vocabulary
[8] 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 plan[9].

❖ NATIONAL MIRROR COMMITTEE:

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

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

2.2. STANDARDIZATION OBJECTIVES

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

- Management of the diversity;
- Convenience of use;
- Compatibility;
- Interchangeability;
- Health;
- Security;
- Environmental protection;
- Product protection;
- Mutual understanding;
- Economic performance;
- Trade;
- Etc.

The standardization principles are:

- **Voluntary**: standards are voluntary which means there is no automatic legal obligation to comply with them. However, laws and regulations may further refer to standards and even make compliance compulsory[10];
- **Consensus**: general agreement characterized by the absence of sustained opposition to critical issues by any important party and reached through a process that takes into account the views of all parties. The need for consensus does not imply unanimity[11];
- **Industry wide**: a standard must offer global solutions, satisfying industries and customers all around the world.

[10] http://www.cencenelec.eu/standards/DefEN/Pages/default.aspx
[11] ISO/IEC Guide 2:2004, *Standardization and Related Activities -- General Vocabulary*

2.3. STANDARDIZATION LANDSCAPE

In Europe, the three recognized European Standardization Organizations (ESO) are[12]:

- 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 Organizations[13]

European and International Standardization Bodies		Date of Creation	Number of Members	Number of Published Standards
ISO	International Organization for Standardization	1946	166	19977
IEC	International Electrotechnical Commission	1906	83	6933
ITU-T	International Telecommunication Union's Telecommunication Standardization Sector	1865	193[14]	4890
CEN	European Committee for Standardization	1961	33	15615
CENELEC	European Committee for Electrotechnical Standardization	1973	33	6910
ETSI	European Telecommunications Standards Institute	1988	773[14] (64 countries)	34601

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

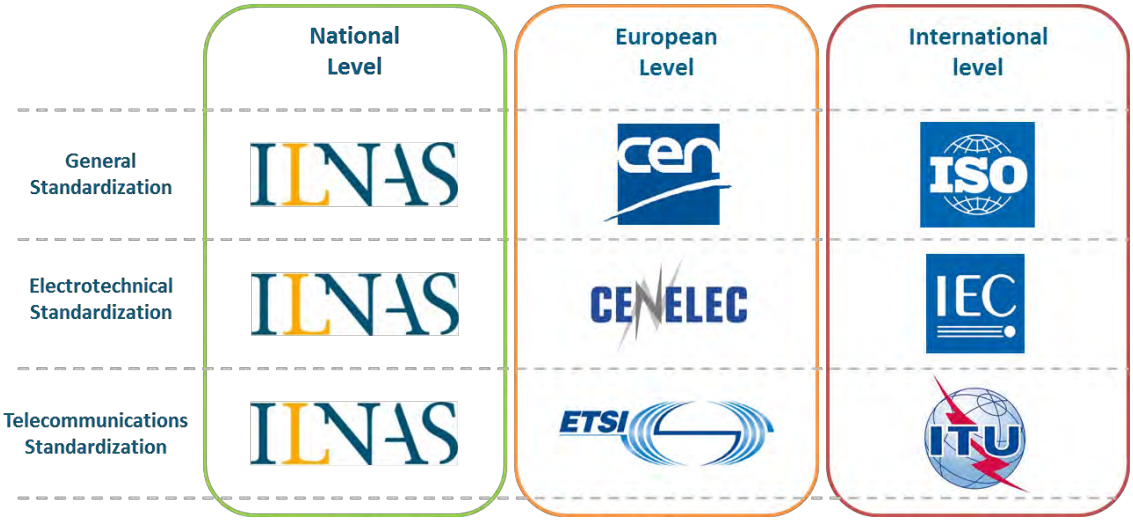
[13] Source: Websites of organizations - January 2015

[14] 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 86% of those ratified by CENELEC, are now technically equivalent or identical to ISO or IEC standards[15]; 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.

[15] Source: CEN and CENELEC Quarterly Statistical Pack (2014 Q4)

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 (166) and IEC (83)	1 country = 1 voice	Voluntary
European CEN and CENELEC	National bodies complying with membership criteria of CEN and CENELEC[16] (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"[17], 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**

[16] CEN-CENELEC Guide 20 "Guide on membership criteria of CEN & CENELEC"
[17] 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*"[18].

[18] 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*"[19].

Regarding current trends and the future of ICT at a global level, this sector remains promising. R&D investment in the ICT sector is still very important and has continued to increase in 2014 (e.g. Technology Hardware & Equipment: 3.3%, Software & Computer Services: 11.4%)[20] and most of the other dynamic sectors (healthcare, education, cultural industries, etc.) are massively investing in ICT[21]. 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.[22].

At the European level, the ICT sector has been directly responsible for 4.5% of GVA[23] (Gross Value Added), with a market value of EUR 529 billion in 2013[24], 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 (this figure rises to 96% in Luxembourg)[25], that 75% of individuals in the EU use the Internet on a regular basis (this figure rises to 93% in Luxembourg)[26] and that virtually all Europeans own mobile phones have changed lifestyles.

In 2010, the European Commission published "A Digital Agenda for Europe"[27]. 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 Strategy[28], 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 Commission[29], 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 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 in[30]:

- Advanced research to uncover radically new technological possibilities and ICT contributions to research and innovation;

[19] ISO/IEC JTC 1, Information technology - Business Plan 2014
[20] http://iri.jrc.ec.europa.eu/scoreboard14.html
[21] http://ipts.jrc.ec.europa.eu/publications/pub.cfm?id=4479
[22] http://www.gartner.com/newsroom/id/2867917
[23] 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)
[24] Source: Eurostat (online data code : nama_nace10_c)
[25] http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=isoc_ci_in_h&lang=en (source : Eurostat)
[26] http://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&language=en&pcode=tin00091&plugin=1 (source : Eurostat)
[27] http://ec.europa.eu/information_society/digital-agenda/index_en.htm
[28] http://ec.europa.eu/europe2020/index_en.htm
[29] http://ec.europa.eu/digital-agenda/ict-enabled-benefits-eu-society-analysis-and-data
[30] https://ec.europa.eu/programmes/horizon2020/sites/horizon2020/files/ICT%20in%20H2020%20WP2014-15_0.pdf

- 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 Program[31], 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 4.57% of the total employment[32]. Moreover, the ICT sector has been directly responsible for 6.2% of GVA (Gross Value Added) in 2013[33].

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.

[31] http://www.gouvernement.lu/3322796/Programme-gouvernemental.pdf
[32] Source: STATEC
[33] 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* standards[34].

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*"[35].

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*

[34] "*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)
[35] 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"[36]. 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 2015[37].

❖ 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)[38], to advise on matters related to the implementation of ICT standardization policy (including the work program for ICT standardization, priority setting in support of legislation and policies, and identification of specifications developed by global ICT standards development organizations), in order to improve standards setting in the ICT field and to ensure interoperability between ICT applications, services and products[39].

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.

[36] http://ec.europa.eu/enterprise/sectors/ict/files/ict-policies/2010-2013_ict_standardisation_work_programme_2nd_update_en.pdf
[37] http://ec.europa.eu/DocsRoom/documents/8641/attachments/1/translations/en/renditions/pdf
[38] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:C:2011:349:0004:0006:EN:PDF
[39] 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 Plan[40] 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 policy[41]. 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
• eHealth • Active and Healthy Aging • Accessibility of ICT products and services • Web Accessibility • e-Skills and e-Learning • Emergency communications • eCall	• 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**
• 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	• 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:

[40] http://ec.europa.eu/DocsRoom/documents/8641/attachments/1/translations/en/renditions/pdf

[41] 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 12 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 3.2.3). 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 52 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"[42] 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 closely and directly 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 university courses developed in collaboration with the University of Luxembourg, including 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"[43]. 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.

[42] 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
[43] 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.

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"[44]. 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 1976[45];
- 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 8 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.

[44] 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
[45] 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" [46] 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).

[46] 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 procedure[47];
- The Publicly Available Specifications (PAS) Submitters of ISO/IEC JTC 1. The work quality of these organizations is recognized by ISO/IEC JTC 1, and they are allowed to submit PAS as drafts for review and approval as international ISO/IEC JTC 1 standards[48];
- 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 codes[49] (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.

[47] ISO/IEC Directives, part 1 – Draft Consolidated JTC 1 Supplement 2015, Annex F
[48] List of approved JTC 1 PAS Submitters
[49] 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:
- 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. Telemetering.	- 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 **45 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 32 TC (out of 45 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 13 remaining TC are listed in Table 10.

5.1.1. ICT subsectors and related technical committees

Table 7: ICT subsectors

Subsector 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*"[50]. 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.

[50] 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 adopted[51]). 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 world[52]. 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"*[53].
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"*[54]. The telecommunications subsector covers any transmission, emission or reception of signs, signals, writing, images and sounds or intelligence of any nature by wire, radio, optical or other electromagnetic systems[55].
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"*[56]. 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"*[57]. 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 entity[58]. This subsector deals thus with a large scope of standards at the hardware, software, network or management level.

[51] The future of data centres in Europe – Luxembourg: where else?, PricewaterhouseCoopers, 2010
[52] http://ict.investinluxembourg.lu/ict/data-center-europe
[53] 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)
[54] ISO 5127:2001, Information and documentation -- Vocabulary (developed by ISO/TC 46)
[55] Definition extracted from the International Telecommunication Convention (Nairobi, 1982)
[56] ISO/IEC 2382-1, Information technology -- Vocabulary -- Part 1: Fundamental terms (developed by ISO/IEC JTC 1)
[57] ISO 16404:2013, Space systems -- Programme management -- Requirements management (developed by ISO/TC 20/SC 14)
[58] 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)

Subsector 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*"[59]. 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.
Subsector 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*"[60]. 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 Council[61] 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).
Subsector 8 – E-archiving	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 time[62]. This analysis focuses on digital archives.
Subsector 9 – 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*"[63]. Sensor networks are essential for the development of numerous ICT innovations: smart cities, smart grids, intelligent transport systems, internet of things, etc.

[59] ISO/IEC TR 10032:2003, Information technology -- Reference Model of Data Management (developed by ISO/IEC JTC 1/SC 32)
[60] ETSI TS 101 733, Electronic Signatures and Infrastructures (ESI); CMS Advanced Electronic Signatures (CAdES) (developed by ETSI/TC ESI)
[61] http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:31999L0093
[62] Based on ISO/IEC 30300:2011, Information and documentation -- Management systems for records -- Fundamentals and vocabulary (developed by ISO/TC 46/SC 11)
[63] 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	Corporate governance involves a set of relationships between a company's management, its board, its shareholders and other stakeholders. Corporate governance also provides the structure through which the objectives of the company are set, and the means of attaining those objectives and monitoring performance are determined[64]. The governance of IT is thus a component or a subset of organization governance, which is one key element in improving economic efficiency and growth as well as enhancing investors' confidence. Governance of IT can be defined as the system by which the current and future use of IT is directed and controlled[65].
Subsector 11 – Internet of Things	The final study report of ISO/IEC JTC 1/SWG 5[66] 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.

Following the definition of the subsectors categorizing the ICT sector, the technical committees are classified. The 32 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
DATA CENTER	INT	ISO/IEC JTC 1/SC 39 - Sustainability for and by Information Technology	49
	EU	CLC/TC 215 - Electrotechnical aspects of telecommunication equipment	51
TELECOMMUNI-CATIONS	INT	ISO/IEC JTC 1/SC 6 - Telecommunications and information exchange between systems	55
	INT	ISO/IEC JTC 1/SC 25 - Interconnection of information technology equipment	57
	INT	ITU-T - International Telecommunication Union's Telecommunication Standardization Sector	59
	EU	ETSI - European Telecommunications Standards Institute	61
	EU	ETSI/TC SES - Satellite and Earth Stations & Systems	63

[64] OECD principles of corporate Governance
[65] Based on ISO/IEC TR 38502:2014, Information Technology -- Governance of IT -- Framework and model (developed by ISO/IEC JTC 1/SC 40)
[66] 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 ERM - Electromagnetic compatibility & Radio spectrum Matters	64
	EU	CEN/TC Project Committee 365 - Internet Filtering	66
SOFTWARE AND SYSTEM ENGINEERING	INT	ISO/IEC JTC 1/SC 7 - Software and systems engineering	69
	INT	ISO/IEC JTC 1/SC 22 - Programming languages, their environments and system software interfaces	71
	INT	ISO/IEC JTC 1/SC 29 - Coding of audio, picture, multimedia and hypermedia information	73
SECURITY	INT	ISO/IEC JTC 1/SC 27 - IT Security techniques	77
	INT	ISO/IEC JTC 1/SC 37 - Biometrics	80
	EU	ETSI/TC CYBER - Cyber Security	82
DATA MANAGEMENT	INT	ISO/IEC JTC 1/WG 9 - Big Data	85
	INT	ISO/IEC JTC 1/SC 2 - Coded character sets	86
	INT	ISO/IEC JTC 1/SC 23 - Digitally Recorded Media for Information Interchange and Storage	87
	INT	ISO/IEC JTC 1/SC 24 - Computer graphics, image processing and environmental data representation	88
	INT	ISO/IEC JTC 1/SC 31 - Automatic identification and data capture techniques	90
	INT	ISO/IEC JTC 1/SC 32 - Data management and interchange	92
	INT	ISO/IEC JTC 1/SC 34 - Document description and processing languages	94
	EU	CEN/TC 225 - AIDC Technologies	96
ELECTRONIC SIGNATURE	INT	ISO/IEC JTC 1/SC 17 - Cards and personal identification	101
	EU	CEN/TC 224 - Personal Identification, Electronic Signature and Cards	103
	EU	ETSI/TC ESI - Electronic Signatures and Infrastructures	105
E-ARCHIVING	INT	ISO/TC 46 - Information and documentation	109
SENSOR NETWORKS	INT	ISO/IEC JTC 1/WG 7 - Sensor Networks	111
GOVERNANCE OF IT	INT	ISO/IEC JTC 1/SC 40 - IT Service Management and IT Governance	115
INTERNET OF THINGS	INT	ISO/IEC JTC 1/WG 10 - Internet of Things	121
	EU	ETSI/TC SmartM2M - Smart Machine-to-Machine Communications	122

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

In summary, the 32 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	0	1	**1**
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	**10**	**22**	**32**

5.1.2. Technical committees not related to subsectors

Finally, the standards watch has identified 13 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	119
	INT	ISO/IEC JTC 1/SC 28 - Office equipment	129
	INT	ISO/IEC JTC 1/SC 35 - User interfaces	130
	INT	ISO/IEC JTC 1/SC 36 - Information technology for learning, education and training	132
CEN	EU	CEN/TC 247 Building - Automation, Controls and Building Management	134
	EU	CEN/TC 251 - Health Informatics	136
	EU	CEN/TC 278 - Road transport and traffic telematics	137
	EU	CEN/TC 287 - Geographic Information	139
	EU	CEN/TC 294 - Communication systems for meters and remote reading of meters	140
	EU	CEN/TC 310 - Advanced Automation Technologies and their Applications	142
	EU	CEN/TC 353 - Information and Communication Technologies for Learning, Education and Training	144
	EU	CEN/TC 428 - Project Committee - e-competences and ICT Professionalism	146
	EU	CEN/TC 434 - Project Committee - Electronic Invoicing	147

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: - 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 52 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), international standards (ISO/IEC 27010) 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".

❖ 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.

❖ 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.

During the last ISO/IEC JTC 1 Plenary Meeting, held on 15-20/11/2014, SWG-P has been requested to investigate the following areas and develop recommendations:

- 3D Scanning and Printing;
- Smart Machines.

Following the recommendations of SWG-P, ISO/IEC JTC 1 also established a JTC1 WG on Big Data and reconstituted the Study Group (SG) on Smart Cities during this plenary meeting. Their objectives are to consider activities in these fields across all of JTC 1 and to provide a report with recommendations, and potentially other deliverables to the 2015 JTC 1 Plenary. Furthermore, a new JTC 1 WG on Internet of Things (IoT) has also been established to develop foundational standards for IoT.

❖ 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 very strong in Luxembourg, with several actors active in this field. Moreover, as mentioned by the CEN-CENELEC[67], 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"[68] was published in 2014 by ILNAS to investigate and develop the knowledge areas of digital trust. Finally, a 3rd version of this White Paper will be released in 2015 by ILNAS.

❖ 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.

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.

[67] http://www.cencenelec.eu/research/Pages/default.aspx
[68] 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 *fora/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 delegates[69].

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.

[69] 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* standards[70].

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 4,000 standards under development[71]. 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).

[70] 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.
[71] 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 body[72].

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.

[72] 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"[73].

The main characteristics of cloud computing are:

- *Broad network access: physical and virtual resources are available over a network and accessed through standard mechanisms that promote use by heterogeneous client platforms;*
- *Measured service: the metered delivery of cloud services is such that usage can be monitored, controlled, reported and billed;*
- *Multi-tenancy: 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.*

[73] *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	**MEMBERS** 	**Participating Countries (28):** 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, South Africa, Spain, Sweden, Switzerland, United Kingdom **Observing Countries (7):** 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		
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: - 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 Service Oriented Architecture (SOA) JTC 1/SC 38/WG 3 Cloud Computing Service Level Agreements (CCSLA) JTC 1/SC 38/WG 4 Cloud Computing Interoperability and Portability (CCIP) JTC 1/SC 38/WG 5 Cloud Computing Data and its Flow (CCDF)		
Standardization work			
Published standards	Number of published ISO standards under the direct responsibility of JTC 1/SC 38 (number includes updates): 6		
Standards under development	8		
Involvement of Luxembourg			
5 delegates - 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. 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. Cloud computing is the delivery of computing as a service rather than a product, whereby shared resources,			

software, and information are provided to computers and other devices as a utility (like the electricity grid) over a network (typically the Internet).

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 work program concerning cloud computing includes:

- ISO/IEC DIS 18384-1, Information technology -- Reference Architecture for Service Oriented Architecture (SOA RA) -- Part 1: Terminology and Concepts for SOA;
- ISO/IEC DIS 18384-2 Information Technology -- Reference Architecture for Service Oriented Architecture (SOA RA) -- Part 2: Reference Architecture for SOA Solutions;
- ISO/IEC DIS 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 CD 19086-2, Information technology -- Cloud computing -- Service level agreement (SLA) framework and Technology -- Part 2: Metrics;
- ISO/IEC CD 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 AWI 19944, Information Technology -- Cloud Computing – Data and their Flow across Devices and Cloud Services.

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 adopted[74]. 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 world[75].

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"[76].

[74] *The future of data centres in Europe – Luxembourg: where else?, PricewaterhouseCoopers, 2010*
[75] *http://ict.investinluxembourg.lu/ict/data-center-europe*
[76] *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

<table>
<tr><th colspan="4">General information</th></tr>
<tr><td>Committee</td><td>ISO/IEC JTC 1/SC 39</td><td>Title</td><td>Sustainability for and by Information Technology</td></tr>
<tr><td>Creation date</td><td>2012</td><td rowspan="5">MEMBERS
  </td><td rowspan="5">Participating Countries (18):
United States, Belgium, Canada, China, Finland, France, Germany, Italy, Japan, Kenya, Republic of Korea, Luxembourg, Netherlands, Norway, Russian Federation, Singapore, South Africa, United Kingdom

Observing Countries (8):
Australia, Austria, Czech Republic, Islamic Republic of Iran, Ireland, Poland, Spain, Switzerland</td></tr>
<tr><td>Secretariat</td><td>ANSI (USA)</td></tr>
<tr><td>Secretary</td><td>Ms. Sally Seitz</td></tr>
<tr><td>Chairperson</td><td>Mr. Jay Taylor</td></tr>
<tr><td>Organizations in liaison</td><td>Ecma International, ITU, TGG</td></tr>
<tr><td>Web site</td><td colspan="3">http://www.iso.org/iso/standards_development/technical_committees/list_of_iso_technical_committees/iso_technical_committee.htm?commid=654019</td></tr>
<tr><td>Scope</td><td colspan="3">Standardization related to the intersection of resource efficiency and IT which supports environmentally and economically viable development, application, operation and management aspects.

To avoid any duplication of work and to support innovation, SC 39 will engage in active liaison and collaboration with:
- Other JTC 1 entities;
- ISO/TC 207, ISO/TC 242, ISO/TC 257;
- IEC/TC 100, IEC/TC 108, IEC/TC 111, SMB/SG 4, IEC/PC 118, IEC/TC 57/WG 21, IEC/TC 9 and SMB/SG 3;
- ITU-T/SG 5; and
- Any other appropriate body including external organizations (e.g. consortia).</td></tr>
<tr><td>Structure</td><td colspan="3">JTC 1/SC 39/WG 1 Resource Efficient Data Centres
JTC 1/SC 39/WG 2 Green ICT</td></tr>
<tr><th colspan="4">Standardization work</th></tr>
<tr><td>Published standards</td><td colspan="3">Number of published ISO standards under the direct responsibility of JTC 1/SC 39 (number includes updates): 1</td></tr>
<tr><td>Standards under development</td><td colspan="3">7</td></tr>
<tr><th colspan="4">Involvement of Luxembourg</th></tr>
<tr><td colspan="4">2 delegates

- Mr. Didier Monestes (Chairman) Systemic Area Network S.à r.l.
- Mr. Johnatan Pecero ANEC GIE</td></tr>
<tr><th colspan="4">Comments</th></tr>
<tr><td colspan="4">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:</td></tr>
</table>

- ISO/IEC NP 30131, Information technology -- Data Centres -- Taxonomy and Maturity Model;
- ISO/IEC AWI TR 30133, Information technology – Data Centres – Guidelines for resource efficient data centres
- ISO/IEC AWI 30134-4, Information Technology – Data Centres – Key performance indicators – Part 4: IT Equipment Energy Efficiency for Servers (ITEE)
- ISO/IEC WD TR 30132, Information technology – Information technology sustainability -- Guidance for the development, evaluation and application of energy efficient computing systems;
- 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).

The future series of standards ISO/IEC 30134 will provide a set of key performance indicators for data centers. The second part of this series, concerning PUE, is already under development. The third part of ISO/IEC 30134 series under development regards renewable energy factor. The fourth part of this series, concerning ITEE, is already under development but several other metrics are under discussion:

- IT Equipment Utilization for Servers ($ITEU_{SV}$);
- Green Energy Coefficient (GEC);
- Carbon Usage Effectiveness (CUE);
- Water Usage Effectiveness (WUE).

7.2.2. CENELEC/TC 215

<table>
<tr><th colspan="4">General information</th></tr>
<tr><td>Committee</td><td>CLC/TC 215</td><td>Title</td><td>Electrotechnical aspects of telecommunication equipment</td></tr>
<tr><td>Creation date</td><td>1991</td><td rowspan="5">MEMBERS
  </td><td rowspan="5">33 members of CEN/CENELEC</td></tr>
<tr><td>Secretariat</td><td>Germany</td></tr>
<tr><td>Secretary</td><td>Dipl. Ing. Thomas Wegmann</td></tr>
<tr><td>Chairperson</td><td>Mr. Dominique Roche</td></tr>
<tr><td>Organizations in liaison</td><td>EC, EURALARM</td></tr>
<tr><td>Web site</td><td colspan="3">http://www.cenelec.eu/dyn/www/f?p=104:7:127814256114401::::FSP_ORG_ID:1258297</td></tr>
<tr><td>Scope</td><td colspan="3">The priorities of CLC/TC 215 are:
- To address standardization in the field of electrotechnical aspects of telecommunication equipment and associated infrastructures and liaise with other standardization bodies as appropriate;
- To prepare harmonized standards (EN, TS or TR) covering all aspects of generic and application-specific telecommunications cabling (e.g. ISDN, LAN and others) within all types of premises;
- These documents also cover the requirements and recommendations for building infrastructures related to the effective installation and operation of associated telecommunication equipment by reference to the existing or forthcoming standards provided by the relevant committees or using technical inputs from them;
- To provide contributions to ETSI standards (EN and/or other deliverables) in areas related to those detailed above;
- To serve as a mediator in those cases where in accordance with the CENELEC-ETSI-Agreement ETSI indicates to CENELEC the need of standardization activities (EN/TS/TR or contributions to ETSI deliverables) of electrotechnical aspects related to its work;
- Identification of the appropriate TC within CENELEC, thereby providing proper assignment of the technical work to the responsible group of experts;
- Where an appropriate TC within CENELEC cannot be identified, TC 215 may decide to establish a Working Group to resolve a specific task;
- To review international standardization results of ISO/IEC JTC 1 as far as telecommunication equipment with respect to Customer Premises Cabling and Energy Efficient Data Centers are concerned. This includes coordination of harmonization and assignment to the responsible organization in close cooperation with CEN bearing in mind JTC 1 being a joint ISO/IEC-Committee.</td></tr>
<tr><td>Structure</td><td colspan="3">CLC/TC 215/WG 01 Cabling design
CLC/TC 215/WG 01-04 Testing of installed cabling
CLC/TC 215/WG 02 Cabling installation – Quality assurance and installation practices
CLC/TC 215/WG 03 Facilities and infrastructures</td></tr>
<tr><th colspan="4">Standardization work</th></tr>
<tr><td>Published standards</td><td colspan="3">43</td></tr>
<tr><td>Standards under development</td><td colspan="3">5</td></tr>
</table>

Involvement of Luxembourg

1 delegate

- Mr. Didier Monestes (Acting as Chairman) Systemic Area Network S.à r.l.

Comments

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.

The following parts are still under development:

- FprEN 50600-2-4, Information technology - Data centre facilities and infrastructures - Part 2-4: Telecommunications Cabling Infrastructure;
- prEN 50600-2-5, Information technology - Data centre facilities and infrastructures - Part 2-5: Security systems;
- prEN 50600-2-6, Information technology - Data centre facilities and infrastructures - Part 2-6: Management and operational information.

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"[77].

The telecommunications subsector covers any transmission, emission or reception of signs, signals, writing, images and sounds or intelligence of any nature by wire, radio, optical or other electromagnetic systems[78].

[77] *ISO 5127:2001, Information and documentation -- Vocabulary (developed by ISO/TC 46)*
[78] *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 (31):** Argentina, Bosnia and Herzegovina, Colombia, Cuba, Cyprus, France, Ghana, Hong Kong, Hungary, Iceland, India, Indonesia, Islamic Republic of Iran, Ireland, Italy, Kenya, **Luxembourg**, 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		
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 Physical and data link layers JTC 1/SC 6/WG 7 Network, transport and future network JTC 1/SC 6/WG 10 Directory, ASN.1 and Registration		
Standardization work			
Published standards	Number of published ISO standards under the direct responsibility of JTC 1/SC 6 (number includes updates): 352		
Standards under development	37		
Involvement of Luxembourg			
1 delegate - Mr. Mathieu Lessinnes (Acting as Chairman) ANEC GIE			
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	Dr. Ing. Walter P. von Pattay		
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 Project Team: Taxonomy and Terminology (PTTT) JTC 1/SC 25/WG 1 Home electronic systems JTC 1/SC 25/WG 3 Customer premises cabling JTC 1/SC 25/WG 4 Interconnection of computer systems and attached equipment		
Standardization work			
Published standards	Number of published ISO standards under the direct responsibility of JTC 1/SC 25 (number includes updates): 173		
Standards under development	29		
Involvement of Luxembourg			
NO (no registered delegate)			

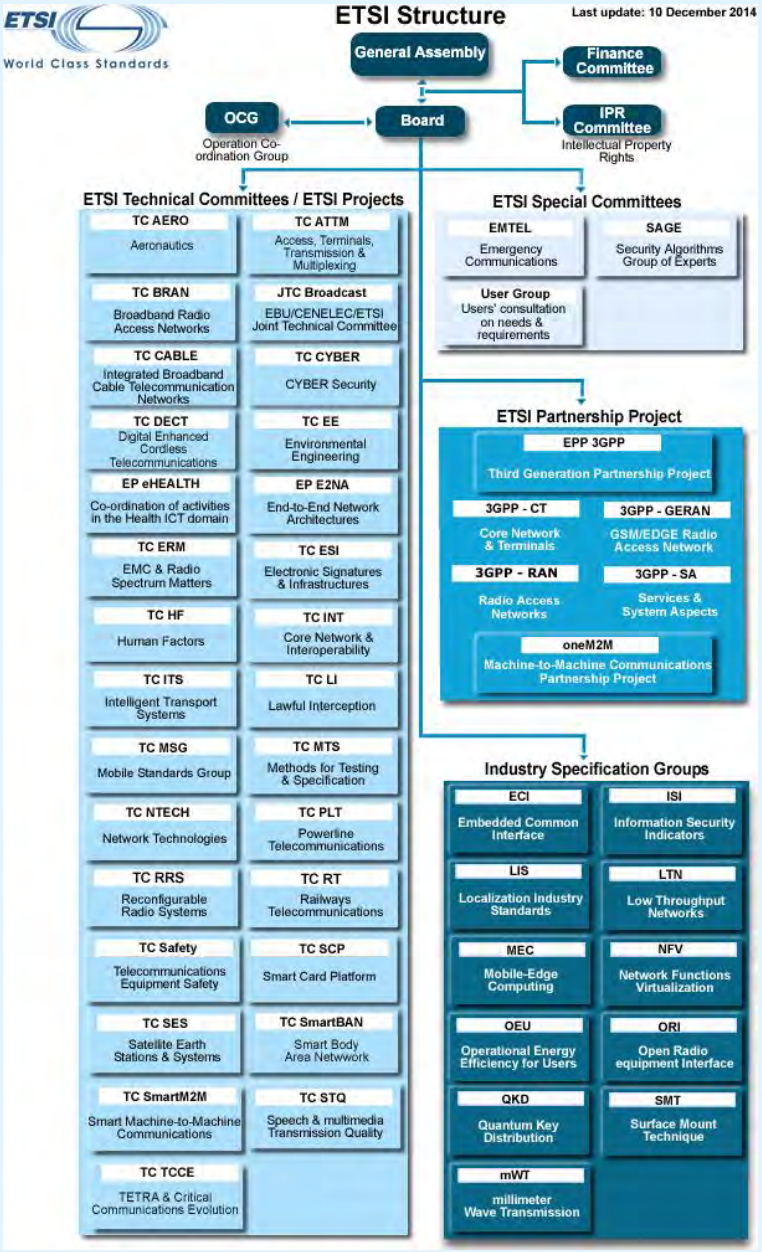
Comments
Some standards in development or developed, that are representative of the work of ISO/IEC JTC 1/SC 25 are: - ISO/IEC TR 29108:2013, Information technology -- Terminology for intelligent homes; - ISO/IEC 14165 series of standards concerning Fiber Channel. Standards for Generic cabling, SCSI, 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. Malcolm Johnson		
Web site	http://www.itu.int/ITU-T/index.hltm		
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	**Advisory Group** Telecommunication Standardization Advisory Group (TSAG) **Study Groups** - 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 mobile and NGN - SG 15: Networks, Technologies and Infrastructures for Transport, Access and Home - SG 16: Multimedia coding, systems and applications - SG 17: Security **Focus Groups** - Focus Group on Smart Sustainable Cities (FG-SSC) - Focus Group on Smart Cable Television (FG SmartCable) - Focus Group on Bridging the Gap: from Innovation to Standards (FG Innovation) - Focus Group on Disaster Relief Systems, Network Resilience and Recovery (FG-DR&NRR) - Focus Group on M2M Service Layer (FG M2M) - Focus Group on Smart Water Management (FG-SWM) **Joint Coordination Activities** - 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 for Cloud Computing (JCA-Cloud) - 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) - Joint Coordination Activity on IPTV (JCA-IPTV)		

	- Joint Coordination Activity on Conformance and Interoperability Testing (JCA-CIT) **Global Standards Initiative** - Internet of Things Global Standards Initiative (IoT-GSI) - IPTV Global Standards Initiative (IPTV-GSI) **Committees** - Standardization Committee for Vocabulary
Standardization work	
Published standards	Over 4000 ITU-T Recommendations
Standards under development	/
Involvement of Luxembourg	
3 members - *Service des medias et des Communications* - *Institut Luxembourgeois de Régulation* (ILR) - POST Telecom	
Comments	
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.	

7.3.4.ETSI – European Telecommunications Standards Institute

General information			
Organization	**ETSI**	**Title**	**European Telecommunications Standards Institute**
Creation date	1988	**MEMBERS**	More than 770 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.		
Structure			

Standardization work	
Published standards	Over 30000 standards and reports
Standards under development	More than 900

Involvement of Luxembourg

9 members

- ILNAS
- ANEC GIE
- Arhs
- FBConsulting
- eWitness
- POST Telecom
- SES S.A
- Skylane Optics
- SnT

Comments

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

The international reputation of ETSI is built on openness, discussion, consensus, and direct input from their members. ETSI is officially recognized by the European Union as a European Standardization Organization. The quality of its work and its open approach to standardization has helped it to evolve into a European roots - global branches operation with a good reputation for technical excellence.

ETSI is currently conducting an intensive review of more than 270 harmonized standards, following the new Radio Equipment Directive of the European Commission[79].

The following ETSI standards are used in Luxembourg by ILNAS to supervise/accredit Certification Service Providers:

- 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".

[79] 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, ITU, TIA		
Web site	https://portal.etsi.org/tb.aspx?tbid=162&SubTB=162,476,481,676,757		
Scope	Responsible for all aspects related to satellite earth stations and systems. The field includes: - 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 Primary Committee for co-ordinating the position of ETSI with relevant ITU Study Groups.		
Structure	SES HARM Harmonization under the R&TTE Directive (99/5/EC) SES MAR ESV Maritime and Railways Satellite Earth stations on Board Vessels & Train SES SATEC Satellite Emergency Communication SES SCN Satellite Communication and Navigation		
Standardization work			
Published standards	456		
Standards under development	66		
Involvement of Luxembourg			
2 members - SES Astra - Interdisciplinary Centre for Security, Reliability and Trust (SnT)			
Comments			
/			

7.3.6.ETSI/TC ERM

<table>
<tr><th colspan="4">General information</th></tr>
<tr><td>Committee</td><td>ERM</td><td>Title</td><td>Electromagnetic compatibility & Radio spectrum Matters</td></tr>
<tr><td>Creation date</td><td>May 2005</td><td rowspan="3">MEMBERS
  </td><td rowspan="3">/</td></tr>
<tr><td>Chairperson</td><td>Mr. Holger Butscheidt</td></tr>
<tr><td>Organizations in liaison</td><td>ADCO R&TTE, CCSA, CEN, CENELEC, CEPT, CESI, Continua Health Alliance, DMR Association, EASA, ECC, Ecma Intl, ERTICO, ESMIG, EUROCAE, IEC, IEEE, ISO/IEC JTC1, ITU, TIA</td></tr>
<tr><td>Web site</td><td colspan="3">https://portal.etsi.org/tb.aspx?tbid=286&SubTB=286,304,732,805,807,305,544,442,526,552,582,584,586,596,620,811,624,598,729</td></tr>
<tr><td>Scope</td><td colspan="3">All TC-ERM activities have a common theme of electromagnetic and/or radio spectrum compatibility.
- 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.</td></tr>
<tr><td>Structure</td><td colspan="3"><table>
<tr><td>ElectroMagnetic Compatibility
ERM EMC</td><td>Radio Matters
ERM RM</td><td>Wideband data systems
ERM TG11</td></tr>
<tr><td>Standards for Broadcast and Ancillary Communications Equipment
ERMTG17</td><td>Maritime
ERMTG26</td><td>Generic SRD's
ERMTG28</td></tr>
<tr><td>Wireless Medical Devices
ERMTG30</td><td>RF Identification Devices
ERM TG34</td><td>Intelligent Transport Systems
ERM TG37</td></tr>
<tr><td>Wireless Industrial Applications
ERM TG41</td><td>TC ERM /TC AERO Joint Task Force
ERMJTFEA</td><td>TC ERM / TC RRS Joint Task Force
ERM JTFER</td></tr>
<tr><td>Digital Mobile Radio
ERMTGDMR</td><td>Automotive and Surveillance Radar
ERM TGSRR</td><td>Ultra Wide Band
ERM TGUWB</td></tr>
<tr><td>Joint Working Group CENELEC 210
JWG CLC 210</td><td>Task Force for ERM and MSG for Harmonized Standards for IMT-2000</td><td></td></tr>
</table></td></tr>
</table>

Standardization work	
Published standards	899
Standards under development	117
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"[80].

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"[81].

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.

[80] *ISO/IEC 2382-1, Information technology -- Vocabulary -- Part 1: Fundamental terms (developed by ISO/IEC JTC 1)*
[81] *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 (39):** 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 **Observing Countries (21):** Austria, Bosnia and Herzegovina, Chile, Colombia, Cuba, Cyprus, Estonia, Ghana, Hong Kong, Hungary, Iceland, Indonesia, Islamic Republic of Iran, Kenya, Morocco, Norway, Philippines, Serbia, The former Yugoslav Republic of Macedonia, Turkey, Uruguay
Secretariat	SCC (Canada)		
Secretary	Dr. Witold Suryn		
Chairperson	Mr. François Coallier		
Organizations in liaison	AES, Ecma International, IEEE, INCOSE, ISACA, ITU, PMI, WMO, itSMF		
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 — Spanish Translation Task Force JTC 1/SC 7/AG 1 — Life Cycle Processes Harmonization Advisory Group (LCPHAG) JTC 1/SC 7/SWG 1 — JTC 1/SC7 Business Planning Group (BPG) JTC 1/SC 7/SWG 5 — Standards management group JTC 1/SC 7/SWG 22 — Vocabulary validation JTC 1/SC 7/WG 2 — System software documentation JTC 1/SC 7/WG 4 — Tools and environment JTC 1/SC 7/WG 6 — Evaluation and metrics JTC 1/SC 7/WG 7 — Life cycle management JTC 1/SC 7/WG 10 — Process assessment JTC 1/SC 7/WG 19 — Techniques for Specifying IT Systems JTC 1/SC 7/WG 20 — Software and systems bodies of knowledge and professionalization JTC 1/SC 7/WG 21 — Information technology asset management JTC 1/SC 7/WG 24 — SLC Profile and guidelines for VSE JTC 1/SC 7/WG 26 — Software testing JTC 1/SC 7/WG 28 — Joint between ISO/IEC JTC 1/SC 7 and ISO/TC 159/SC 4: Common Industry Formats for Usability Reports JTC 1/SC 7/WG 42 — Architecture		

Standardization work	
Published standards	Number of published ISO standards under the direct responsibility of JTC 1/SC 7 (number includes updates): 151
Standards under development	54

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

The main standards published by the subcommittee are:

- 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).

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.

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		
Web site	http://www.iso.org/iso/standards_development/technical_committees/list_of_iso_technical_committees/iso_technical_committee.htm?commid=45202		
Scope	Standardization of programming languages (such as COBOL, Fortran, Ada, C, C++ and Prolog) and their environments (such as POSIX and Linux). SC 22 also produces common language-independent specifications to facilitate standardized bindings between programming languages and system services, as well as greater interaction between programs written in different languages. The most recently created WG has a project to document the vulnerabilities of various programming languages. Program portability between different implementations of the same language is a key goal.		
Structure	JTC 1/SC 22/WG 4 COBOL JTC 1/SC 22/WG 5 Fortran JTC 1/SC 22/WG 9 Ada JTC 1/SC 22/WG 14 C JTC 1/SC 22/WG 17 Prolog JTC 1/SC 22/WG 21 C++ JTC 1/SC 22/WG 23 Programming Language Vulnerabilities		
Standardization work			
Published standards	Number of published ISO standards under the direct responsibility of JTC 1/SC 22 (number includes updates): 95		
Standards under development	16		
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 (24):** 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):** 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: - 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 Coding of still pictures JTC 1/SC 29/WG 11 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): 501		
Standards under development	121		
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 entity*[82].

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

[82] *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

<table>
<tr><th colspan="4">General information</th></tr>
<tr><td>Committee</td><td>ISO/IEC JTC 1/SC 27</td><td>Title</td><td>IT Security techniques</td></tr>
<tr><td>Creation date</td><td>1990</td><td rowspan="5">MEMBERS
  </td><td rowspan="5">Participating Countries (53):
Germany, Algeria, Argentina, Australia, Austria, Belgium, Brazil, Canada, Chile, China, Cyprus, Czech Republic, Côte d'Ivoire, Denmark, Estonia, 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, Singapore, Slovakia, Slovenia, South Africa, Spain, Sri Lanka, Sweden, Switzerland, Thailand, The Former Yugoslav Republic of Macedonia, Ukraine, United Arab Emirates, United Kingdom, United States, Uruguay

Observing Countries (16):
Belarus, Bosnia and Herzegovina, Costa Rica, El Salvador, Ghana, Hong Kong, Hungary, Iceland, Indonesia, Islamic Republic of Iran, Lithuania, Morocco, State of Palestine, Portugal, Saudi Arabia, Serbia, Swaziland, Turkey</td></tr>
<tr><td>Secretariat</td><td>DIN (Germany)</td></tr>
<tr><td>Secretary</td><td>Ms. Krystyna Passia</td></tr>
<tr><td>Chairperson</td><td>Dr. Walter Fumy</td></tr>
<tr><td>Organizations in liaison</td><td>(ISC)2, CCETT, Cloud security alliance, ECBS, ENISA, EPC, Ecma International, ISACA, ISSEA, ITU, MasterCard International, MasterCard Europe</td></tr>
<tr><td>Web site</td><td colspan="3">http://www.iso.org/iso/standards_development/technical_committees/list_of_iso_technical_committees/iso_technical_committee.htm?commid=45306</td></tr>
<tr><td>Scope</td><td colspan="3">The development of standards for the protection of information and ICT. This includes generic methods, techniques and guidelines to address both security and privacy aspects, such as:
- Security requirements capture methodology;
- Management of information and ICT security; in particular, information security management systems (ISMS), security processes, security controls and services;
- Cryptographic and other security mechanisms, including but not limited to mechanisms for protecting the accountability, availability, integrity and confidentiality of information;
- Security management support documentation including terminology, guidelines as well as procedures for the registration of security components;
- Security aspects of identity management, biometrics and privacy;
- Conformance assessment, accreditation and auditing requirements in the area of information security;
- Security evaluation criteria and methodology.

SC 27 engages in active liaison and collaboration with appropriate bodies to ensure the proper development and application of SC 27 standards and technical reports in relevant areas.</td></tr>
<tr><td>Structure</td><td colspan="3">JTC 1/SC 27/SWG-M Special Working Group on Management
JTC 1/SC 27/SWG-T Transversal Items
JTC 1/SC 27/WG 1 Information security management systems
JTC 1/SC 27/WG 2 Cryptography and security mechanisms
JTC 1/SC 27/WG 3 Security evaluation testing and specification
JTC 1/SC 27/WG 4 Security controls and services
JTC 1/SC 27/WG 5 Identity management and privacy technologies</td></tr>
</table>

Standardization work	
Published standards	Number of published ISO standards under the direct responsibility of JTC 1/SC 27 (number includes updates): 144
Standards under development	79

Involvement of Luxembourg

21 delegates

- Mr. Benoit Poletti (Chairman)	INCERT GIE
- Mr. Cédric Mauny (Vice-Chairman)	Telindus Luxembourg S.A.
- Mr.Jérémy Thimont	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. Bérangère Broutin	e-Business & Resilience Centre
- Mrs. Myriam Djerouni	Banque de Luxembourg S.A.

Comments

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

Working Groups

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

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

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

The **WG 4** is developing and maintaining International Standards, Technical Specifications and Technical Reports for information security in the area of Security Controls and Services, to assist organizations in the

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

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

Standards

The best-known standard developed by SC 27 are ISO/IEC 27001:2013, Information technology -- Security techniques -- Information security management systems -- Requirements and ISO/IEC 27002:2013, Information technology -- Security techniques -- Code of practice for information security controls. Organizations setting up an ISMS certified compliant with ISO/IEC 27001 are increasingly numerous[83].

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 DIS 27017, Information technology -- Security techniques -- Code of practice for information security controls based on ISO/IEC 27002 for cloud services.

[83] 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 (30):** 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, Thailand, Ukraine, United Kingdom **Observing Countries (11):** Austria, Belgium, Bosnia and Herzegovina, Ghana, Hungary, Indonesia, Islamic Republic of Iran, Ireland, Kenya, Romania, Serbia,
Secretariat	ANSI (United States)		
Secretary	Ms. Lisa Rajchel		
Chairperson	Mr. Fernando L. Podio		
Organizations in liaison	IBIA, ILO, ITU, OASIS		
Web site	http://www.iso.org/iso/standards_development/technical_committees/list_of_iso_technical_committees/iso_technical_committee.htm?commid=313770		
Scope	Standardization of generic biometric technologies pertaining to human beings to support interoperability and data interchange among applications and systems. Generic human biometric standards include: common file frameworks; biometric application programming interfaces; biometric data interchange formats; related biometric profiles; application of evaluation criteria to biometric technologies; methodologies for performance testing and reporting and cross jurisdictional and societal aspects. Excluded is the work in ISO/IEC JTC 1/SC 17 to apply biometric technologies to cards and personal identification. Excluded is the work in ISO/IEC JTC 1/SC 27 for biometric data protections techniques, biometric security testing, evaluations, and evaluations methodologies.		
Structure	JTC 1/SC 37/WG 1 Harmonized biometric vocabulary JTC 1/SC 37/WG 2 Biometric technical interfaces JTC 1/SC 37/WG 3 Biometric data interchange formats JTC 1/SC 37/WG 4 Technical Implementation of Biometric Systems JTC 1/SC 37/WG 5 Biometric testing and reporting JTC 1/SC 37/WG 6 Cross-Jurisdictional and Societal Aspects of Biometrics		
Standardization work			
Published standards	Number of published ISO standards under the direct responsibility of JTC 1/SC 37 (number includes updates): 97		
Standards under development	50		
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	January 2014	**MEMBERS** 	/
Chairperson	Mr. Charles Brookson		
Organizations in liaison	CEN, CENELEC, ENISA		
Web site	https://portal.etsi.org/tb.aspx?tbid=824&SubTB=824		
Scope	The activities of ETSI TC CYBER include the following broad areas: - Cyber Security - Security of infrastructures, devices, services and protocols - Security advice, guidance and operational security requirements to users, manufacturers and network and infrastructure operators - Security tools and techniques to ensure security - Creation of security specifications and alignment with work done in other TCs.		
Structure	/		
Standardization work			
Published standards	0		
Standards under development	8		
Involvement of Luxembourg			
/			
Comments			
As it has only been formed in January 2014, ETSI TC CYBER has not published any standard yet.			

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"[84].

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.

[84] *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** 	/
Secretariat	/		
Secretary	/		
Chairperson	Mr. Wo Chang		
Organizations in liaison	/		
Web site	/		
Scope	- 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	0		
Involvement of Luxembourg			
1 delegate - Mr. Johnatan Pecero ANEC GIE			
Comments			
This WG is still under construction. It has been established during the 2014 ISO/IEC JTC 1 plenary meeting.			

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 (28):** Japan, Austria, Canada, China, Egypt, Finland, France, Germany, Greece, Hungary, Iceland, India, Indonesia, Ireland, Democratic People's Republic Korea, Republic of Korea, Lithuania, Mongolia, Norway, Poland, Russian Federation, Serbia, Sri Lanka, Thailand, 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, Turkey, Viet Nam
Secretariat	JISC(Japan)		
Secretary	Ms. Ayuko Nagasawa		
Chairperson	Dr. Yoshiki Mikami		
Organizations in liaison	CCSDS, EC, ISOC, ITU, UNCTAD, UNECE, WIPO, WMO		
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): 51		
Standards under development	4		
Involvement of Luxembourg			
NO (no registered delegate)			
Comments			
Noteworthy standards of ISO/IEC JTC 1/SC 2 are: - ISO 646:1991, Information technology -- ISO 7-bit coded character set for information interchange; - ISO/IEC 8859 series of standards entitled "8-bit single-byte coded graphic character sets"; - ISO/IEC 10646:2014, Information technology -- Universal Coded Character Set (UCS) (published for the first time in 1993).			

7.6.3.ISO/IEC JTC 1/SC 23

<table>
<tr><th colspan="4">General information</th></tr>
<tr><td>Committee</td><td>ISO/IEC JTC 1/SC 23</td><td>Title</td><td>Digitally Recorded Media for Information Interchange and Storage</td></tr>
<tr><td>Creation date</td><td>1987</td><td rowspan="5">MEMBERS
  </td><td rowspan="5">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</td></tr>
<tr><td>Secretariat</td><td>JISC(Japan)</td></tr>
<tr><td>Secretary</td><td>Ms. Toshiko Kimura</td></tr>
<tr><td>Chairperson</td><td>Mr. Key Yamashita</td></tr>
<tr><td>Organizations in liaison</td><td>Ecma International, WIPO</td></tr>
<tr><td>Web site</td><td colspan="3">http://www.iso.org/iso/standards_development/technical_committees/list_of_iso_technical_committees/iso_technical_committee.htm?commid=45240</td></tr>
<tr><td>Scope</td><td colspan="3">Standardization in the field of removable digital storage media utilizing optical, holographic and magnetic recording technologies, and flash memory technologies for digital information interchange, including:
- Algorithms for the lossless comprehension of data;
- Volume and file structure;
- Methods for determining the life expectancy of digital storage media;
- Methods for error monitoring of digital storage media.</td></tr>
<tr><td>Structure</td><td colspan="3">/</td></tr>
<tr><th colspan="4">Standardization work</th></tr>
<tr><td>Published standards</td><td colspan="3">Number of published ISO standards under the direct responsibility of JTC 1/SC 23 (number includes updates): 142</td></tr>
<tr><td>Standards under development</td><td colspan="3">2</td></tr>
<tr><th colspan="4">Involvement of Luxembourg</th></tr>
<tr><td colspan="4">NO (no registered delegate)</td></tr>
<tr><th colspan="4">Comments</th></tr>
<tr><td colspan="4">Examples of standards developed by ISO/IEC JTC 1/SC 23 are:

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

7.6.4.ISO/IEC JTC 1/SC 24

<table>
<tr><th colspan="4">General information</th></tr>
<tr><td>Committee</td><td>ISO/IEC JTC 1/SC 24</td><td>Title</td><td>Computer graphics, image processing and environmental data representation</td></tr>
<tr><td>Creation date</td><td>1987</td><td rowspan="5">MEMBERS
  </td><td rowspan="5">Participating Countries (10):
United Kingdom, Australia, China, Egypt, France, Japan, Republic of Korea, 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</td></tr>
<tr><td>Secretariat</td><td>BSI (United Kingdom)</td></tr>
<tr><td>Secretary</td><td>Dr. Charles A. Whitlock</td></tr>
<tr><td>Chairperson</td><td>Professor Ha-Jine Kimn</td></tr>
<tr><td>Organizations in liaison</td><td>SEDRIS Organization, WIPO</td></tr>
<tr><td>Web site</td><td colspan="3">http://www.iso.org/iso/standards_development/technical_committees/list_of_iso_technical_committees/iso_technical_committee.htm?commid=45252</td></tr>
<tr><td>Scope</td><td colspan="3">Standardization of interfaces for information technology based applications relating to:
- Computer graphics;
- Image processing;
- Environmental data representation;
- Support for the augmented reality continuum (ARC);
- Interaction with, and visual presentation of, information.

<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.

<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.</td></tr>
<tr><td>Structure</td><td colspan="3">JTC 1/SC 24/WG 6 Augmented reality continuum presentation and interchange
JTC 1/SC 24/WG 7 Image processing and interchange
JTC 1/SC 24/WG 8 Environmental representation
JTC 1/SC 24/WG 9 Augmented reality continuum concepts and reference model</td></tr>
<tr><th colspan="4">Standardization work</th></tr>
<tr><td>Published standards</td><td colspan="3">Number of published ISO standards under the direct responsibility of JTC 1/SC 24 (number includes updates): 80</td></tr>
<tr><td>Standards under development</td><td colspan="3">13</td></tr>
<tr><th colspan="4">Involvement of Luxembourg</th></tr>
<tr><td colspan="4">NO (no registered delegate)</td></tr>
</table>

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; - ISO/IEC 19777-2:2006, Information technology -- Computer graphics and image processing -- Extensible 3D (X3D) language bindings -- Part 2: Java.

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 (31):** United States, Australia, Austria, Belgium, Brazil, Canada, China, Colombia, Czech Republic, Denmark, France, Germany, India, Ireland, Israel, Japan, Kenya, Republic of Korea, Malaysia, Netherlands, Peru, Philippines, Russian Federation, Singapore, Slovakia, South Africa, Spain, Sweden, Switzerland, United Kingdom **Observing Countries (12):** Bosnia and Herzegovina, Finland, Ghana, Hong Kong, Hungary, Indonesia, Islamic Republic of Iran, Italy, Kazakhstan, **Luxembourg**, New Zealand, Romania, Serbia, Thailand
Secretariat	ANSI (United States)		
Secretary	Mr. Frank M. Sharkey		
Chairperson	Mr. Dan Kimball		
Organizations in liaison	AIM, ETSI, Ecma International, GS1, IATA, ITU, OGC, UPU		
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 Data carrier JTC 1/SC 31/WG 2 Data structure JTC 1/SC 31/WG 4 Radio frequency identification for item management JTC 1/SC 31/WG 5 Real time locating systems JTC 1/SC 31/WG 6 Mobile Item Identification and Management (MIIM) JTC 1/SC 31/WG 7 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): 109		
Standards under development	44		
Involvement of Luxembourg			
1 delegate - Mr. Mathieu Lessinnes (Acting as Chairman) ANEC GIE			
Comments			
Technologies such as bar coding and radiofrequency identification (RFID) provide quick, accurate and cost-effective ways to identify, track, acquire and manage data and information about items, personnel, transactions and resources. These are known as the automatic identification and data capture (AIDC) technologies. AIDC is an industry term that describes the identification and/or direct collection of data into a microprocessor-controlled device, such as a computer system or a programmable logic controller (PLC), without the use of a			

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

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

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 (20):** 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
Secretariat	ANSI (USA)		
Secretary	Dr. Timothy D. Schoechle		
Chairperson	Mr. Jim Melton		
Organizations in liaison	CISAC, ITSO, ITU, Infoterm, SWIFT, UNECE, WMO		
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: - 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 eBusiness JTC 1/SC 32/WG 2 MetaData JTC 1/SC 32/WG 3 Database language JTC 1/SC 32/WG 4 SQL/Multimedia and application packages		
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	43		
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); - ISO/IEC 11179-1:2004, Information technology -- Metadata registries (MDR) -- Part 1: Framework; - ISO/IEC 19503:2005, Information technology -- XML Metadata Interchange (XMI); - ISO/IEC 19763-1:2007, Information technology -- Metamodel framework for interoperability (MFI) -- Part 1: Reference model. 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

<table>
<tr><th colspan="4">General information</th></tr>
<tr><td>Committee</td><td>ISO/IEC JTC 1/SC 34</td><td>Title</td><td>Document description and processing languages</td></tr>
<tr><td>Creation date</td><td>1998</td><td rowspan="5">MEMBERS
  </td><td rowspan="5">Participating Countries (28):
Japan, Armenia, Bulgaria, Chile, China, Czech Republic, Denmark, Egypt, Finland, France, Germany, India, Italy, Republic of Korea, Lebanon, Luxembourg, Malaysia, Malta, Netherlands, Pakistan, Poland, Russian Federation, Slovakia, South Africa, Sri Lanka, Thailand, United Kingdom, United States

Observing Countries (28):
Australia, Austria, Belgium, Bosnia and Herzegovina, Brazil, Canada, Croatia, Cyprus, Côte d'Ivoire, Greece, Hong Kong, Hungary, Indonesia, Islamic Republic of Iran, Ireland, Israel, Kazakhstan, Lithuania, Mexico, Norway, Portugal, Romania, Serbia, Spain, Sweden, Switzerland, Turkey, Ukraine</td></tr>
<tr><td>Secretariat</td><td>JISC (Japan)</td></tr>
<tr><td>Secretary</td><td>Ms. Toshiko Kimura</td></tr>
<tr><td>Chairperson</td><td>Professor Sam Gyun Oh</td></tr>
<tr><td>Organizations in liaison</td><td>Ecma International, ISUG, OASIS</td></tr>
<tr><td>Web site</td><td colspan="3">http://www.iso.org/iso/standards_development/technical_committees/list_of_iso_technical_committees/iso_technical_committee.htm?commid=45374</td></tr>
<tr><td>Scope</td><td colspan="3">Standardization in the field of document structures, languages and related facilities for the description and processing of compound and hypermedia documents, including:
- Languages for describing document logical structures and their support facilities;
- Languages for describing document-like objects in web environments;
- Document processing architecture and formatting for logical documents;
- Languages for describing interactive documents;
- Multilingual font information interchange and related services;
- Final-form document architecture and page information interchange;
- Hypermedia document structuring language and application resources;
- API's for document processing.</td></tr>
<tr><td>Structure</td><td colspan="3">JTC 1/SC 34/WG 4 Office Open XML
JTC 1/SC 34/WG 6 OpenDocument Format
JTC 1/SC 34/JWG 7 Joint JTC 1/SC 34 – TC 46/SC 4 – IEC/TC 100/TA 10 WG: EPUB
JTC 1/SC 34/WG 8 Document processing and presentation</td></tr>
<tr><th colspan="4">Standardization work</th></tr>
<tr><td>Published standards</td><td colspan="3">Number of published ISO standards under the direct responsibility of JTC 1/SC 34 (number includes updates): 72</td></tr>
<tr><td>Standards under development</td><td colspan="3">11</td></tr>
<tr><th colspan="4">Involvement of Luxembourg</th></tr>
<tr><td colspan="4">1 delegate
- Mr. David Naramski (Acting as Chairman) NOWINA SOULTIONS S.à.r.l.</td></tr>
</table>

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. Moreover, international standardization of IDPF EPUB, currently lead by SC 34, would strongly encourage the wider adoption of EPUB, especially in public sector applications.

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. M. Peelen		
Chairperson	Mr. H. 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	1		
Involvement of Luxembourg			
NO (no registered delegate)			
Comments			

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.

CEN/TC 225 will deliver EN standards and technical reports to:

- 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"[85].

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 Council[86] 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).

[85] *ETSI TS 101 733, Electronic Signatures and Infrastructures (ESI); CMS Advanced Electronic Signatures (CAdES) (developed by ETSI/TC ESI)*
[86] *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 (16):** Bosnia and Herzegovina, 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	Mr. Chris Starr		
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		
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: - 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 Physical characteristics and test methods for ID-cards JTC 1/SC 17/WG 3 Identification cards - Machine readable travel documents JTC 1/SC 17/WG 4 Integrated circuit card with contacts JTC 1/SC 17/WG 5 Registration Management Group (RMG) JTC 1/SC 17/WG 8 Integrated circuit cards without contacts JTC 1/SC 17/WG 9 Optical memory cards and devices JTC 1/SC 17/WG 10 Motor vehicle driver license and related documents JTC 1/SC 17/WG 11 Application of biometrics to cards and personal identification		
Standardization work			
Published standards	Number of published ISO standards under the direct responsibility of JTC 1/SC 17 (number includes updates): 121		
Standards under development	42		
Involvement of Luxembourg			
2 delegates - Mr. Benoit Poletti (Chairman) INCERT GIE - Mr. Valentin Lacave 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, Electronic Signature and Cards and their related systems and operations**
Creation date	1989	**MEMBERS** 	33 members of CEN/CENELEC
Secretariat	AFNOR (France)		
Secretary	Ms. C. De Condé		
Chairperson	Mr. D. 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	Development of inter-industry standards for: - Cards and related interfaces; - Personal identification including authentication, confidentiality; - Electronic signature; - Card life management.		
Structure	CEN/TC 224/WG 6 User Interface CEN/TC 224/WG 9 Telecommunication applications CEN/TC 224/WG 11 Transport applications CEN/TC 224/WG 15 European citizen card CEN/TC 224/WG 16 Application Interface for smart cards used as Secure Signature Creation Devices CEN/TC 224/WG 17 Protection Profiles in the context of SSCD CEN/TC 224/WG 18 Interoperability of biometric recorded data		
Standardization work			
Published standards	51		
Standards under development	17		
Involvement of Luxembourg			
1 delegate - Mr. Benoit Poletti (Chairman) INCERT GIE			

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, ENISA, ISO, ISO/IEC JTC 1, ISOC/IETF, ITU, OASIS, UNECE, UPU		
Web site	http://portal.etsi.org/portal/server.pt/community/ESI/307		
Scope	TC ESI is the lead body within ETSI in relation to Electronic Signatures and Infrastructures, including the preparation of reports and other necessary activities, by: - Developing generic standards, guides and reports relating to electronic signatures and related trust infrastructures to protect electronic transactions and ensure trust and confidence with business partners; - Liaising with other ETSI bodies in relation to electronic signatures and related trust infrastructures; - Liaising with bodies external to ETSI in relation to electronic signatures and related trust infrastructures; - Establishing a continuing work plan in relation to electronic signatures and related trust infrastructures.		
Structure	/		
Standardization work			
Published standards	139		
Standards under development	65		
Involvement of Luxembourg			
2 members - Arhs - eWitness			
Comments			
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. The lack of standards to support the use of electronic signatures and public key certificates has been identified as one of the greatest impediments to electronic commerce. The deployment of vendor-specific new infrastructures is currently in progress. It is recognized by different parties that there is an urgent need for standards to provide the basis for an open electronic commerce environment. Speedy specifications in this area will make it possible to influence early developments. The ETSI strategy is in line with, and endorsed by the initiative of the EU Commission to establish a harmonized infrastructure for electronic signatures.		

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 time[87].

This analysis focuses on digital archives.

[87] *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	**MEMBERS** 	**Participating Countries (38):** France, Argentina, Armenia, Australia, Austria, Belgium, Bulgaria, Canada, China, Croatia, Denmark, Egypt, Estonia, Finland, Germany, Islamic Republic of Iran, Ireland, Italy, Japan, Kenya, Democratic People's Republic of Korea, 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 **Observing Countries (34):** Belarus, Bosnia and Herzegovina, Brazil, Colombia, Cuba, Czech Republic, Ethiopia, Greece, Hong Kong, Hungary, Iceland, India, Indonesia, Israel, Kazakhstan, Lithuania, **Luxembourg**, Malaysia, Republic of Moldova, Mongolia, New Zealand, Pakistan, Romania, Saudi Arabia, Serbia, Singapore, Slovakia, Slovenia, Sri Lanka, Sudan, Syrian Arab Republic, United Republic of Tanzania, Tunisia, Turkey
Secretariat	AFNOR (France)		
Secretary	Ms. S. D. Cusse		
Chairperson	Ms. G. 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		
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 ISO 3166 Maintenance Agency TC 46/WG 2 Coding of country names and related entities TC 46/WG 3 Conversion of written languages TC 46/WG 4 Terminology of information and documentation TC 46/SC 4 Technical interoperability TC 46/SC 8 Quality - Statistics and performance evaluation TC 46/SC 9 Identification and description TC 46/SC 10 Requirements for document storage and conditions for preservation TC 46/SC 11 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		

Standards under development	18

Involvement of Luxembourg

9 delegates

- 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. Joel Thill	*Archives nationales de Luxembourg*
- 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/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;
- ISO/DIS 30302, Information and documentation -- Management systems for records -- Guidelines for implementation.

7.9. 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"[88].

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

[88] *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	OGC, IEEE Instrumentation and Measurement Society TC 9		
Web site	http://isotc.iso.org/livelink/livelink/open/jtc1wg7		
Scope	1) In the area of generic solutions for sensor networks, undertake standardization activities that support and can be applied to the technical work of all relevant JTC 1 entities and to other standards organizations. This includes activities in sensor networks such as the following: - Standardization of terminology; - Development of a taxonomy; - Standardization of reference architectures; - Development of guidelines for interoperability; - Standardization of specific aspects of sensor networks. 2) In the area of application - oriented sensor networks, identify gaps and commonalities that may impact standardization activities within the scope of JTC 1. Further, share this information with relevant entities within and outside of JTC 1. Unless better pursued within another JTC 1 entity, the following standardization activities may be pursued as projects by this Working Group: - Addressing the technology gaps within the scope of JTC 1 entities; - Exploiting technology opportunities where it is desirable to provide common approaches to the use of sensor networks across application domains; - Addressing emerging areas related to M2M and IoT. 3) In order to foster communication and sharing of information between groups working in the field of sensor networks: - Seek liaison relationships with all relevant JTC 1 SCs/WGs; - Seek liaison relationships with other organizations outside JTC 1 including but not limited to: relevant ISO TCs, IEC TCs and ITU-T SGs, IEEE 1451, IEEE 1588, IEEE P2030, IEEE 802.15, Open Geospatial Consortium, ZigBee Alliance, IETF 6LoWPAN, IETF ROLL WG, ETSI, IPSO Alliance, EPCglobal, ISA 100, LONMARK, KNX Association, Zwave Alliance; - Consider the possibility of conducting joint projects with relevant ITU-T SG; - Seek input from relevant research projects and *consortia*.		
Structure	/		
Standardization work			
Published standards	5		
Standards under development	5		

Involvement of Luxembourg
1 delegate
- Mr. Mathieu Lessinnes (Acting as Chairman) ANEC GIE
Comments
The scope of ISO/IEC JTC 1/WG 7 has been updated during the 27th Meeting of ISO/IEC JTC 1 in November 2012 in Jeju Island (Korea) [Resolution 44]. ISO/IEC JTC 1/WG 7 is, amongst other, in charge of the development of 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. Several parts of the series are already published (1, 2, 3, 4 and 5). The current work program includes: - ISO/IEC DIS 29182-6, Sensor networks: Sensor Network Reference Architecture (SNRA) -- Part 6: Application; - ISO/IEC DIS 29182-7, Sensor networks: Sensor Network Reference Architecture (SNRA) -- Part 7: Interoperability guidelines; - ISO/IEC DIS 30101, Information technology -- Sensor Networks: Sensor Network and its interfaces for smart grid system; - ISO/IEC DIS 30128, Information technology -- Sensor Networks -- Generic Sensor Network Application Interface.

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 determined[89].

The governance of IT is thus a component or a subset of organization governance, which is one key element in improving economic efficiency and growth as well as enhancing investors' confidence. Governance of IT can be defined as the system by which the current and future use of IT is directed and controlled[90].

[89] *OECD principles of corporate Governance*
[90] *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

<table>
<tr><th colspan="4">General information</th></tr>
<tr><td>Committee</td><td>ISO/IEC JTC 1/SC 40</td><td>Title</td><td>IT Service Management and IT Governance</td></tr>
<tr><td>Creation date</td><td>2013</td><td rowspan="5">MEMBERS
  </td><td rowspan="5">Participating Countries (27):
Australia, Brazil, Canada, China, Côte d'Ivoire, Denmark, Finland, France, Germany, India, Italy, Japan, Republic of Korea, Luxembourg, Netherlands, New Zealand, Peru, Poland, Portugal, Romania, Russian Federation, Singapore, South Africa, Spain, Sweden, United Kingdom, United States

Observing Countries (8):
Argentina, Austria, Belgium, Czech Republic, Islamic Republic of Iran, Ireland, Kenya, Switzerland</td></tr>
<tr><td>Secretariat</td><td>SA (Australia)</td></tr>
<tr><td>Secretary</td><td>Mrs. Jenny Mance</td></tr>
<tr><td>Chairperson</td><td>Mr. John Sheridan</td></tr>
<tr><td>Organizations in liaison</td><td>OASIS, itSMFI</td></tr>
<tr><td>Web site</td><td colspan="3">http://www.iso.org/iso/standards_development/technical_committees/list_of_iso_technical_committees/iso_technical_committee.htm?commid=5013818</td></tr>
<tr><td>Scope</td><td colspan="3">Standardization of IT Service Management and IT Governance.

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

The work will initially cover:
- 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: the development of the ISO/IEC 20000 series standards and related documents;
- IT-Enabled Services/Business Process Outsourcing: the development of the ISO/IEC 30105 series standards and related documents.</td></tr>
<tr><td>Structure</td><td colspan="3">JTC 1/SC 40/CAG 1 Chairman Advisory Group
JTC 1/SC 40/SG 1 General Study Group on Future Work
JTC 1/SC 40/SG 2 Study Group on Service Maintenance
JTC 1/SC 40/WG 1 Governance of Information Technology
JTC 1/SC 40/WG 2 IT service management
JTC 1/SC 40/WG 3 IT-enabled services / Business process outsourcing</td></tr>
<tr><th colspan="4">Standardization work</th></tr>
<tr><td>Published standards</td><td colspan="3">Number of published ISO standards under the direct responsibility of JTC 1/SC 40 (number includes updates): 7</td></tr>
<tr><td>Standards under development</td><td colspan="3">13</td></tr>
</table>

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).

The following standards are currently under development:

- ISO/IEC 38500 series standards on corporate governance of IT;
- ISO/IEC 30121 System and software engineering -- Information technology -- Governance of digital forensic risk framework;
- 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 5[91] 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.

[91] *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

<table>
<tr><th colspan="4">General information</th></tr>
<tr><td>Committee</td><td>ISO/IEC JTC 1/WG 10</td><td>Title</td><td>Internet of Things (IoT)</td></tr>
<tr><td>Creation date</td><td>2014</td><td rowspan="5">MEMBERS
  </td><td rowspan="5">Participating countries (15):
Republic of Korea, Australia, Belgium, Canada, China, Czech Republic, Finland, Germany, Japan, Luxembourg, Singapore, Spain, Sweden, United Kingdom, United States</td></tr>
<tr><td>Secretariat</td><td>KATS (Republic of Korea)</td></tr>
<tr><td>Secretary</td><td>/</td></tr>
<tr><td>Chairperson</td><td>Mr. Sangkeun Yoo</td></tr>
<tr><td>Organizations in liaison</td><td>/</td></tr>
<tr><td>Web site</td><td colspan="3">http://isotc.iso.org/livelink/livelink?func=ll&objId=16911907</td></tr>
<tr><td>Scope</td><td colspan="3">- Serve as a focus of and proponent for JTC 1's IoT standardization program.
- Develop foundational standards for IoT related to JTC 1 for guiding IoT efforts throughout JTC 1 upon which other standards can be developed.
- The work will cover:
o Developing Terms and Definitions for JTC 1 IoT Vocabulary
o Developing IoT Reference Architecture and other foundational specifications as JTC 1 standards
o Continuing the work begun in SWG on IoT on standardization gaps
o Establishing a liaison with JTC 1, ISO, IEC or other entities undertaking work related to IoT
o Encouraging the prompt and efficient exchange of information within JTC 1 and with ISO, IEC, or other entities working on IoT, as appropriate
o Monitoring the ongoing IoT regulatory, market, business and technology requirements
o Developing other IoT standards that build on the foundational standards when relevant JTC 1 subgroups that could address these standards do not exist or are unable to develop them.</td></tr>
<tr><td>Structure</td><td colspan="3">/</td></tr>
<tr><th colspan="4">Standardization work</th></tr>
<tr><td>Published standards</td><td colspan="3">0</td></tr>
<tr><td>Standards under development</td><td colspan="3">1</td></tr>
<tr><th colspan="4">Involvement of Luxembourg</th></tr>
<tr><td colspan="4">1 delegate
- Mr. Mathieu Lessinnes ANEC GIE</td></tr>
<tr><th colspan="4">Comments</th></tr>
<tr><td colspan="4">This WG is still under construction. It has been established during the 2014 ISO/IEC JTC 1 plenary meeting.

JTC 1 establishes JTC 1 Working Group 10 on Internet of Things (IoT) reporting to JTC 1, with the transfer of project ISO/IEC 30141 (IoT Reference Architecture) from JTC 1/WG 7.</td></tr>
</table>

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, ATIS, Broadband Forum, CEN, CENELEC, Continua Health Alliance, DLMS, ESMIG, GSM Association, HGI, IEEE, IPSO Alliance, ISO/IEC JTC1, ISOC/IETF, ITU, OASIS, OMA, TIA		
Web site	http://portal.etsi.org/portal/server.pt/community/SmartM2M		
Scope	TC Smart M2M aims at referring to existing work done elsewhere, or encouraging existing groups to fulfil SmartM2M requirements. The TC undertakes necessary work that is not being provided for elsewhere. The activities of TC Smart M2M include: - Be a center of expertise in the area of M2M and Internet of Things (IoT) to support M2M services and applications; - Maintain ETSI M2M published specifications; - Produce specifications as needed for regulatory purposes; - Transpose the output of oneM2M to TC M2M.		
Structure	/		
Standardization work			
Published standards	26		
Standards under development	11		
Involvement of Luxembourg			
NO (no registered delegate)			
Comments			
/			

7.12. TECHNICAL COMMITTEES NOT RELATED TO SUBSECTORS

The standards watch has identified 13 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, Armenia, 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, Norway, Peru, Russian Federation, Singapore, South Africa, Spain, Sweden, Switzerland, United Arab Emirates, United Kingdom **Observing countries (58):** Algeria, Argentina, 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, Nigeria, Pakistan, State of Palestine, Philippines, Poland, Portugal, Romania, 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		
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 Directives (SWG-D) ISO/IEC JTC 1/SWG 3 Planning (SWG-P) ISO/IEC JTC 1/SWG 6 Management ISO/IEC JTC 1/SG 1 Smart Cities ISO/IEC JTC 1/WG 7 Sensor Networks ISO/IEC JTC 1/WG 9 Big Data ISO/IEC JTC 1/WG 10 Internet of Things (IoT) ISO/IEC JTC 1/SC 2 Coded character sets ISO/IEC JTC 1/SC 6 Telecommunications and information exchange between systems ISO/IEC JTC 1/SC 7 Software and systems engineering ISO/IEC JTC 1/SC 17 Cards and personal identification ISO/IEC JTC 1/SC 22 Programming languages, their environments, and system software interfaces ISO/IEC JTC 1/SC 23 Digitally Recorded Media for Information Interchange and Storage ISO/IEC JTC 1/SC 24 Computer graphics, image processing, and environmental data representation ISO/IEC JTC 1/SC 25 Interconnection of information technology equipment ISO/IEC JTC 1/SC 27 IT Security techniques ISO/IEC JTC 1/SC 28 Office equipment ISO/IEC JTC 1/SC 29 Coding of audio, picture, multimedia and hypermedia information ISO/IEC JTC 1/SC 31 Automatic identification and data capture techniques		

	ISO/IEC JTC 1/SC 32	Data management and interchange
	ISO/IEC JTC 1/SC 34	Document description and processing languages
	ISO/IEC JTC 1/SC 35	User interfaces
	ISO/IEC JTC 1/SC 36	Information technology for learning, education and training
	ISO/IEC JTC 1/SC 37	Biometrics
	ISO/IEC JTC 1/SC 38	Cloud Computing and Distributed Platforms
	ISO/IEC JTC 1/SC 39	Sustainability for and by Information Technology
	ISO/IEC JTC 1/SC 40	IT Service Management and IT Governance

Standardization work

Published standards	Total number of published ISO standards related to the technical committee and its SCs (number includes updates): 2773 Number of published ISO standards under the direct responsibility of JTC 1 (number includes updates): 457
Standards under development	652

Involvement of Luxembourg

3 delegates

Mr. Nicolas Domenjoud	ANEC GIE
Mr. Johnatan Pecero	ANEC GIE
Mr. Mathieu Lessinnes	ANEC GIE

Comments

ISO/IEC JTC 1 is currently the main standardization committee in the information and communication technology domain, regarding the number of published standards and the number of standards users. Among the standards developed by ISO/IEC JTC 1, the following standards are the best-selling at the ISO level (and at ILNAS level concerning the top 3) and therefore particularly relevant for the economic market (source: ISO Customer Services – January 2015):

- 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.

ISO/IEC JTC 1 also benefits from the rapid, market-driven work of *de facto* standards-setting organizations and industry *consortia*. This is amplified by having many technical experts participating not only in national

standardization bodies but also in key *de facto* standards-setting bodies and industrial *fora*. Liaising and cooperating extends the expertise of ISO/IEC JTC 1's subcommittees and provides feedback on how ISO/IEC JTC 1 standards are being used. It also helps identify any gaps or inconsistencies that need to be addressed. By working with other standards-setting organizations (SDOs), ISO/IEC JTC 1's ability to serve an integration function is enhanced[92].

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;

[92] JTC1 Vision, Mission and Principles, 2014

- 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;
- 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**	**Office equipment**
Creation date	1989	**MEMBERS** 	**Participating Countries (12):** Japan, Austria, China, Germany, Italy, Republic of Korea, Netherlands, Philippines, Russian Federation, Thailand, United Kingdom, United States **Observing Countries (20):** 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
Secretariat	JISC (Japan)		
Secretary	Mr. Motokuni Sugiyama		
Chairperson	Mr. Akira Saito		
Organizations in liaison	CIE, Ecma International, ICC, WMO		
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 Advisory Group JTC 1/SC 28/WG 2 Consumables JTC 1/SC 28/WG 3 Productivity JTC 1/SC 28/WG 4 Image quality assessment JTC 1/SC 28/WG 5 Office Colour		
Standardization work			
Published standards	Number of published ISO standards under the direct responsibility of JTC 1/SC 28 (number includes updates): 49		
Standards under development	6		
Involvement of Luxembourg			
NO (no registered delegate)			
Comments			
Inventory of published ISO/IEC JTC 1/SC 28 standards concerns specification sheets descriptors, productivity (throughput) measurement methods, printed image quality evaluation methods, toner/ink cartridges yield measurement methods, declaration of quality of product made of reused parts and accessibility guidelines for office equipment. The fact that the frontier of ISO/IEC JTC 1/SC 28 is contiguous with scopes of ISO/TC 42, TC 130 and TC 171 necessitates tight liaisons with those technical committees among others. Also, ISO/IEC JTC 1/SC 28 has always been an active member of the ISO Steering Committee on Image Technology (SCIT).			

7.12.3. ISO/IEC JTC 1/SC 35

<table>
<tr><th colspan="4">General information</th></tr>
<tr><td>Committee</td><td>ISO/IEC JTC 1/SC 35</td><td>Title</td><td>User interfaces</td></tr>
<tr><td>Creation date</td><td>1998</td><td rowspan="5">MEMBERS
  </td><td rowspan="5">Participating Countries (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</td></tr>
<tr><td>Secretariat</td><td>AFNOR (France)</td></tr>
<tr><td>Secretary</td><td>Mr. Philippe Magnabosco</td></tr>
<tr><td>Chairperson</td><td>Mr. Khalid Choukri</td></tr>
<tr><td>Organizations in liaison</td><td>W3C</td></tr>
<tr><td>Web site</td><td colspan="3">http://www.iso.org/iso/standards_development/technical_committees/list_of_iso_technical_committees/iso_technical_committee.htm?commid=45382</td></tr>
<tr><td>Scope</td><td colspan="3">Standardization in the field of user-system interfaces in information and communication technology (ICT) environments and support for these interfaces to serve all users, including people having accessibility or other specific needs, with a priority of meeting the JTC 1 requirements for cultural and linguistic adaptability. This includes:
- User interface accessibility (requirements, needs, methods, techniques and enablers);
- Cultural and linguistic adaptability and accessibility (such as evaluation of cultural and linguistic adaptability of ICT products, harmonized human language equivalents, localization parameters, voice messaging menus, etc.);
- User interface objects, actions and attributes;
- Methods and technologies for controlling and navigating within systems, devices and applications in visual, auditory, tactile and other sensorial modalities (such as by voice, vision, movement, gestures, etc.);
- Symbols, functionality and interactions of user interfaces (such as graphical, tactile and auditory icons, graphical symbols and other user interface elements);
- Visual, auditory, tactile and other sensorial input and output devices and methods in ICT environments (for devices such as keyboards, displays, mice, etc.);
- User interfaces for mobile devices, hand-held devices and remote interactions.</td></tr>
<tr><td>Structure</td><td colspan="3">JTC 1/SC 35/WG 1 Keyboards and input interfaces
JTC 1/SC 35/WG 2 Graphical user interface and interaction
JTC 1/SC 35/WG 4 User interfaces for mobile devices
JTC 1/SC 35/WG 5 Cultural and linguistic adaptability
JTC 1/SC 35/WG 6 User interfaces accessibility
JTC 1/SC 35/WG 7 User interfaces object, actions and attributes
JTC 1/SC 35/WG 8 User interfaces for remote interactions</td></tr>
<tr><th colspan="4">Standardization work</th></tr>
<tr><td>Published standards</td><td colspan="3">Number of published ISO standards under the direct responsibility of JTC 1/SC 35 (number includes updates): 56</td></tr>
<tr><td>Standards under development</td><td colspan="3">12</td></tr>
</table>

Involvement of Luxembourg
NO (no registered delegate)
Comments
SC 35 is currently increasing its activity in the field of Voice interfaces (ISO/IEC 17549 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.

7.12.4. ISO/IEC JTC 1/SC 36

<table>
<tr><th colspan="4">General information</th></tr>
<tr><td>Committee</td><td>ISO/IEC JTC 1/SC 36</td><td>Title</td><td>Information technology for learning, education, and training</td></tr>
<tr><td>Creation date</td><td>1999</td><td rowspan="5">MEMBERS
  </td><td rowspan="5">Participating Countries (25):
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

Observing Countries (21):
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, Singapore, Sweden, Switzerland, Turkey, United States</td></tr>
<tr><td>Secretariat</td><td>KATS (Republic of Korea)</td></tr>
<tr><td>Secretary</td><td>Ms Eunsook Kim</td></tr>
<tr><td>Chairperson</td><td>Mr. Erlend Øverby</td></tr>
<tr><td>Organizations in liaison</td><td>ADL, AICC, AUF, IMS, Infoterm, LETSI, LTSC</td></tr>
<tr><td>Web site</td><td colspan="3">http://www.iso.org/iso/standards_development/technical_committees/list_of_iso_technical_committees/iso_technical_committee.htm?commid=45392</td></tr>
<tr><td>Scope</td><td colspan="3">Standardization in the field of information technologies for learning, education, and training to support individuals, groups, or organizations, and to enable interoperability and reusability of resources and tools.

Excluded: 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.</td></tr>
<tr><td>Structure</td><td colspan="3">JTC 1/SC 36/AG 1 Business planning and communications
JTC 1/SC 36/WG 1 Vocabulary
JTC 1/SC 36/WG 2 Collaborative technology
JTC 1/SC 36/WG 3 Learner information
JTC 1/SC 36/WG 4 Management and delivery of learning, education and training
JTC 1/SC 36/WG 5 Quality assurance and descriptive frameworks
JTC 1/SC 36/WG 6 Platform, Services, and specification integration
JTC 1/SC 36/WG 7 ITLET - Culture, language and individual needs
JTC 1/SC 36/WG 8 Learning Analytics Interoperability</td></tr>
<tr><th colspan="4">Standardization work</th></tr>
<tr><td>Published standards</td><td colspan="3">Number of published ISO standards under the direct responsibility of JTC 1/SC 36 (number includes updates): 36</td></tr>
<tr><td>Standards under development</td><td colspan="3">28</td></tr>
</table>

Involvement of Luxembourg

2 delegates

- Mrs. Marie-Rose Decker — Luxair S.A.
- Mr. Patrick Plichart — Open Assessment Technologies S.A.

Comments

Since its inception, ISO/IEC JTC 1/SC 36 has successfully adapted to create standards for growing and changing markets by adopting and adhering to the essential principles of global openness, transparency, consensus, and technical coherence. In ISO/IEC JTC 1/SC 36, these principles are implemented through development of International Standards representative of all interested National Member Bodies, and Liaison Organizations, by utilizing proven and value-added processes.

These principles also have enabled the production of global and market relevant standards and technical reports, which are recognized and implemented by global users to:

- Facilitate global trade;
- Improve quality, security, and consumer protection;
- Global dissemination of technologies and good practices, all of which contribute to economic and social progress.

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. B. Mullis		
Chairperson	Mr. R. 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. Excluded from this scope are areas of building automation which are under the responsibility of other CEN/CENELEC TC's.		
Structure	CEN/TC 247/WG 3 CEN/TC 247/WG 4 CEN/TC 247/WG 6	Building Automation and Control and Building Management Systems Open System Data Transmission Electronic control equipment for HVAC applications, integrated room automation, controls and management systems	
Standardization work			
Published standards	22		
Standards under development	16		
Involvement of Luxembourg			
NO (no registered delegate)			
Comments			

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

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

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

CENELEC/TC 205 "Home and Building Electronic Systems (HBES)" especially for Home and Building Control Networks;

- Standards for requirements of electromagnetic compatibility, electrical safety and environmental conditions in BACS and HBES have been developed by the Joint Working Group "General Technical Requirements" of CEN/TC 247 and CENELEC /TC205;
- The CEN/TC 247 standardization activities, reflecting the requirements and test set ups, especially for energy efficient products and systems, supports the European certification schema and quality assurance system of the Building Automation Industry;
- CEN/TC 247 is 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. S. Golyardi		
Chairperson	Mr. R. Stegwee		
Organizations in liaison	COCIR, EC, GS1, HL7, Normapme		
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 Information models CEN/TC 251/WG 2 Terminology and knowledge representation CEN/TC 251/WG 3 Security, safety and quality CEN/TC 251/WG 4 Technology for interoperability		
Standardization work			
Published standards	97		
Standards under development	22		
Involvement of Luxembourg			
NO (no registered delegate)			
Comments			
CEN/TC 251 will seek to remain engaged with other standards development organizations, *consortia* and *fora* to enhance efforts to coordinate its work with other organizations that have similar goals, such that stakeholder wishes for fewer, but more universal, global standards for health informatics are recognized in Europe. If this is to be achieved then the number of commercial and user organizations engaged in the TC and actively participating through NSBs has to be increased. For the next five years market indications are that the production of standards profiles in response to use cases as proposed in the M/403-2007 eHealth-INTEROP phase 1 Report will be the driver of most CEN/TC 251 work. The work of the TC will therefore be in cooperation with the CEN Workshop proposed to deliver the M/403-2007 eHealth-INTEROP phase 2 work, and on specifically targeted items to fill gaps in existing global provision, or to clarify ambiguities in that provision. CEN/TC 251 Health informatics will in general stimulate the development of ISO standards in areas where there is specific need and in so doing ensure they meet European requirements. Where necessary it may develop European standards to address regional legislative demands.			

7.12.7. 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. M. Peelen		
Chairperson	Mr. L. Eggink		
Organizations in liaison	ASECAP, EPC, ERFA, ERTICO ITS, FIA – Europe, UITP		
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 is concerned; - Traffic and parking management; - User fee collection; - Public transport management; - User information.		
Structure	CEN/TC 278/WG 1 Electronic fee collection and access control (EFC) CEN/TC 278/WG 2 Freight, Logistics and Commercial Vehicle Operations CEN/TC 278/WG 3 Public transport (PT) CEN/TC 278/WG 4 Traffic and traveler information (TTI) CEN/TC 278/WG 5 Traffic control (TC) CEN/TC 278/WG 7 ITS spatial data CEN/TC 278/WG 8 Road traffic data (RTD) CEN/TC 278/WG 9 Dedicated Short Range Communication (DSRC) CEN/TC 278/WG 10 Man-machine interfaces (MMI) CEN/TC 278/WG 12 Automatic Vehicle Identification and Automatic Equipment Identification (AVI/AEI) CEN/TC 278/WG 13 Architecture and terminology CEN/TC 278/WG 14 After theft systems for the recovery of stolen vehicles CEN/TC 278/WG 15 eSafety CEN/TC 278/WG 16 Cooperative ITS		
Standardization work			
Published standards	136		
Standards under development	47		

Involvement of Luxembourg
1 delegate
- Mr. Georges Simon (Acting as Chairman) *Administration des Ponts et Chaussées*
Comments
CEN/TC 278's vision statement for ITS standardization in Europe in the first quarter of the twenty-first century is: "To provide a family of Standards and related specifications, interoperable on a pan-European basis, that will enable services to be provided to travelers (be they drivers, pedestrians or users of public transport); to provide services to transport and highway managers and operators; to commercial fleet managers and commercial service providers, utilizing information technology to maximize efficiency, safety and the quality of service provided. To ensure that by co-operating in international standardization, International Standards provide the best solutions for European stakeholders." Based on the considerations above, CEN/TC 278 proposes the following objectives and strategic directions for its future work: - Electronic fee collection and access control; - Automatic vehicle and equipment identification; - Freight and fleet management; - Telematics in public transport; - Road and traffic data; - Parking systems; - Human-machine interfaces; - Architecture and terminology; - Recovery of stolen vehicles; - eSafety; - Cooperative ITS.

7.12.8. 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. M. Ford		
Chairperson	Dr. R. Walker		
Organizations in liaison	AGILE, BRISEIDE Project, DGIWG, EGIDA Project, ENVIROFI Project, EUROGI, EuroGeographics, EuroSDR, GEO, GISIG, GeoViQua Project, IEEE - SA / SCC 40, JRC Ispra, OGC, OMG, SMART-ISLANDS Project, TaToo Project		
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	48		
Standards under development	10		
Involvement of Luxembourg			
NO (no registered delegate)			
Comments			

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

- Adopting, when appropriate, the ISO/TC 211 standards series as CEN standards;
- 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.

7.12.9. 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. B. Hein		
Chairperson	Mr. O. Pfaff		
Organizations in liaison	AQUA, DLMS User Association, E.V.V.E., ECOS, ETSI, EUREAU, ESMIG, FARECOGAZ, KNX Association, Marcogaz, ZigBee Alliance		
Web site	http://standards.cen.eu/dyn/www/f?p=204:7:0::::FSP_ORG_ID:6275&cs=142047F7359698DA6A5B4BE4DE6571AF8		
Scope	Standardization of communication interfaces for systems with meters and remote reading of meters for all kind of fluids and energies distributed by network. Secure communication covering data privacy as an inherent property, providing a scalable mechanism for security services, data integrity, authentication and confidentiality. Cooperation with CENELEC and ETSI for consistent interface definitions as essential condition for achieving interoperability between entities in systems.		
Structure	CEN/TC 294/WG 2 CEN/TC 294/WG 4 CEN/TC 294/WG 5 CEN/TC 294/WG 6	Application layer for communication systems for and remote reading of all meters within the scope Data exchange for meters on bus-systems and interface Radio meter data exchange Wireless mesh networking - Communication systems for meter data exchange	
Standardization work			
Published standards	7		
Standards under development	6		
Involvement of Luxembourg			
NO (no registered delegate)			
Comments			
CEN/TC 294 already specified a set of standards which are to be maintained and extended according to the market needs and new technologies and to maintain the state of the art. At the moment CEN/TC 294 responds in its work to the EC/EFTA mandate M/441 in the fields of measuring instruments for the development of an open architecture for utility meters involving communication protocols enabling interoperability.			

CEN/TC 294 standards do not impose identical solutions on all smart metering systems in Member States, nor are they a best practice solution or recommendations. The standards which have been developed should be seen as a common standards "toolbox" to facilitate smart metering deployments.

This approach recognizes that Member States will have their own priorities and will undertake their own cost benefit analysis. Beside this there are differences in national architectures for smart metering systems and between utility meters to be connected, taking into account technical constraints for interfacing communication systems.

7.12.10. 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. M. Leggett		
Chairperson	Mr. H. G. Mason		
Organizations in liaison	/		
Web site	http://standards.cen.eu/dyn/www/f?p=204:7:0::::FSP_ORG_ID:6291&cs=1FB8DE3E2415169C5A629164496F80A52		
Scope	Standardization in the field of automation systems and technologies and their application and integration to ensure the availability of the standards required by industry for design, sourcing, manufacturing and delivery, support, maintenance and disposal of products and their associated services. Areas of standardization may include enterprise modelling and system architecture, information and its supporting systems, robotics for fixed and mobile robots in industrial and specific non-industrial environments, automation and control equipment and software, human and mechanical aspects, integration technologies and system operational aspects. These standards may utilize other standards and technologies beyond the scope of TC310, such as machines, equipment, information technologies, multi-media capabilities and multi-modal communications networks.		
Structure	CEN/TC 310/WG 1 Systems architecture CEN/TC 310/WG 2 STEP CEN/TC 310/WG 3 Cad lib		
Standardization work			
Published standards	11		
Standards under development	0		
Involvement of Luxembourg			
2 delegates - Mrs. Wided Guedria — Luxembourg Institute of Science and Technology (LIST) - Mr. Yannick Naudet — LIST			
Comments			
The mission of CEN/TC 310 is to undertake standardization activities in the field of Advanced Manufacturing Technologies (AMT) to ensure the availability of the standards required by European industry for the operation and integration of the elements of AMT systems. The specific objectives of CEN/TC 310 are to:			

- Act as focal point within Europe for standardization in Advanced Manufacturing Technologies;
- Undertake the leading technical responsibility for the general strategy for standardization in the field of AMT and to document an agreed upon European strategy in this Business Plan;
- Develop standards for AMT systems and elements that are not included in the work program of other European TCs;
- Support and accommodate the standardization needs of European industry, if different from, or with a higher priority than, international standards being developed;
- Create a wider understanding and awareness of the importance of AMT standardization driven by market needs for European industry, the European Commission and national Governments;
- Encourage the awareness of AMT standardization by improving the availability of information between interested parties.

7.12.11. CEN/TC 353

General information			
Committee	**CEN/TC 353**	**Title**	**Information and Communication Technologies for Learning, Education and Training (ICT for LET)**
Creation date	2007	**MEMBERS** 	33 members of CEN/CENELEC
Secretariat	UNI (Italy)		
Secretary	Mr. C. Sirocchi		
Chairperson	Mr. C. Stracke		
Organizations in liaison	ADL		
Web site	http://standards.cen.eu/dyn/www/f?p=204:7:0::::FSP_ORG_ID:580446&cs=15AD42370A941BEC38A49B673D09BFEF6		
Scope	Produce standards in the field of information and communication technologies relating to learning, education and training. The European Standards (EN), Technical Specifications (TS) and Technical Reports (TR) that are developed will have a well-defined European scope. These may include: - Development of CEN Workshop Agreements (CWAs) and other specifications into standards, if appropriate; - Developments of national standards into European Standards.		
Structure	CEN/TC 353/WG 1 Interoperability CEN/TC 353/WG 2 Business Planning, Communications & Prospectives (BPCP)		
Standardization work			
Published standards	10		
Standards under development	0		
Involvement of Luxembourg			
1 delegate - Mr. Stéphane Jacquemart (Acting as Chairman) Luxembourg Institute for Science and Technology (LIST)			
Comments			
The objective of the TC is to encourage the effective development and use of relevant and appropriate standards for European information and communication technologies for learning, education and training. The following work priorities have been defined within the TC: - European Policies: Development of European standards for the realization, dissemination, implementation and exploitation of a) European policies such as European Qualifications Framework (EQF), the Europass documents; b) European key strategies such as European mobility and lifelong learning expressed in EU2020 and other communications by the European Union; - Competences: Development of a well-defined European data model and guidelines for expressing, referencing and capturing measurable characteristics of simple and complex competences and		

identification of existing competence maps and taxonomies and development of guidelines on taxonomies and vocabularies;

- Quality: Development of frameworks, specifications and guidelines to improve the quality and transparency of organizations, processes, products and services; localization of international standards (e.g., ISO/IEC 19796-1); providing guidance to stakeholders involved in quality development and improvement of quality competencies for European stakeholders;
- Interoperability and Frameworks: Development of European learning, education and training vocabularies and frameworks; provide interoperability specifications for the exchange a range of European curriculum information; development of a practical approach towards interoperability between existing and future repositories for learning whose purpose is the safe storage or delivery, and also administration and configuration management for learning objects; integration with systems e.g. knowledge management systems; and sharing education related data, services, content and tools achieved through clearer technical agreements between all parties, without losing the value of expression typical of each European community's language and culture.

7.12.12. 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. V. Salsano		
Chairperson	Mr. F. 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	1		
Involvement of Luxembourg			
NO (no registered delegate)			
Comments			
/			

7.12.13. 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	/		
Standardization work			
Published standards	0		
Standards under development	0		
Involvement of Luxembourg			
NO (no registered delegate)			
Comments			
On 6 May 2014, the Directive 2014/55/EU[93] of the European Parliament and of the Council of 16 April 2014 on electronic invoicing in public procurement was published in the Official Journal, which "*request that the relevant European standardization organization draft a European standard for the semantic data model of the core elements of an electronic invoice (the 'European standard on electronic invoicing')*". In this context, CEN/TC 434 has been created. 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.			

[93] http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32014L0055

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 fora/consortia 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 standards[94];*
- *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.*

[94] List of approved JTC 1 PAS Submitters

7.13.1. W3C - World Wide Web Consortium

General information			
Forum / Consortium	**W3C**	**Title**	**World Wide Web Consortium**
Creation date	1994	**MEMBERS** 	402 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	**Working Groups:** - Audio - Authoring Tool Accessibility Guidelines - Browser Testing and Tools - CSV on the Web - Cascading Style Sheets (CSS) - Data on the Web Best Practices - Device APIs - Education and Outreach - Efficient XML Interchange - Evaluation and Repair Tools - Forms - Geolocation - HTML - Independent User Interface (Indie UI) - Internationalization - Linked Data Platform (LDP) - Math - Multimodal Interaction - Near Field Communications - Pointer Events - Protocols and Formats - RDF Data Shapes - RDFa - Research and Development - SVG - Second Screen Presentation - Social Web - 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 - HTML5 Japanese - HTML5 Korean - Internationalization (I18n) - Internationalization Tag Set (ITS) - Patents and Standards - Privacy - Semantic Web Health Care and Life Sciences - Semantic Web - Social - WAI - Web Payments - Web Security - Web and Mobile - Web and TV **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. **Permanent Groups :** - Technical Architecture Group (TAG) - Advisory Board (AB)
Standardization work	
Published standards	249
Standards under development	279

7.13.2. 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** 	200 corporate members
Chairperson	Ms. Karen Bartleson		
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	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. 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.		
Structure	**Topics:** - 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	3067
Standards under development	647

7.13.3. DMTF - Distributed Management Task Force

General information			
Forum / Consortium	**DMTF**	**Title**	**Distributed Management Task Force**
Creation date	1992	**MEMBERS** 	170 member companies and organizations, and more than 4,000 active participants crossing 43 countries
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	**DMTF Initiatives:** - Network Management (NETMAN) - Common Diagnostic Model (CDM) - Common Information Model (CIM) - Cloud Management Initiative (CLOUD) - Desktop and Mobile Architecture for System Hardware (DASH) - Systems Management Architecture for Server Hardware (SMASH) - Virtualization Management (VMAN)		
Standardization work			
Published standards	448		
Standards under development	14[95]		

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

7.13.4. Ecma International (previously called ECMA)

General information			
Forum / Consortium	**Ecma International**	**Title**	**Ecma International**
Creation date	1961	**MEMBERS** 	71 member organizations
Chairperson	Ms. I. Valet-Harper		
Involvement of Luxembourg	/		
Web site	http://www.ecma-international.org/		
Scope	Standardization of Information and Communication Technology (ICT) and Consumer Electronics (CE).		
Executive summary	The aims of Ecma are: - 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. Many of the Ecma International standards are then adopted as ISO, ISO/IEC, or ETSI standards. Ecma International is currently recognized as an organization in liaison with ISO/IEC JTC 1.		
Structure	- TC 12 Safety - TC 20 (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		

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

<table>
<tr><th colspan="4">General information</th></tr>
<tr><td>Forum / Consortium</td><td>OASIS</td><td>Title</td><td>Organization for the Advancement of Structured Information Standards</td></tr>
<tr><td>Creation date</td><td>1993</td><td rowspan="3">MEMBERS
  </td><td rowspan="3">More than 5000 participants representing over 600 organizations and individual members in more than 65 countries</td></tr>
<tr><td>Chairperson</td><td>/</td></tr>
<tr><td>Involvement of Luxembourg</td><td>/</td></tr>
<tr><td>Web site</td><td colspan="3">http://www.oasis-open.org/</td></tr>
<tr><td>Scope</td><td colspan="3">OASIS promotes industry consensus and produces worldwide standards for security, Internet of Things, Cloud computing, energy, content technologies, emergency management and other areas.</td></tr>
<tr><td>Executive summary</td><td colspan="3">OASIS (Organization for the Advancement of Structured Information Standards) is a not-for-profit consortium that drives the development, convergence and adoption of open standards for the global information society. OASIS open standards offer the potential to lower cost, stimulate innovation, grow global markets and protect the right of free choice of technology.

OASIS is distinguished by its transparent governance and operating procedures. Members themselves set the OASIS technical agenda, using a lightweight process expressly designed to promote industry consensus and unite disparate efforts. Completed work is ratified by open ballot. Governance is accountable and unrestricted.</td></tr>
<tr><td>Structure</td><td colspan="3"><u>OASIS Committee Categories:</u>
- Big Data
- Cloud
- Conformance
- Content Technologies
- e-Commerce
- e-Invoicing
- eGov/Legal
- Emergency Management
- Government/Legal
- Healthcare
- IoT/M2M
- Lyfecycle Integration
- Localization
- Messaging
- Privacy/Identity
- Security
- SOA
- Standards Adoption
- Supply Chain
- Sustainability
- Web Services</td></tr>
<tr><th colspan="4">Standardization work</th></tr>
<tr><td>Published standards</td><td colspan="3">111</td></tr>
<tr><td>Standards under development</td><td colspan="3">Unknown</td></tr>
</table>

7.13.6. OMG - Object Management Group

<table>
<tr><th colspan="4">General information</th></tr>
<tr><td>Forum / Consortium</td><td>OMG</td><td>Title</td><td>Object Management Group</td></tr>
<tr><td>Creation date</td><td>1989</td><td rowspan="3">MEMBERS
  </td><td rowspan="3">285 member organizations</td></tr>
<tr><td>Chairperson</td><td>Mr. Richard Soley</td></tr>
<tr><td>Involvement of Luxembourg</td><td>/</td></tr>
<tr><td>Web site</td><td colspan="3">http://www.omg.org/index.htm</td></tr>
<tr><td>Scope</td><td colspan="3">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.</td></tr>
<tr><td>Executive summary</td><td colspan="3">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™).</td></tr>
<tr><td>Structure</td><td colspan="3"><u>Domain Technology Committee</u>
- Business Modeling and Integration DTF
- Consultation, Command, Control, Communications & Intelligence (C4I) DTF
- Emergency, Crisis and Major Event Management Domain Special Interest Group (ECMEM DSIG)
- 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

<u>Platform Technology Committee</u>
- Analysis and Design PTF
- Architecture-Driven Modernization PTF
- Middleware and Related Services PTF
- System Assurance PTF
- Agent PSIG
- Data Distribution Services PSIG
- Japan PSIG
- Korea PSIG
- Ontology PSIG
- Software Defined Networking Working Group
- Telecommunications PSIG</td></tr>
</table>

Standardization work	
Published standards	224
Standards under development	Unknown

7.13.7. TOG - The Open Group

<table>
<tr><th colspan="4">General information</th></tr>
<tr><td>Forum / Consortium</td><td>TOG</td><td>Title</td><td>The Open Group</td></tr>
<tr><td>Creation date</td><td>1996</td><td rowspan="3">MEMBERS
  </td><td rowspan="3">521 members</td></tr>
<tr><td>Chairperson</td><td>Mr. Jim Bell</td></tr>
<tr><td>Involvement of Luxembourg</td><td>/</td></tr>
<tr><td>Web site</td><td colspan="3">http://www.opengroup.org/</td></tr>
<tr><td>Scope</td><td colspan="3">The Open Group works with customers and suppliers of IT products and services as well as with consortia and other standards organizations to capture, clarify and integrate current and emerging requirements, establish standards and policies, and share best practices. TOG standards ensure openness, interoperability and consensus.</td></tr>
<tr><td>Executive summary</td><td colspan="3">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:
- 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 consortia;
- Operate the industry's premier certification service.</td></tr>
<tr><td>Structure</td><td colspan="3"><u>Subject Areas</u>
- Enterprise Architecture
- Cloud Computing
- Enterprise Management
- Platforms
- Product Lifecycle
- Real-time & Embedded Systems
- Security
- IT4IT
- Service Oriented Architecture</td></tr>
<tr><th colspan="4">Standardization work</th></tr>
<tr><td>Published standards</td><td colspan="3">268</td></tr>
<tr><td>Standards under development</td><td colspan="3">Unknown</td></tr>
</table>

7.13.8. SNIA - Storage Networking Industry Association

<table>
<tr><th colspan="4">General information</th></tr>
<tr><td>Forum / Consortium</td><td>SNIA</td><td>Title</td><td>Storage Networking Industry Association</td></tr>
<tr><td>Creation date</td><td>1997</td><td rowspan="3">MEMBERS
  </td><td rowspan="3">About 400 member companies</td></tr>
<tr><td>Chairperson</td><td>Mr. David Dale</td></tr>
<tr><td>Involvement of Luxembourg</td><td>/</td></tr>
<tr><td>Web site</td><td colspan="3">http://www.snia.org</td></tr>
<tr><td>Scope</td><td colspan="3">SNIA lead the storage industry worldwide in developing and promoting standards, technologies and educational services to empower organizations in the management of information.</td></tr>
<tr><td>Executive summary</td><td colspan="3">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.

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.</td></tr>
<tr><td>Structure</td><td colspan="3"><u>Technical Work Groups (TWG)</u>
- Cloud Storage TWG
- Disk Resource Management TWG
- Fibre Channel TWG
- File Systems Management TWG
- Green Storage TWG
- I/O Traces, Tools & Analysis TWG
- Linear Tape File Systems TWG
- Long Term Retention TWG
- NVM Programming TWG
- Security TWG
- SMI-S Core TWG
- Solid State Storage TWG
- Storage Media Library TWG</td></tr>
<tr><th colspan="4">Standardization work</th></tr>
<tr><td>Published standards</td><td colspan="3">28</td></tr>
<tr><td>Standards under development</td><td colspan="3">5</td></tr>
</table>

7.13.9. TCG - Trusted Computing Group

<table>
<tr><th colspan="4">General information</th></tr>
<tr><td>Forum / Consortium</td><td>TCG</td><td>Title</td><td>Trusted Computing Group</td></tr>
<tr><td>Creation date</td><td>2003</td><td rowspan="3">MEMBERS
  </td><td rowspan="3">95 member organizations</td></tr>
<tr><td>Chairperson</td><td>Dr. Joerg Borchert</td></tr>
<tr><td>Involvement of Luxembourg</td><td>/</td></tr>
<tr><td>Web site</td><td colspan="3">http://www.trustedcomputinggroup.org/</td></tr>
<tr><td>Scope</td><td colspan="3">TCG recognizes international standards in the field of IT security as the most appropriate method to ensure efficacy, interoperability, adoption and user acceptance. TCG takes into consideration international market requirements through international membership and welcomes participation from industry, academia and governments in a unified, worldwide Trusted Computing standards development process.</td></tr>
<tr><td>Executive summary</td><td colspan="3">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. The Trusted Computing Group (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.

In support of open security standards, TCG encourages all nations to adopt global best practices around standards development and adoption. An open process fully supports worldwide participation from industry, academia and government with fair and transparent development and decision processes. Specifications must be fully transparent and available to all participants, both during development and for implementation. TCG supports the use of published, peer reviewed standards and cryptographic algorithms.</td></tr>
<tr><td>Structure</td><td colspan="3"><u>Workgroups</u>
- Embedded Systems
- Infrastructure
- Mobile Platform
- PC Client
- Server Specific
- Software Stack
- Storage
- Trusted Multi-tenant Infrastructure
- Trusted Network Connect
- Trusted Platform Module
- TCG Software Stack
- Virtualized Platform</td></tr>
<tr><th colspan="4">Standardization work</th></tr>
<tr><td>Published standards</td><td colspan="3">140</td></tr>
<tr><td>Standards under development</td><td colspan="3">Unknown</td></tr>
</table>

7.13.10. 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	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. 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.		
Structure	The following committees are actively working on new and updated UPnP standards: - Audio / Video Working Committee (AV) - Friendly Devices Working Committee (FRIENDLYDEVICES) - Multi-Screen Working Committee (MULTI-SCREEN)		
Standardization work			
Published standards	Unknown		
Standards under development	Unknown		

7.13.11. OGC - The Open Geospatial Consortium

General information			
Forum / Consortium	**OGC**	**Title**	**The Open Geospatial Consortium**
Creation date	1994	**MEMBERS** 	507 companies, government agencies and universities
Chairperson	Mr. Jeffrey Harris		
Involvement of Luxembourg	**1 member (CRP Henri Tudor)**		
Web site	http://www.opengeospatial.org/		
Scope	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 eleven domains: Aviation, Built Environment & 3D, Defence & Intelligence (D&I), Emergency Response & Disaster Management, Geosciences & Environment, Government & Spatial Data Infrastructure, Energy & Utilities, Law Enforcement /Public Safety, Mobile Internet & Location Services, Sensor Webs, University & Research.		
Executive summary	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. 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.		
Structure	**Domain Working Groups:** - 3DIM DWG (3DIM DWG) - Agriculture DWG (Agriculture DWG) - Architecture DWG (Arch DWG) - Aviation DWG (Aviation DWG) - Big Data DWG (BigData DWG) - Catalog DWG (Cat DWG) - Coordinate Reference System DWG (CRS DWG) - Coverages DWG (Coverages DWG) - Data Preservation DWG (PreservDWG) - Data Quality DWG (DQ DWG) - Defense and Intelligence DWG (D and I DWG) - Earth Systems Science DWG (ESS WG) - Emergency & Disaster Management DWG (EDM DWG) - Energy and Utilities DWG (EnergyUtilities) - Geo Rights Management (GeoRM) DWG (GeoRM DWG) - Geography Markup Language (GML) DWG (GML DWG) - Geometry DWG (GeometryDWG) - Geosemantics DWG (Semantics) - Health DWG (Health DWG)		

	- Hydrology DWG (Hydrology DWG) - Land and Infrastructure DWG (LandInfraDWG) - Law Enforcement and Public Safety DWG (LEAPS DWG) - Metadata DWG (Metadata DWG) - Meteorology & Oceanography DWG (Met Ocean DWG) - Mobile Location Services DWG (MLSDWG) - Oblique Imagery DWG (ObliqueImageryD) - Security DWG (SecurityDWG) - Sensor Web Enablement DWG (SensorWeb DWG) - Temporal DWG (Temporal DWG) - University DWG (Univ DWG) - Web Feature Service DWG (WFS DWG) - Workflow DWG (Workflow DWG)
Standardization work	
Published standards	80
Standards under development	Unknown

7.13.12. GS1 - Global Standards

General information			
Forum / Consortium	**GS1**	**Title**	**Global Standards**
Creation date	1973	**MEMBERS** 	Member Organizations in over 100 countries
Chairperson	Mr. Timothy Smucker		
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	Standards Maintenance Groups (SMGs): - 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 Mission-specific Work Groups (MSWGs): - GSMP AIDC Healthcare Application Standard Updates MSWG - GSMP B2C Trusted Source of Data (TSD) MSWG - GSMP EPC Information Service (EPCIS) 1.1 and Core Business Vocabulary (CBV) MSWG - GSMP GLN Allocation Rules Update MSWG - GSMP GTIN+ on the Web MSWG - GSMP Next Generation Product Identification (NGPI) - GSMP Event Based Traceability MSWG aka GSMP Pedigree Security, Choreography and Checking Service MSW - HAG UHF Air Interface 1and2 Work Group		
Standardization work			
Published standards	Unknown		
Standards under development	Unknown		

7.13.13. SPICE User Group

General information			
Forum / Consortium	**SPICE User Group**	**Title**	**Software Process Improvement and Capability dEtermination User Group**
Creation date	1993	**MEMBERS** 	Unknown
Chairperson	/		
Involvement of Luxembourg	/		
Web site	http://spiceforum.ning.com/		
Scope	The SPICE User Group: - Acts as a leadership forum for users of ISO/IEC 15504 & 330xx; - Promotes the practical and beneficial use of ISO/IEC 15504 & 330xx; - Contributes to the development of and provides user feedback on the use of ISO/IEC 15504 & 330xx; - Provides an active program of networking, information exchange, conferences, events and support for users of ISO/IEC 15504 & 330xx; - Provides user confidence in claims of compliance and conformance to requirements of ISO/IEC 15504 & 330xx.		
Executive summary	/		
Structure	/		
Standardization work			
Published standards	Unknown		
Standards under development	Unknown		

7.13.14. ISOC - The Internet Society

General information			
Forum / Consortium	**ISOC**	**Title**	**The Internet Society**
Creation date	1992	**MEMBERS** 	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	97 members[96]		
Web site	http://www.internetsociety.org/		
Scope	To promote the open development, evolution, and use of the Internet for the benefit of all people throughout the world. To help achieve its mission, the Internet Society: - Facilitates open development of standards, protocols, administration, and the technical infrastructure of the Internet; - Supports education in developing countries specifically, and wherever the need exists; - Promotes professional development and builds community to foster participation and leadership in areas important to the evolution of the Internet; - Provides reliable information about the Internet; - Provides forums for discussion of issues that affect Internet evolution, development and use in technical, commercial, societal, and other contexts; - Fosters an environment for international cooperation, community, and a culture that enables self-governance to work; - Serves as a focal point for cooperative efforts to promote the Internet as a positive tool to benefit all people throughout the world; - Provides management and coordination for on-strategy initiatives and outreach efforts in humanitarian, educational, societal, and other contexts.		
Executive summary	The IETF is an organized activity of the Internet Society. ISOC 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 publish the *IETF Journal* three times a year in advance of each IETF meeting.		
Structure	/		
Standardization work			
Published standards	/		
Standards under development	/		

[96] http://www.isoc.lu/l-association/les-membres

7.13.15. OMA - The Open Mobile Alliance

General information			
Forum / Consortium	**OMA**	**Title**	**The Open Mobile Alliance**
Creation date	2002	**MEMBERS** 	101 organizations
Chairperson	Mr. Gary K. Jones		
Involvement of Luxembourg	/		
Web site	http://openmobilealliance.org/		
Scope	- 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	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.		
Structure	Committees: - Release and Planning Management Working groups: - Architecture - Communications (COM) - Content Delivery - Device Management - Interoperability - Location - Requirements		
Standardization work			
Published standards	167		
Standards under development	Unknown		

8. ICT AND ECONOMIC INTERSECTORAL APPROACH

Today, ICT is predominant and is a keystone of the global economy. ICT can be considered as a horizontal support of many other sectors in the worldwide economy. The examples of sectors where ICT is a cornerstone are numerous and obvious: aeronautics, automotive, energy, biomedical, logistics, space, etc.

In the frame of the standards analysis of different sectors in Luxembourg, the ICT sector can be seen as a supporting sector. The following sections describe the link established between the ICT sector and other sectors. Sections 8.1 to 8.4 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 8.5 is dedicated to potential sectors to be analyzed in the future *via* a standards analysis.

8.1. ICT AS A SUPPORTING SECTOR OF THE ARCHIVING SECTOR

8.1.1. 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 information[97]. 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.

Version 2.0 of the "Technical regulation requirements and controls for certifying Digitisation or Archiving Service Providers (PSDCs)"[98] was published on June 6, 2014. 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. If the criteria of verification established by the law related to electronic archiving (in preparation) and by the *ad hoc* quality system of ILNAS (Digital trust department) are confirmed, ILNAS will proceed 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 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:

[97] ILNAS, White Paper "Digital Trust - Towards excellence in ICT", Version 2.0, 2014
[98] http://www.portail-qualite.public.lu/fr/documentations/confiance-numerique/surveillance-psdc/regle-technique-psdc/ilnas-regle-technique-psdc-v2-0/TechnicalRegulationPSDC_EN_v2_0.pdf

- 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.

8.1.2.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.

8.2. ICT AS A SUPPORTING SECTOR OF THE ENERGY SECTOR

8.2.1. Standardization in the energy sector and ICT

In line with the priorities set by the Government of the Grand Duchy of Luxembourg, the sector of energy has been identified as a carrier for the national economy[99]. In this context, five subsectors have been defined in the frame of the standards watch of the energy sector conducted in October 2013 by ILNAS in order to survey it:

- 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 a grid using computer technologies to optimize production and distribution of energy. The objective is to better link the supply and demand between producers and consumers in order to save energy. 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. 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. In January 28, 2013, the Smart Grid Coordination Group[100] concluded that standardization was ready, that current industry applications were already supported by standards and that there was a systematic process in place (for example, guides were published, a work program was implemented, an overview on available and coming standards was available, etc.).Nevertheless, 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 cooperation and European integration, particularly through the European Network of Transmission System Operators for Electricity (ENTSO-E)[101].

In order to protect consumers' personal data when it comes to smart meters and smart grids, the European Commission has also produced guidance on data protection and privacy for data controllers and investors in smart grids (Data Protection Impact Assessment Template supported by Commission Recommendation 2014/724/EU[102]). Furthermore, the European Network and Information Security Agency (ENISA) has drawn-up security measures to help smart grid providers improve the infrastructures' cyber resilience[103].

[99] http://www.portail-qualite.public.lu/fr/publications/normes-normalisation/etudes-nationales/standards-analysis-energy-october-2013/standards-analysis-energy-sector-october-2013.pdf
[100] The Smart Grid Coordination Group was established in June 2011 and is a JWG Cen-Cenelec-ETSI
[101] https://www.entsoe.eu/about-entso-e/Pages/default.aspx
[102] http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32014H0724&from=EN
[103] https://ec.europa.eu/energy/sites/ener/files/documents/20140409_enisa_0.pdf

Last but not least, on October 25, 2012, the EU adopted the Directive 2012/27/EU[104] on energy efficiency. This Directive establishes a common framework of measures for the promotion of energy efficiency within the Union in order to ensure the achievement of the Union's 2020 goal: 20% headline target on energy efficiency and to pave the way for further energy efficiency improvements beyond that date. It lays down rules designed to remove barriers in the energy market and overcome market failures that impede efficiency in the supply and use of energy, and provides for the establishment of indicative national energy efficiency targets for 2020.

8.2.2. Technical Committees related to ICT in the energy sector

Two technical committees have been selected as relevant for this subsector, respectively one 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

Recently, ISO/IEC JTC 1/WG 7 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, six parts of Sensor Network Reference Architecture (RA) have been published by this WG since 2013 and the last is still under development:

- *ISO/IEC 29182-1:2013, Information technology -- Sensor networks: Sensor Network Reference Architecture (SNRA) -- Part 1: General overview and requirements;*
- *ISO/IEC 29182-2:2013, Information technology -- Sensor networks: Sensor Network Reference Architecture (SNRA) -- Part 2: Vocabulary and terminology;*
- *ISO/IEC 29182-3:2013, Information technology -- Sensor networks: Sensor Network Reference Architecture (SNRA) -- Part 3: Reference architecture views;*
- *ISO/IEC 29182-4:2013, Information technology -- Sensor networks: Sensor Network Reference Architecture (SNRA) -- Part 4: Entity models;*
- *ISO/IEC 29182-5:2013, Information technology -- Sensor networks: Sensor Network Reference Architecture (SNRA) -- Part 5: Interface definitions.*
- *ISO/IEC 29182-6:2014, Information technology -- Sensor networks: Sensor Network Reference Architecture (SNRA) -- Part 6: Applications.*
- *ISO/IEC 29182-7:2014, Information technology -- Sensor networks: Sensor Network Reference Architecture (SNRA) -- Part 7: Interoperability guidelines (under development).*

European Level

Technical Committee
CEN/CENELEC/ETSI JWG Smart Grid Coordination Group (SG-CG)

[104] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2012:315:0001:0056:EN:PDF

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

8.3.1. Standardization in the biomedical technologies sector and ICT

In line with the priorities set by the Government of the Grand Duchy of Luxembourg, the sector of biomedical technologies has also been identified as a carrier for the national economy. 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 analysis[105], 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. eHealth is a recent term, dating back to at least 1999, and various different definitions have been used over time to designate ICT applications in the health domain.

For the Journal of Medical Internet Research – JMIR, eHealth "[...] *is an emerging field in the intersection of medical informatics, public health and business, referring to health services and information delivered or enhanced through the internet and related technologies*[106]".

From the European Commission, eHealth is "[...] *the ICT tools and services for health. It covers the interaction between patients and health-service providers, institution-to-institution transmission of data, or peer-to-peer communication between patients and/or health professionals*[107]".

According to the World Health Organization (WHO) definition, "*eHealth is the transfer of health resources and health care by electronic means. It encompasses three main areas:*

- *The delivery of health information, for health professionals and health consumers, through the internet and telecommunications;*
- *Using the power of ICT and e-commerce to improve public health services, e.g. through the education and training of health workers;*
- *The use of e-commerce and e-business practices in health systems management*[108]".

The notion of eHealth covers all aspects of health. The eHealth objective is not simply to exchange files between public health institutions, but also to increase the use of eHealth technologies and the necessary reforms in health systems and, thereby, to move towards the overall improvement of health on a global scale. (Source: ITU).

[105] http://www.portail-qualite.public.lu/fr/publications/normes-normalisation/etudes-nationales/standards-analysis-biomedical-october-2013/standards-analysis-biomedical-october-2013.pdf
[106] http://www.jmir.org/2001/2/e20/
[107] http://europa.eu/rapid/press-release_MEMO-12-959_en.htm
[108] http://www.who.int/trade/glossary/story021/en/

The eHealth sector includes many dimensions, 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, in 2011, 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.

8.3.2.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

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)

Other Initiatives
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.

8.4. ICT AS A SUPPORTING SECTOR OF THE SPACE SECTOR

8.4.1. 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 analysis[109], 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.

8.4.2. 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

[109] http://www.portail-qualite.public.lu/fr/publications/normes-normalisation/etudes-nationales/standards-analysis-space-november-2013/standards-analysis-space-sector-november-2013.pdf

8.5. 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**
  - ISO/TC 68 - Financial services
  - CEN/TC 263 - Secure storage of cash, valuables and data media
  - ISO/IEC JTC 1/WG 7 - Sensor Networks (Automation of facilities management and security)

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

- **Railway sector**
  - CLC/TC 9X - Electrical and electronic applications for railways
  - ETSI/TC RT - Railways Telecommunications
  - 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**
  - ISO/TC 36 - Cinematography
  - ISO/TC 42 - Photography
  - ISO/TC 130 - Graphic technology
  - IEC/TC 100 - Audio, video and multimedia systems and equipment
  - CLC/SR 100 - Audio, video and multimedia systems and equipment
  - CLC/TC 100X - Audio, video and multimedia systems and equipment and related sub-systems

- **Geographic information/Geomatics sector**
  - ISO/TC 211 - Geographic information/Geomatics
  - CEN/TC 287 - Geographic Information

- **Ergonomics sector**
  - ISO/TC 159 - Ergonomics
  - CEN/TC 122 - Ergonomics

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

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

- **Maritime sector**
  - ISO/TC 8 - Ships and marine technology
  - 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**
  - ISO/TC 29 - Small tools
  - IEC/TC 65 - Industrial-process measurement, control and automation
  - IEC/TC 22 - Power electronic systems and equipment
  - CEN/TC 310 - Advanced Automation Technologies and their Applications
  - CLC/TC 65X - Industrial-process measurement, control and automation
  - 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**
  - IEC/TC 108 - Safety of electronic equipment within the field of audio/video, information technology and communication technology
  - CLC/TC 108X - Safety of electronic equipment within the fields of Audio/Video, Information Technology and Communication Technology
  - ISO/IEC JTC 1/WG 7 - Sensor Networks (Environment observation, forecasting, and protection)

- **Building sector**
  - CEN/TC 247 - Building Automation, Controls and Building Management
  - ISO/IEC JTC 1/WG 7 - Sensor Networks (Remote habitat monitoring and automation; Smart homes)

- **Public sector**
  - ISO/IEC JTC 1/WG 7 - Sensor Networks (Homeland security; Civil protection and public safety)

- **Agriculture sector**
  - ISO/IEC JTC 1/WG 7 - Sensor Networks (Automation and control of agriculture processes)

- **Research, Development and Innovation sector**
  - ISO/IEC JTC 1/WG 7 - Sensor Networks

- **E-commerce & e-business sector**
  - CEN/WS eCAT - eCataloguing (Multilingual catalogue strategies for ecommerce and ebusiness
  - CEN/ WS eBES - eBusiness European Standardization, EDI and ebXML
  - CEN/WS GITB2 - Global eBusiness test bed methodologies phase2
  - CEN/TC 434 - Project Committee - Electronic Invoicing

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"[110], ANEC GIE, under the supervision of ILNAS, will provide the most relevant information for the national ICT standardization community by participating directly in technical standardization committees. This mission will particularly be achieved by the involvement of ANEC GIE 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

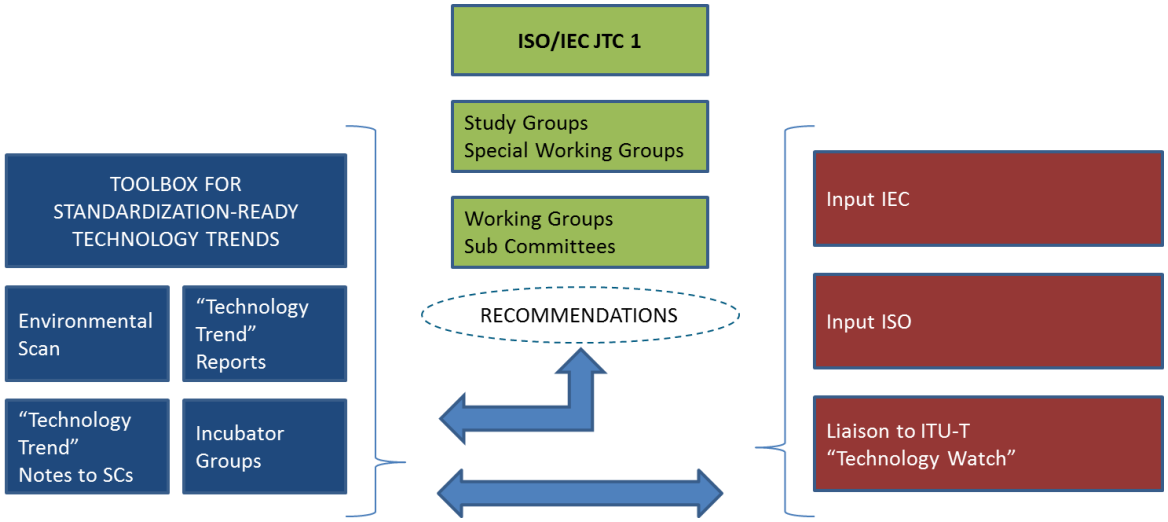
ISO, IEC and ITU-T have developed processes to guarantee a successful standardization roadmap in line with the market needs. In this frame, they have also established working groups intended to identify technology trends defined as "mature" for standardization work. The most relevant group for ICT related 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:

[110] 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

Figure 5: ISO/IEC JTC 1/SWG-P tools to support perspective setting regarding standardization-ready technology trends[111]



- 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, two new technology areas will be investigated by ISO/IEC JTC 1/SWG-P until the next JTC 1 Plenary Meeting:

- 3D Scanning and Printing;
- Smart Machines.

[111] Source: ISO/IEC JTC 1/SWG-P

10. CONCLUSION

Today, ICT is one of the most active and promising sectors both at national and international levels. It is a major source of growth and economic development. Maybe more importantly, it supports other economic sectors (health, energy, space, automotive, etc.), being a source of progress and providing added value to these sectors.

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

As described in the national standardization strategy 2014-2020[112], ICT is a horizontal sector supporting many innovative 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"[113]. 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 companies (Skype, Amazon, iTunes, RTL Group, PayPal, etc.)[114] 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.

[112] http://www.portail-qualite.public.lu/fr/publications/normes-normalisation/orientations-strategiques/strategie-normative-2014-2020/luxembourg-standardization-strategy-2014-2020.pdf
[113] 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
[114] http://ict.investinluxembourg.lu/ict/success-stories

11. APPENDIX

11.1. PARTICIPATION IN THE STANDARDIZATION PROCESS

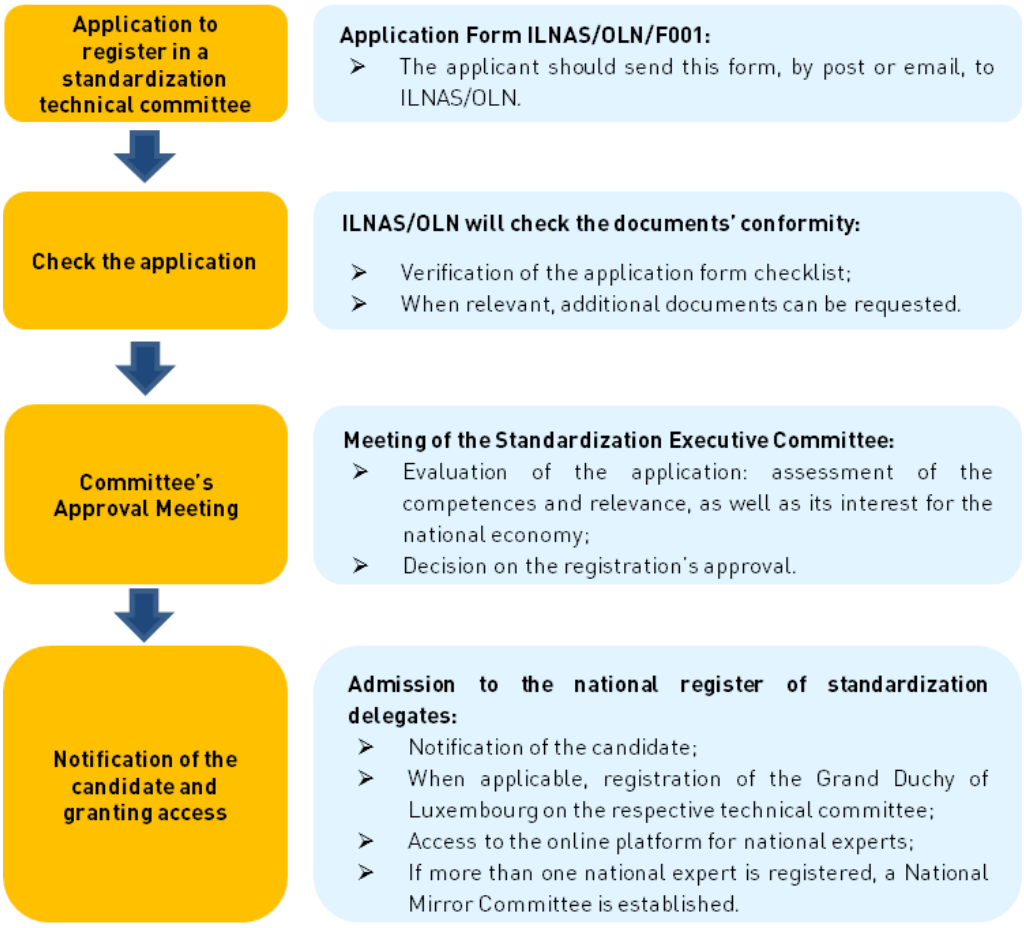
ILNAS, as the national standards body, is a member of European and international standardization organizations. In this frame, ILNAS *via* OLN can count with experts from administrations, public services, professional organizations, groups, associations or institutions interested in standardization, 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/P001[115].

❖ 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



[115] 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/A003[116]);
- 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, if you have skills and experience in the ICT field or if you want to anticipate future requirements and influence the market, then do not hesitate to join the standardization process. A simple registration form has to be completed and sent to ILNAS. After your application is approved, ILNAS will grant you full access to standardization works and you will become a full member of the standards network.

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

[116] http://www.portail-qualite.public.lu/fr/documentations/normes-normalisation/delegue-normalisation/ilnas-oln-A003-charte-utilisation-logo-ilnas-network/ilnas-oln-A003-charte-utilisation-logo-ilnas-network.pdf

11.2. LIST OF ACRONYMS

ACRONYM	TITLE
3GPP	3rd Generation Partnership Project
AB	Advisory Board
ADL	Advanced Distributed Learning
AEI	Automatic Equipment Identification
AENOR	*Asociación Española de Normalización y Certificación*
AFNOR	*Association Française de Normalisation*
AGICOA	The Association for the International Collective Management of Audiovisual Works
AHG	Ad Hoc Group
AHS	Ad Hoc Group on Structure
AICC	Aviation Industry CBT Committee
AIDC	Automatic Identification and Data Capture
AMEX	American Express
AMT	Advanced Manufacturing Technologies
ANEC	European Association for the Co-ordination of Consumer Representation in Standardization
ANEC GIE	*Agence pour la Normalisation et l'Economie de la Connaissance*
ANSI	American National Standards Institute
API	Application programming interface
APSI	*Association des Professionnels de la Société de l'Information*
ARC	Augmented Reality Continuum
ASN.1	Abstract Syntax Notation One
ATIS	Alliance for Telecommunications Industry Solutions
ATM	Automated Teller Machine
ATSC	The Advanced Television System Committee
AUF	*Agence Universitaire de la Francophonie*
AVI	Automatic Vehicle Identification

ACRONYM	TITLE
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	*Centre Européen des Consommateurs*
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
CIDOC	International Documentation Committee, International Council of Museums
CIE	International Commission on Illumination
CISAC	International Confederation of Societies of Authors and Composers
CLUSIL	*CLUb de la Sécurité de l'Information – Luxembourg*
CNPD	*Commission Nationale pour la Protection des Données*
COCIR	European Coordination Committee of the Radiological, Electromedical and Healthcare IT Industry
CRP	Public Research Center
CSS	Cascading Style Sheets
CSSF	*Commission de Surveillance du Secteur Financier*
CWA	CEN Workshop Agreement
DAPS	Distributed Application Platforms and Services
DICOM	Digital Imaging and Communication in Medicine
DIN	*Deutsches Institut für Normung*
DIS	Draft International Standard

ACRONYM	TITLE
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	*Conseil Européen des Paiements*
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	*Fédération de l'ILM (Information Lifecycle Management), du Stockage et de l'Archivage*
FG	Focus Group
FIA	*Fédération Internationale de l'Automobile*
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

ACRONYM	TITLE
ICT	Information and Communication Technology
IDC	International Data Corporation
ID-Cards	Identification Cards
IEC	International Electrotechnical Commission
IFLA	International Federation of Library Associations and Institutions
IG	Incubator Group
IIF	International Institute of Refrigeration
ILNAS	*Institut Luxembourgeois de la Normalisation, de l'Accréditation, de la Sécurité et qualité des produits et services*
ILO	International Labour Organization
ILR	*Institut Luxembourgeois de Régulation*
INCOSE	International Council on Systems Engineering
INLAC	Latinoamerican Institute for Quality Assurance
IoT	Internet of Things
IP	Internet Protocol
ISACA	Information Systems Audit and Control Association
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

ACRONYM	TITLE
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

ACRONYM	TITLE
NP	New Proposal
NWIP	New Work Item Proposal
ODR	Online Dispute Resolution
OLAS	*Office Luxembourgeois d'Accréditation et de Surveillance*
OLN	*Organisme luxembourgeois de normalisation*
O-member	Observing member
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	*Prestataire de Services de Certification*
PSDC	*Prestataire de Services de Dématérialisation et/ou de Conservation*
PSF	*Prestataire de Services Financiers*
R&D	Research and Development
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

ACRONYM	TITLE
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	*Security made in Lëtzebuerg*
SMPTE	Society of Motion Picture and Television Engineers
SNCH	*Société Nationale de Certification et d'Homologation*
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
TCP	Transmission Control Protocol
TLS	Transport Layer Security
TR	Technical Report

ACRONYM	TITLE
TS	Technical Specification
TTA	Telecommunications Technology Association
TTC	Telecommunication Technology Committee
UCS	Universal Character Set
UI	User Interface
UIC	International Union of Railways
UITP	International Association of Public Transport
ULC	*Union Luxembourgeoise des Consommateurs*
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	*Ente Nazionale Italiano di Unificazione*
USB	Universal Serial Bus
UPnP	Universal Plug and Play
UPU	Universal Postal Union
URL	Uniform Resource Locator
VSE	Virtual Storage Extended
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
XML	Extensible Markup Language

ACRONYM	TITLE
XMPP	Extensible Messaging and Presence Protocol

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