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Workshop
« Normalisation & Green Computing »

February 9, 2016

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PROGRAM

- Introduction
- Presentation of the White paper “Green Computing”
- Standardization & Green Data Centers
- Participating in standardization Technical Committees in Luxembourg
- Roundtable

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INTRODUCTION

Dr. Jean-Philippe HUMBERT - ILNAS

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ILNAS, Institut Luxembourgeois de la Normalisation, de l'Accréditation, de la Sécurité et qualité des produits et services

- **Creation:** Law dated July 14, 2014 (repealing the amended Law of May 20, 2008)
- **Status:** Public administration under the authority of the Minister of the Economy
- **Total staff:** 36 civil servants (February 2016)

Luxembourg's Standardization Strategy 2014-2020

PILLAR 1	Information and communication technologies (ICT)

- Support and constant **development of the standardization field dedicated to ICT**
- Implementation of the **Luxembourg's Policy on ICT standardization (2015-2020)**
  - Developing the interest and the involvement of the market
  - Promoting and reinforcing the participation of the market
  - Supporting and strengthening the education about standardization and related research activities
- Detection of **niche opportunities for economic developments**

PILLAR 2	National influence and compliance with legal attributions

PILLAR 3	Products and services

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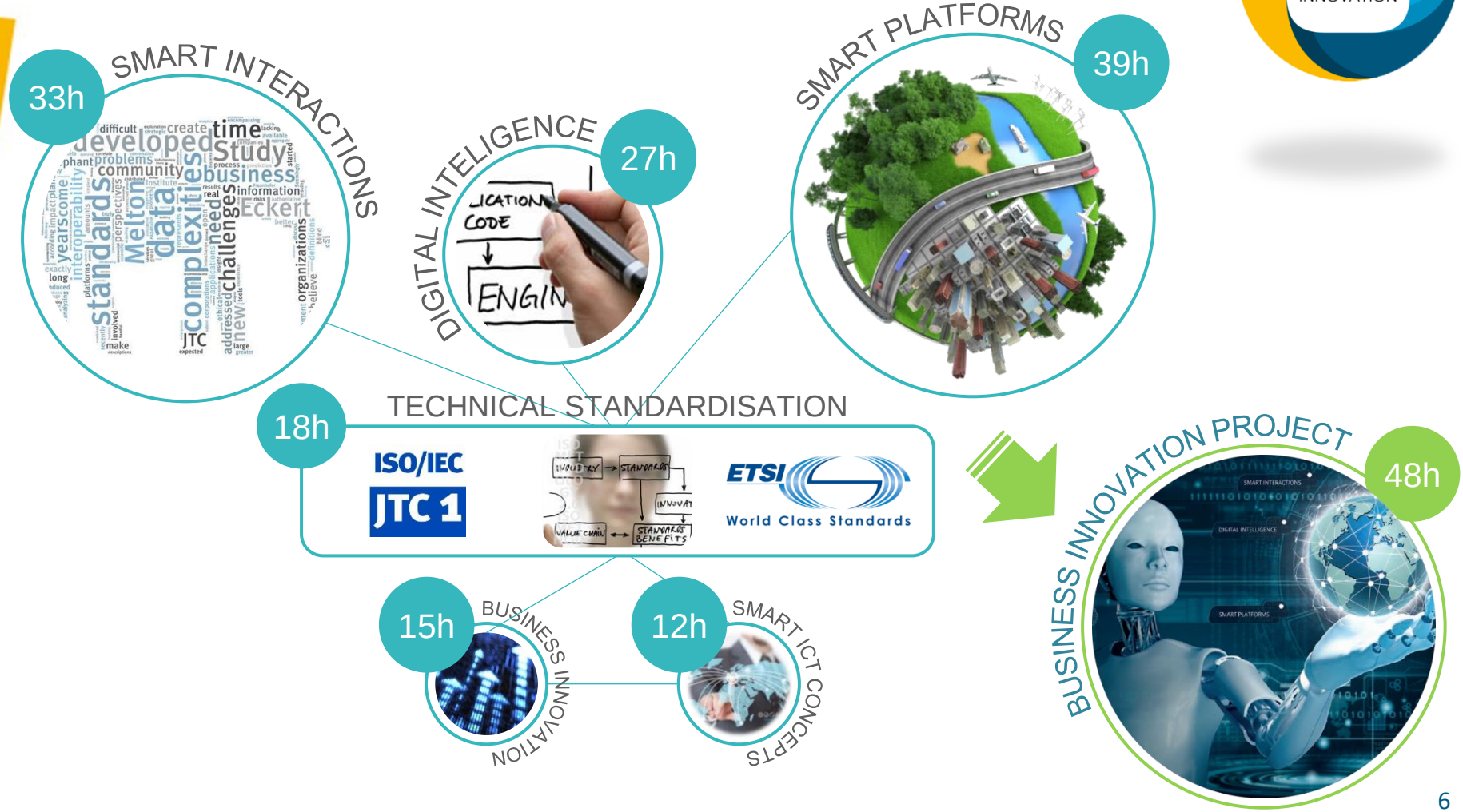
SMART ICT 4business INNOVATION

University certificate “Smart ICT for Business Innovation”



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2015/2016

SUPPORTING ORGANISATIONS:

LE GOUVERNEMENT DU GRAND DUCHE DE LUXEMBOURG Ministère de l'Économie

cen

CENELEC

ETSI World Class Standards

CHAMBRE DE COMMERCE LUXEMBOURG

CIONET

technoport® business incubator | coworking | fab lab

DIAMOND PARTNER - CLASS OF 2015 OFFICIAL SPONSOR:

FUJITSU

GOLD PARTNERS:

actimage digital intelligence

creos

DELL

Post Luxembourg Telecom PSF

SILVER PARTNERS:

arms Group

ATHENA CONSEIL

Microsoft

sas THE POWER TO KNOW.

telindus a Proximus company

2016/2017

UNDER DISCUSSION

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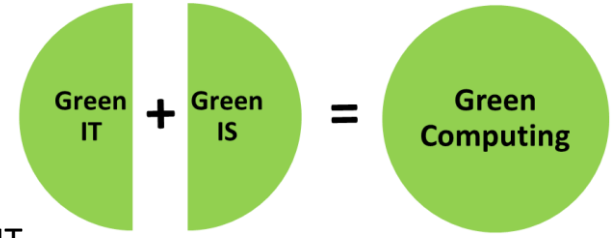
WHITE PAPER “GREEN COMPUTING”

Dr. Jean-Philippe HUMBERT - ILNAS

1 INTRODUCTION
2 GREEN COMPUTING
3 GREEN TECHNOLOGIES
4 GREEN FRAMEWORKS
5 STANDARDIZATION
6 ECO-MANAGEMENT AND AUDIT SCHEME (EMAS)
7 CONCLUSIONS AND OUTLOOK

- **Green IT**
  - Reducing the environmental impact of IT (hardware and software) throughout its life cycle
- **Green IS**
  - developing and using information systems to reduce the environmental impact of products and services that require IT



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- **Green IT value model**
  - Mechanisms to assist an organization to reach the goal of environmental sustainability
- **Green IS value model**
  - Coercive and mimetic pressures that regulations and customers exert on organizations, and how such pressures can be transformed into an added value

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7 CONCLUSIONS AND OUTLOOK

- Different **technologies** and **capabilities** that are frequently **employed to achieve environmental sustainability in or by IT usage**
  - Cloud Computing
  - Computer power management
  - Data Center design
  - Smart Grid and Smart Meters
  - Software algorithmic efficiency
  - Etc.

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7 CONCLUSIONS AND OUTLOOK

- Two **strategies or frameworks orchestrating best "green practices" to foster the environmental sustainability of organizations**
  - **Generic Competitive Environmental Strategies**

Competitive Advantage	Differentiation	Beyond compliance leadership	Eco-branding
	Lower costs	Eco-efficiency	Environmental cost leadership
		Processes	Products & Services
		Competitive Focus	

- Assists firms to define and prioritize areas to invest in Green IS
- Helps to optimize the overall economic return on such investments and convert it into competitive advantage

  - **Framework for environmentally sustainable IT and IS research**

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7 CONCLUSIONS AND OUTLOOK

- Extensive **survey about standardization** for companies to adopt Green IT and Green IS practices
  - ISO
  - IEC
  - CENELEC
  - ETSI
  - ITU-T
  - ECMA
  - IEEE
- Examples:
  - **ISO 14000** family of environmental management standards
  - **ISO 50001** for energy management systems
  - Etc.

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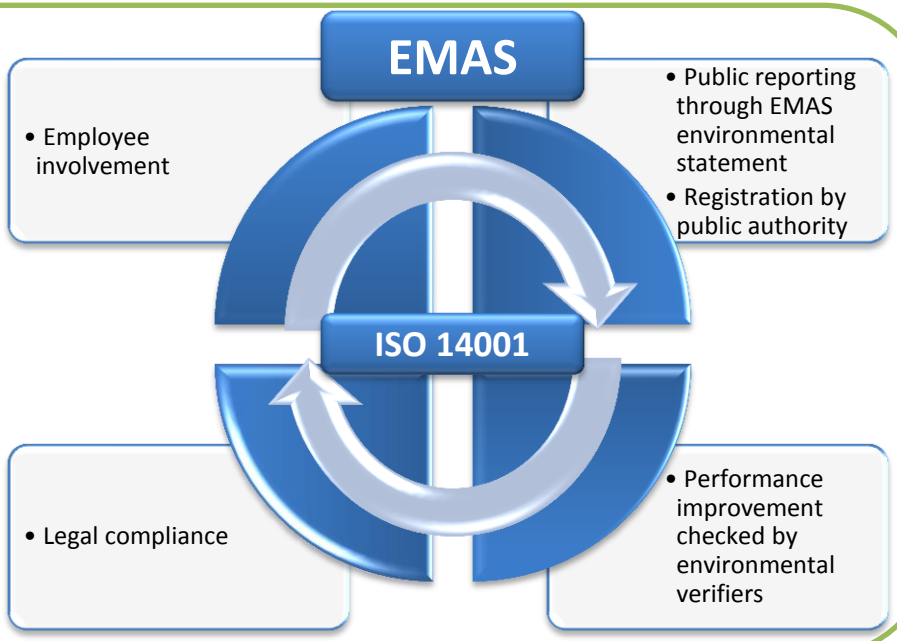
- **Eco-management and audit scheme (EMAS)**
  - **EU regulation** - voluntary environmental management tool for companies
  - Objectives:
    - **Improve environmental and financial performance**
    - **Communicate environmental achievements** to stakeholders and society
  - Audit scheme **strongly based on ISO 14001** "Environmental management system"



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- http://www.portail-qualite.public.lu/fr/publications/normes-normalisation/information-sensibilisation/white-paper-green-computing/white-paper-green-computing.pdf

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STANDARDIZATION & GREEN DATA CENTERS

Dr. Johnatan PECERO - ANEC GIE

Mr. Nicolas DOMENJOUD - ANEC GIE

Standardization organizations

	National Level	European Level	International Level
Standardization in general	ILNAS	cen	ISO
Electotechnical standardization	ILNAS	CENELEC	IEC
Telecommunication standardization	ILNAS	ETSI World Class Standards	ITU *

Vienna Agreements

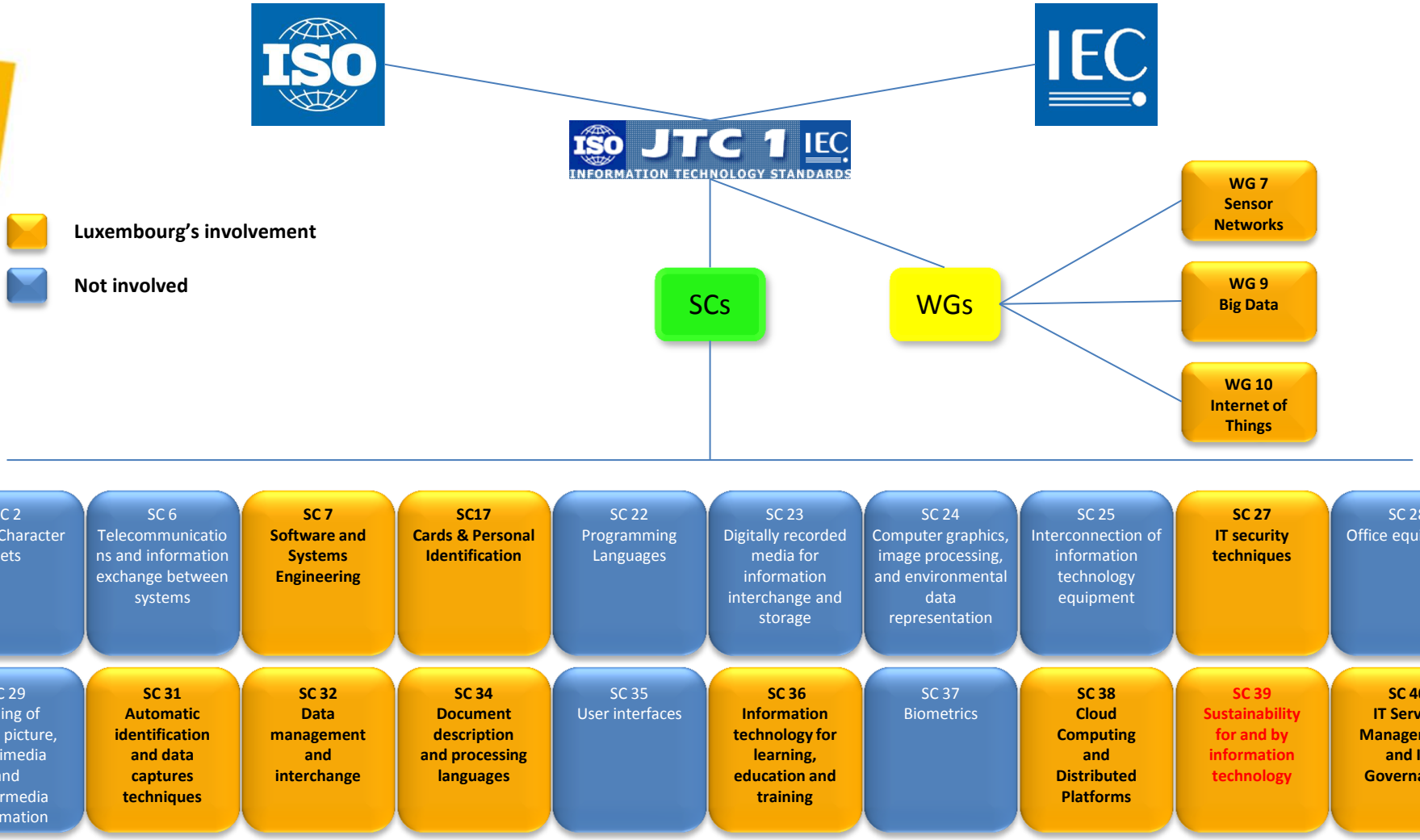
Dresden Agreements

ISO JTC 1 IEC INFORMATION TECHNOLOGY STANDARDS

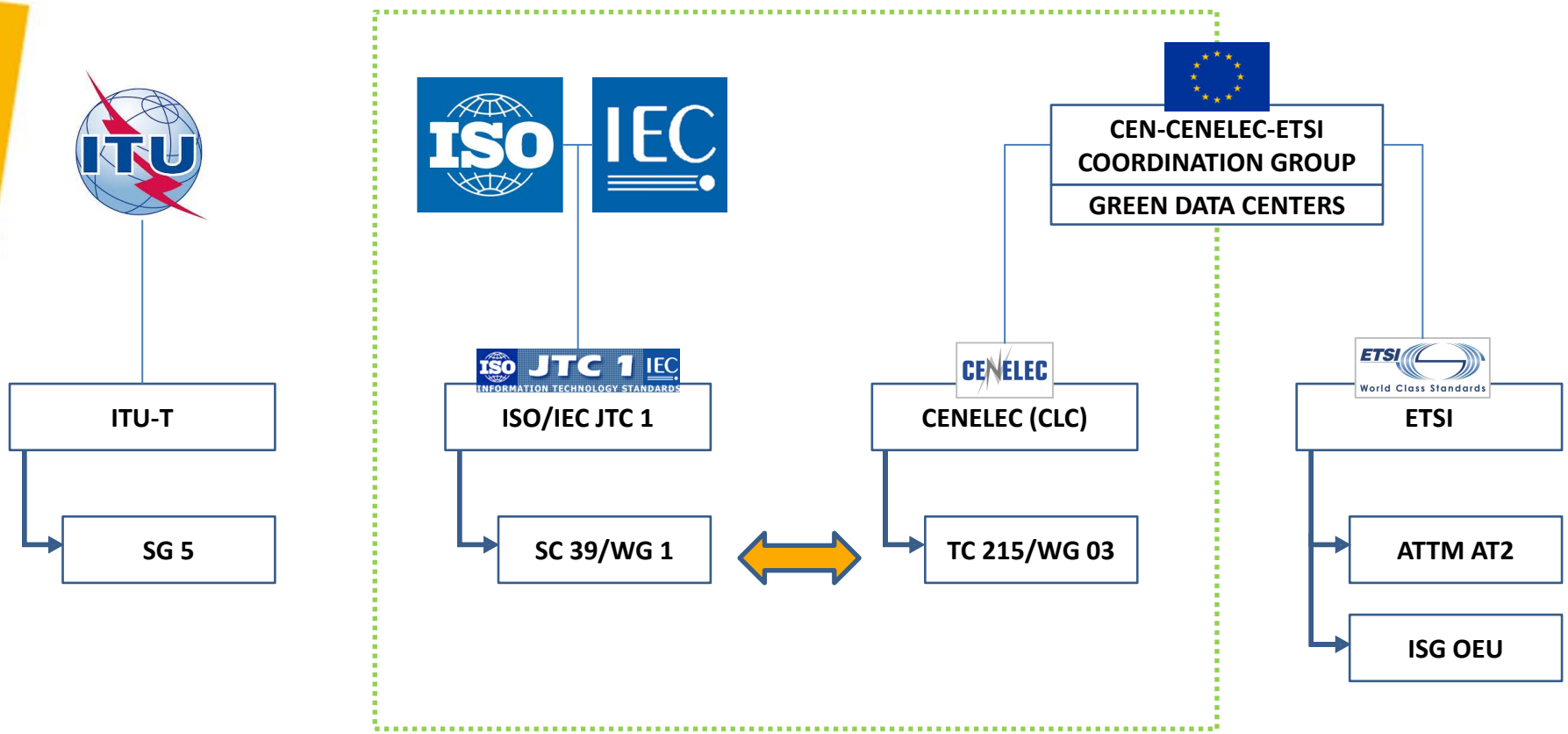
* ITU-T

Fora & Consortia

ISO/IEC JTC 1 representation at the national level



Standardization environment for Green Data Centers



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ISO/IEC JTC 1/SC 39 - Sustainability for and by Information Technology

- **Structure:**
  - **WG 1 - Resource Efficient Data Centres**
  - WG 2 - Green ICT
- **Scope:** Standardization related to the intersection of resource efficiency and IT which supports environmentally and economically viable development, application, operation and management aspects
- **Luxembourg's involvement:**
  - Mr. Didier MONESTES (SYan)
  - Mr. Bruno FERY (EBRC)
  - Mr. Antoine FRANCOIS (EBRC)
  - Mr. Sébastien RENAULD (EBRC)
  - Mr. Sébastien RICHARD (EBRC)
  - Mr. Johnatan PECERO (ANEC GIE)

ISO JTC 1 IEC INFORMATION TECHNOLOGY STANDARDS

CENELEC/TC 215 - Electrotechnical aspects of telecommunication equipment

- **Structure:**
  - WG 01 - Cabling design
  - WG 01-04 - Testing of installed cabling
  - WG 02 - Cabling installation - Quality assurance and installation practices
  - **WG 03 - Facilities and infrastructures**
- **Scope :** 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 (WG 03)
- **Luxembourg's involvement:**
  - Mr. Didier MONESTES (SYan)
  - Mr. Bruno FERY (EBRC)
  - Mr. Antoine FRANCOIS (EBRC)
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  - Mr. Sébastien RICHARD (EBRC)

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ISO/IEC AWI TR 30133, IT -- Data centres

Guidelines for resource efficient data centres

ISO JTC 1 IEC INFORMATION TECHNOLOGY STANDARDS

- This Technical Report provides generally applicable guidelines to improve the resource efficiency of data centres for any field of application
- The guidelines for resource efficiency improvement deal with various establishment and operation aspects such as data centre planning, management, cooling, power feeding, ICT and also cost aspects that are not restricted
- This Technical Report focuses on continuous improvement processes, design and guidelines that prioritize resource efficiency. In general the processes and guidelines are neutral to technology and location

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ISO JTC 1 IEC INFORMATION TECHNOLOGY STANDARDS

CENELEC

ISO/IEC FDIS 30134-1 / prEN 50600-4-1*

Part 1: Overview and general requirements for KPIs

- Definitions and terminology for data centre resource efficiency Key Performance Indicators (KPIs) used within the series ISO/IEC 30134 / EN 50600-4
- Common requirements and objectives for the data centre resource efficiency KPIs of series ISO/IEC 30134 / EN 50600-4
- General information regarding the use of data centre resource efficiency KPIs of series ISO/IEC 30134 / EN 50600-4
- Common structure for the other standards in series ISO/IEC 30134 / EN 50600-4

* *- ISO/IEC FDIS 30134-1, Information Technology -- Data Centres – KPIs -- Part 1: Overview and general requirements*
- prEN 50600-4-1 - Data centre facilities and infrastructures - Part 4-1: Overview and general requirements for KPIs

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ISO JTC 1 IEC INFORMATION TECHNOLOGY STANDARDS

CENELEC

ISO/IEC FDIS 30134-2 / prEN 50600-4-2*

Part 2: Power usage effectiveness (PUE)

- Defines the Power Usage Effectiveness (PUE) of a data center and introduce PUE measurement categories
- Describes the relationship of this KPI to a data center's infrastructure, IT equipment and IT operations
- Defines the measurement, the calculation and the reporting of the parameter
- Provides information on the correct interpretation of the PUE

* *- ISO/IEC FDIS 30134-1, Information Technology -- Data Centres -- KPIs -- Part 2: Power Usage Effectiveness (PUE)*
- prEN 50600-4-2 - Data centre facilities and infrastructures - Part 4-2: Key performance indicator PUE

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ISO JTC 1 IEC INFORMATION TECHNOLOGY STANDARDS

CENELEC

ISO/IEC FDIS 30134-3 / prEN 50600-4-3*

Part 3: Renewable Energy Factor (REF)

- Specifies the REF as a KPI to quantify the use of renewable energy managed by owner/operator for their data center. Renewable energy here is in the form of electricity
  - Ratio of renewable energy use to all the energy use of the data center
- Standardization and representation of a methodology to calculate REF
- REF does not include usage of water or other resources, and assessment of carbon footprint of the data center

* *- ISO/IEC FDIS 30134-3, Information Technology -- Data centres -- KPIs -- Part 3: Renewable energy factor (REF)*
- prEN 50600-4-3 - Data centre facilities and infrastructures - Part 4-3: Key performance indicator REF

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ISO/IEC CD 30134-4, IT -- Data Centres -- KPIs

Part 4: IT Equipment Energy Efficiency for Servers ($ITEE_{SV}$)

- Specifies the process of deriving $ITEE_{SV}$ as a KPI which quantifies the energy efficiency capacity (maximum capability of work per unit energy) of the servers in a data center
  - $ITEE_{SV}$ reflects only the potential energy effectiveness of servers and not a working situation of servers
  - $ITEE_{SV}$ is a KPI intended for self-improvement of a given data center or a part of a data center, not for comparison among different data centers

- This document specifies a process by which server effectiveness relative to energy be calculated using a choice of pre-existing or context specific performance benchmarks

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ISO JTC 1 IEC INFORMATION TECHNOLOGY STANDARDS

ISO/IEC CD 30134-5, IT -- Data Centres -- KPIs

Part 5: IT Equipment Utilization for Servers ($ITEU_{SV}$)

- Specifies the $ITEU_{SV}$ as a KPI to quantify the utilization of servers in a data center
- Two approaches available to improve energy effectiveness of servers in a data center
  - Introduce servers which have high capability of work per unit energy
  - **Improve utilization ratio of servers by using such technologies as virtualization for intensive processing, or by sharing use of servers among multiple users**
    - **$ITEU_{SV}$ is a KPI used to quantify the effects of this second approach**

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ISO JTC 1 IEC INFORMATION TECHNOLOGY STANDARDS

ISO/IEC NWIP 30134-X, IT -- Data Centres -- KPIs

Part X: Energy Reuse Factor (ERF)

- Introduces a new metric, Energy Reuse Factor (ERF), which will provide the data center practitioner with greater visibility into energy efficiency in data centers that make beneficial use of any recovered energy from the data center
- Presents specific rules on ERF's use, along with its theoretical and mathematical development
- Concludes with several examples of site concepts that could employ the ERF metric

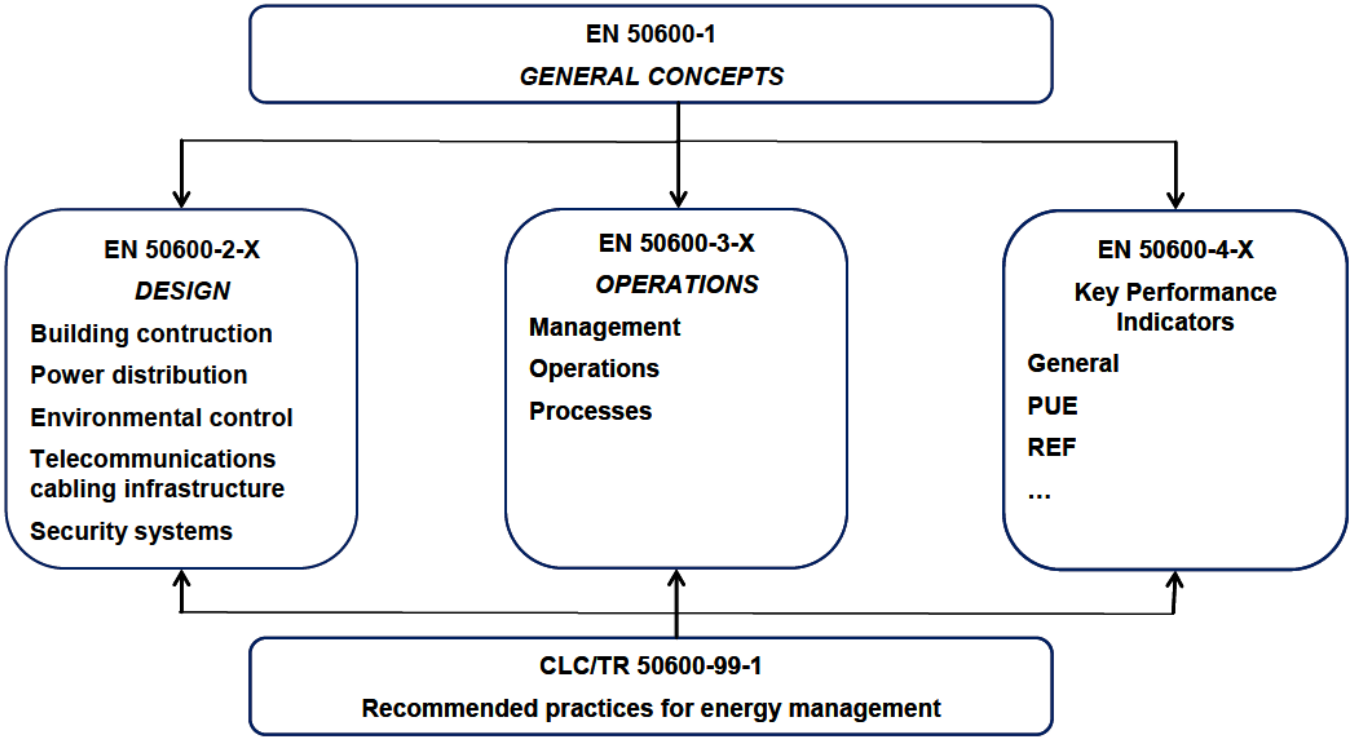
NEW PROPOSAL – VOTE OPEN UNTIL 21/04/2016

ISO/IEC PDTR 20913, IT -- Data Centres -- KPIs

Guidelines on holistic investigation methodology for data centre KPIs

- Describes backgrounds, motivation, and general concept of holistic investigation methodology for data centre KPIs
- Analyses the usefulness of holistic investigation methodology for aggregating KPIs
- Describes a spider web chart-based KPIs status observation method and a control chart extending spider web chart to observe the operational status of KPIs
- Describe alternative and/or additional methods of representing dissimilar KPI's to track holistic resource effectiveness of the data centre
- Presents SWOT analysis results for holistic investigation methods described in this document

EN 50600 series - Data centre facilities and infrastructures



- Developed under EU Mandate 462 “Efficient energy use in fixed and mobile information & communication networks” and Mandate 495 “Ecodesign”

prEN 50600-2-5:2015, IT - Data centre facilities and infrastructures

Part 2-5: Security systems

- Addresses the physical security of data centers based upon the criteria and classifications for “availability”, “security” and “energy efficiency enablement” within EN 50600-1
- Provides designations for the data centers spaces defined in EN 50600-1
- Specifies requirements and recommendations for data center spaces, and the security systems employed within those spaces, in relation to protection against:
  - Unauthorized access
  - Fire events internal to the data center spaces
  - Environmental events, other than fire, and including electromagnetic interference, vibration, flooding, gas and dust hazards which may exist
    - Internal to the data center spaces
    - External to the data center spaces
- Safety and electromagnetic compatibility (EMC) requirements are outside the scope

FprEN 50600-3-1:2015, IT - Data centre facilities and infrastructures

Part 3-1*: Management and operational information

- Specifies processes for management and operating of data centers
  - Primary focus: operational processes to deliver the expected level of resilience, availability, security and energy efficiency
  - Secondary focus: management processes to align the actual and future demand of users (see Figure 2)
  - Transition from planning and building to operating a data center is considered as acceptance test process
- Although the focus is not on KPI, they are provided with the processes as applies

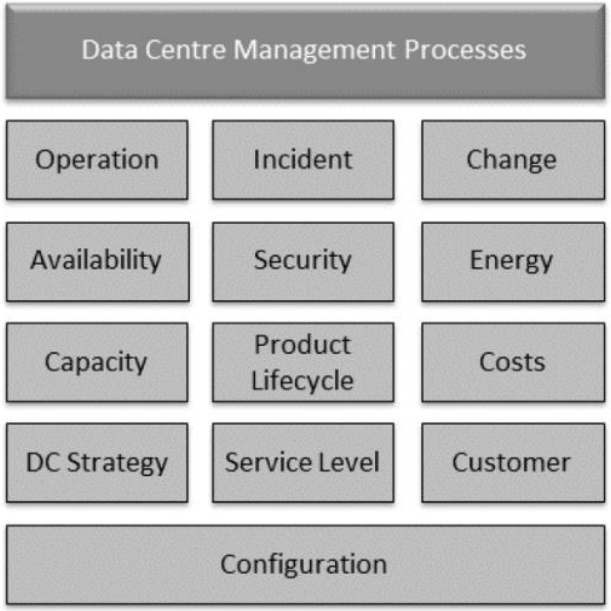


Figure 2 - Data centre management processes overview

* *Recent renumbering of the project. Previous drafts of this project were numbered as part 2-6*

CLC/FprTR 50600-99-1, IT - Facilities and infrastructures - Data centre

Part 99-1: Energy management - Recommended practices

- Compilation of recommended practices for improving the energy management (i.e. reduction of energy consumption and/or increases in energy efficiency) of data centres
- Referenced from the Code of Conduct for Data Centre Energy Efficiency (CoC) scheme operated by the Directorate-General Joint Research Council (DG JRC) of the European Commission
- Replaces all previous versions of the CoC Best Practices documents

CODE OF CONDUCT DATA CENTRES

European Commission

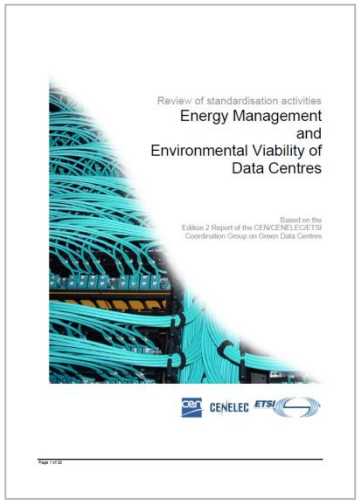
EUROPEAN COMMISSION
DIRECTORATE-GENERAL JRC
JOINT RESEARCH CENTRE
Institute for Energy
Renewable Energies Unit

More information

- **Next plenary meetings**
  - ISO/IEC JTC 1/SC 39
    - 20-24 June 2016 - VDE/DKE Premises in Frankfurt (Germany)
  - CLC/TC 215
    - 6 April 2016 - Frankfurt (Germany)

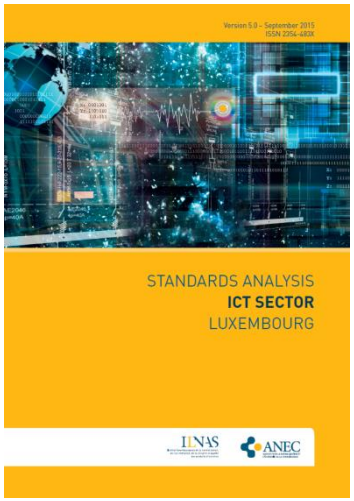
- **KPIs under consideration for future development of the ISO/IEC 30134 / EN 50600-4 series**
  - CUE – Carbon Usage Effectiveness
  - Water KPIs
    - WUE- Water Usage Effectiveness
    - WR - Water Reuse Effectiveness
  - DCCE - Data Centre Cost Efficiency
  - DCPE - Data Centre Profit Efficiency
  - COP - Coefficient of Performance
  - SEER - Seasonally adjusted Energy Efficiency Ratio

More Publications



"Review of standardisation activities - Energy Management and Environmental Viability of Data Centres" - CEN-CENELEC-ETSI CG GD

"Standards Analysis - ICT Sector – Luxembourg" - ILNAS



"Standardisation landscape for the energy management and environmental viability of data centres" - CEN-CENELEC-ETSI CG GD

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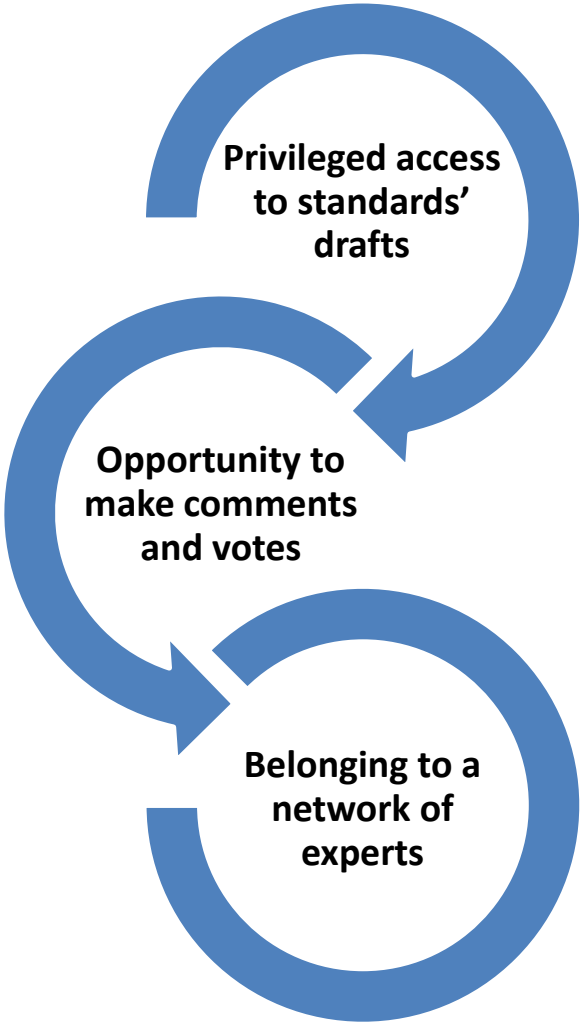
PARTICIPATING IN STANDARDIZATION TECHNICAL COMMITTEES IN LUXEMBOURG

Mr. Jérôme HOEROLD - ILNAS

Standardization stakes for companies

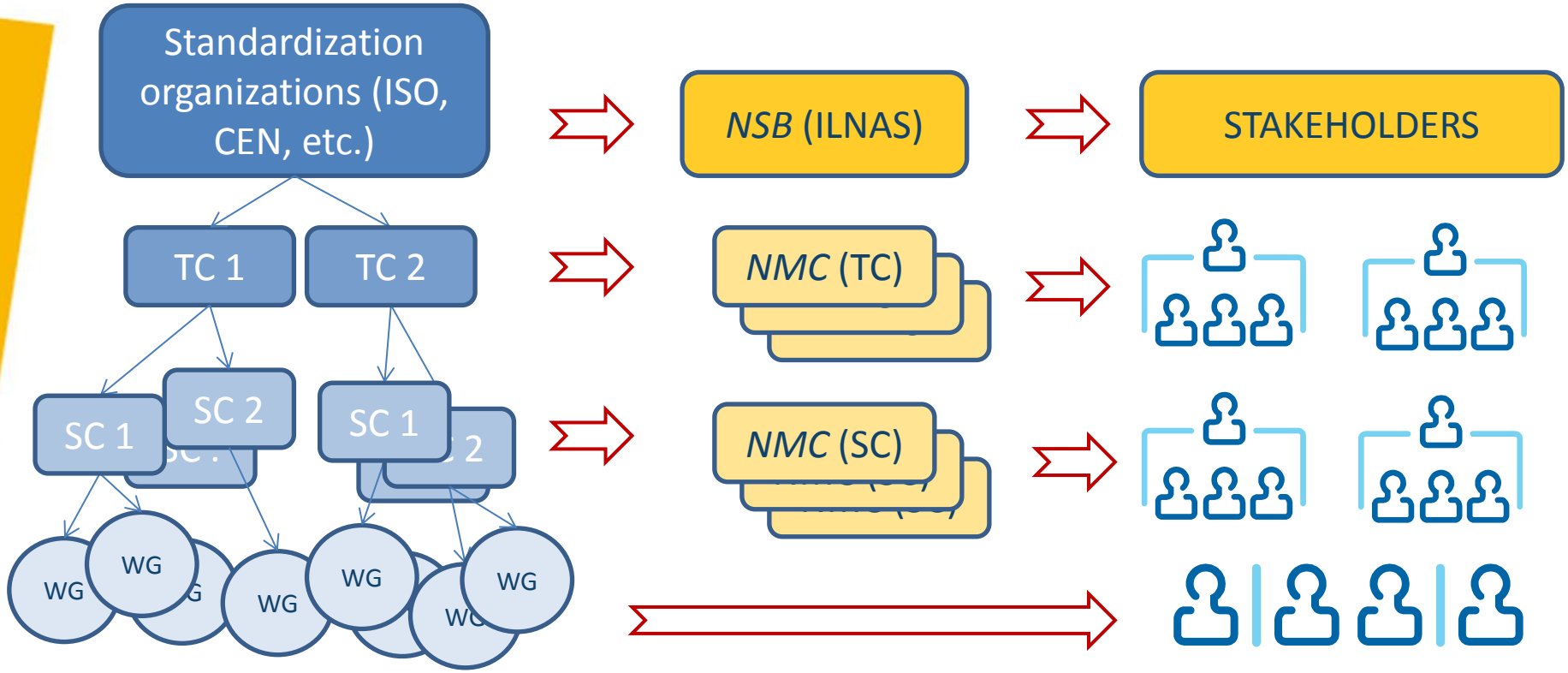


- Monitor
- Anticipate

- Defend the interests of your business
- Spread and promote your innovations

- Learn about your competitors
- Defend common interests
- Promote your business

Organization of participation in standardization



- **TC**: *Technical Committee*
- **SC**: *Sub-committee*
- **WG**: *Working Group*
- **NSB**: *National Standardization Body*
- **NMC**: *National Mirror Committee*

Organization of national mirror committees (NMC)

- **National Mirror Committee**
  - Has to designate its chairman
  - Meets as a group of experts to determine consensus positions
  - Each entity has only one vote
  - Designate delegate(s) participating in international meetings

- **Chairman**
  - Organize the group of experts in a professional manner, ensuring a traceability
  - Define the internal rules
  - Ensure consensus for any official position provided

- **Guiding principle**
  - **CONSENSUS**: **general agreement**, characterized by the **absence of strong opposition** against the subject issued by any important part of the concerned interests and by a process seeking to take into account the views of all stakeholders and reconcile any divergent positions. **Consensus does not necessarily imply unanimity** [ISO/IEC Guide 2: 2004]

Rights of delegates

- **Rights**
  - Access to documents
  - Work on standards under development
  - Vote during the validation or approval process
  - Participate in international meetings
  - Give feedbacks to ILNAS, if necessary, on malfunctions

- **Duties**
  - Respect of the standardization policy
  - Nondisclosure of technical committee's documents to third parties
  - Active participation in the standardization process
  - Providing a periodic review to ILNAS (personal activities, comments, etc.)

Registration process to a standardization technical committee

- **Application form for registration to a standardization technical committee**
  - Form ILNAS/OLN/F001
  - Available at **http://www.portail-qualite.public.lu/fr/normes-normalisation/developpement-normes/devenir-delegue-national/index.html**
- **Processing of the application by ILNAS**
  - Evaluation of the application: competencies, relevance, interest for the national economy
  - Approval of the registration application
- **Entry to the national register of standardization delegates**
  - Notification to the candidate
  - Access to the collaborative platform

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ROUNDTABLE

New services under development - Coaching for national standardization delegates

- First step (available now)
  - Personalized support for the handling of collaborative work platforms and voting system
    - On demand for the national standardization delegates of the ICT sector
    - Complement the Training session “New delegate in standardization”
- Second step (development during 2016)
  - New tools & services based on the needs and barriers identified in step 1
- Objectives
  - Set up good practices common to all national delegates of the ICT sector
  - Facilitate the standardization work of national delegates
    - Understanding of the standardization environment
    - Organization of the national mirror committees
  - Encourage a stronger involvement of the national standardization community

Contact: anec@ilnas.etat.lu

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ISO JTC 1 IEC INFORMATION TECHNOLOGY STANDARDS

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ISO/IEC 19395:2015 - Sustainability for and by IT -- **Smart data centre resource monitoring and control**

ISO/IEC TR 30132 - IT sustainability -- **Guidance for the development, evaluation and application of energy efficient computing systems**

ISO/IEC TR 30133 - Data centres -- **Guidelines for resource efficient data centres**

ISO/IEC TR 20913 - Data Centres -- **KPIs -- Guidelines on holistic investigation methodology for data centre KPIs**

ISO/IEC 30134-1 - Data centres -- **KPIs -- Part 1: Overview and general requirements**

ISO/IEC 30134-2 - Data centres -- **KPIs -- Part 2: Power usage effectiveness (PUE)**

ISO/IEC 30134-3 - Data centres -- **KPIs -- Part 3: Renewable energy factor (REF)**

ISO/IEC 30134-4 - Data centres -- **KPIs -- Part 4: IT Equipment Energy Efficiency for Servers ($ITEE_{SV}$)**

ISO/IEC 30134-5 - Data centres -- **KPIs -- Part 5: IT Equipment Utilization for Servers ($ITEU_{SV}$)**

ISO/IEC 30134-X - Data centers -- **KPIs -- Part X: Energy Reuse Factor (ERF)**

0 month	12 m.	24 m.	30 m.	36 m.
NP	WD	CD	DIS	FDIS	IS
		PDTR	TR		

EN 50600-1:2012 - **Data centre facilities and infrastructures - Part 1: General concepts**

EN 50600-2-1:2014 - **Data centre facilities and infrastructures - Part 2-1: Building construction**

EN 50600-2-2:2014 - **Data centre facilities and infrastructures - Part 2-2: Power distribution**

EN 50600-2-3:2014 - **Data centre facilities and infrastructures - Part 2-3: Environmental control**

EN 50600-2-4:2015 - **Data centre facilities and infrastructures - Part 2-4: Telecommunications cabling infrastructure**

EN 50600-2-5, Information technology - **Data centre facilities and infrastructures - Part 2-5: Security systems**

EN 50600-3-1:2015 - **Data centre facilities and infrastructures - Part 3-1: Management and operational information**

EN 50600-4-1 - **Data centre facilities and infrastructures - Part 4-1: Overview and general requirements for KPIs**

EN 50600-4-2 - **Data centre facilities and infrastructures - Part 4-2: Key performance indicator PUE**

EN 50600-4-3 - **Data centre facilities and infrastructures - Part 4-3: Key performance indicator REF**

CLC/TR 50600-99-1 - **Facilities and infrastructures - Data centre - Energy management - Recommended Practices**

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PWI	WD	prEN			FprEN	EN
		prTR	FprTR	TR		

CONTACT

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Agence pour la Normalisation et l'Économie de la Connaissance GIE

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