Security Conference

Understanding ICT Standardization
Why? How? What?

Presented by: **Claire d'Esclercs and Nizar** Abdelkafi

18/10/2023

Why?

➤ Standardization provides a framework for establishing and following best practices in cybersecurity

➤ Cybersecurity often involves a variety of tools, technologies, and systems. Standardization helps ensure interoperability, meaning that different security solutions can work together seamlessly

➤ Standardized incident response procedures are crucial for handling cybersecurity breaches effectively

➤ Standardization facilitates communication and collaboration within the cybersecurity community

➤ Standards benefit innovation by reducing development time, costs and risks

➤ Many industries and organizations are subject to regulatory requirements and compliance standards

➤ Standardization provides a structured approach to risk management

2

Why?

- Cybersecurity professionals often deal with sensitive information and have a responsibility to protect an individual's privacy and data
- Standardization provides a structured approach to problem-solving in cybersecurity
- The field of cybersecurity is constantly evolving. Learning about standardization helps engineers stay up-to-date with the latest developments and trends in the industry

The ultimate goal of standardization is the implementation of the resulting standards in products and services for the benefit of users and the industry as a whole

Understanding and applying cybersecurity standards can enhance a young engineer's professional development. It can be a valuable skill that sets them apart in the job market and opens up opportunities for career advancement.

3

HOW?
ETSI's Education on ICT Standardization programme

- STF 515 was initiated by ETSI and supported by the European Commission starting in 2016
- Participation from European institutions in Germany, France, Italy, Spain, and Belgium
- Duration: 2,5 years (for the first edition)
- Second Edition published in 2022 with updates based on feedback received

Goals and objectives:

- facilitate education on ICT standardization among lecturers and students
- provide training and informational details to diverse audiences
- foster the position of ICT standardization in educational programs, training and academic curricula
- support the EC's standardization strategy, which recognizes the need to train new experts
- improvement of the employability of future graduates in the area of standardization

4

WHAT?
Development of Teaching Materials for Education on Standardization with a Focus on ICT

- Identification of optimal teaching methods and topics via inputs from many experts
- Development of teaching materials:
  - Set of 348 slides
  - Accompanying 265-page textbook "Understanding ICT Standardization: Principles and Practice"
  - Case studies and other materials, e.g. quizzes, examples and visualizations to increase the attractiveness of the overall topic for teachers and students
- Modular design to suit different higher education levels and different study programs
- All teaching materials resulting from this action are available for free from the ETSI website: https://www.etsi.org/media-library/education

Exploratory study of educational requirements in ICT

- STF 515 conducted and analyzed in total 26 interviews
- 7 main topics for the teaching materials were identified:

  - Introduction to the basics of standardization
  - Working with standards
  - The standardization environment (landscape, processes, rules etc.)
  - Standardization management
  - IPR and standardization in a business context
  - Macro-economic perspective on standardization
  - Standardization, regulation and law

"You can only get people with standardization experience from your competitors. Graduates usually do not have any standardization experience."

"Use pictures that are easy to understand, and that people can easily relate to. For example, QWERTY, beer bottles, stairs in different countries."

"Many people teach standards as a minor part of their lecture, but it is difficult to identify them."

"Keep the material rather short and focused."

6

Cover Page and Chapters

Understanding ICT Standardization

PRINCIPLES AND PRACTICE

2ND EDITION

Prof. Nizar Abdelkafi   Prof. Rudi Bekkers   Prof. Raffaele Bolla
Dr. Alejandro Rodriguez-Ascaso   Dr. Michelle Wetterwald

Chapters:
- Introduction
- Introduction to standards
- The standards ecosystem
- The production of standards
- Standardization and innovation
- A strategic perspective on standardization
- IPR and standardization
- An economic perspective on standardization and public procurement
- Conclusion

https://www.etsi.org/images/files/Education/Textbook_Understanding_ICT_Standardization.pdf

Features of the Book: General Overview

Objective

- Creation of teaching/learning materials for standardization education that are tailored to the requirements and challenges of the ICT sector.
- The teaching materials are **NOT** aimed only at universities but could also be used by professionals and practitioners, e.g., for internal training.

Features

- Modular design
- Slide set with all contents of the book
- Learning objectives
- Visualizations
- Examples
- Case studies
- Quizzes and solutions
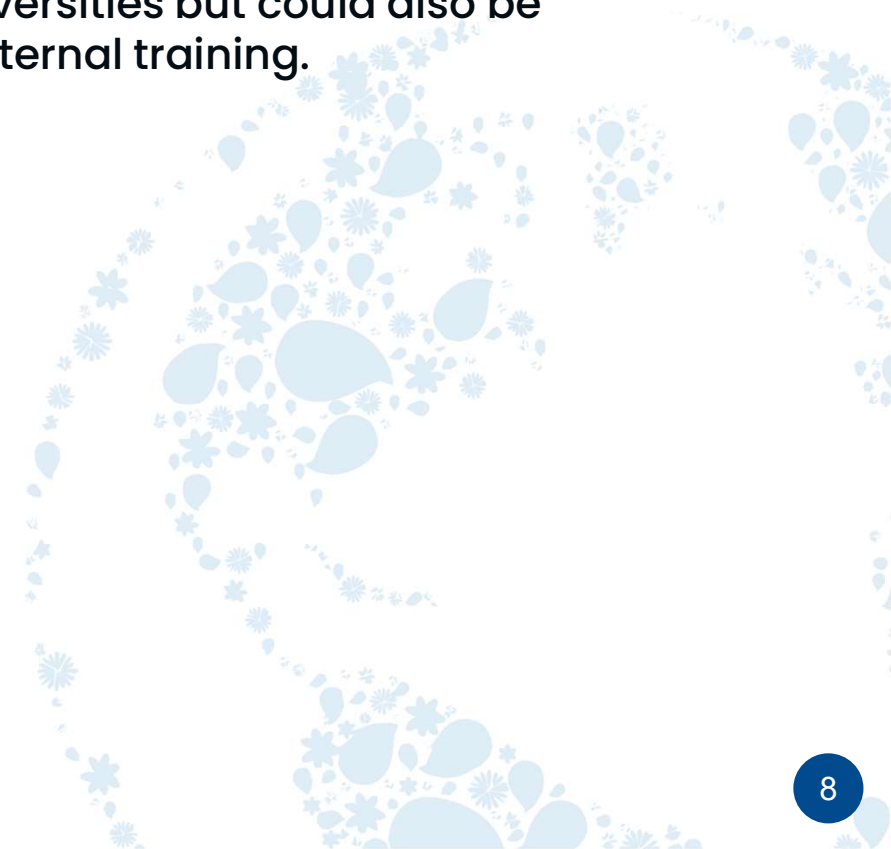
Modular Design

- The chapters can be read independently of each other.
- Repetitions are made, whenever it is necessary (not too many!).
- Reference to other chapters are indicated, if required, e.g., a concept has been introduced in an earlier chapter.
- Every chapter contains **a list of abbreviations.**
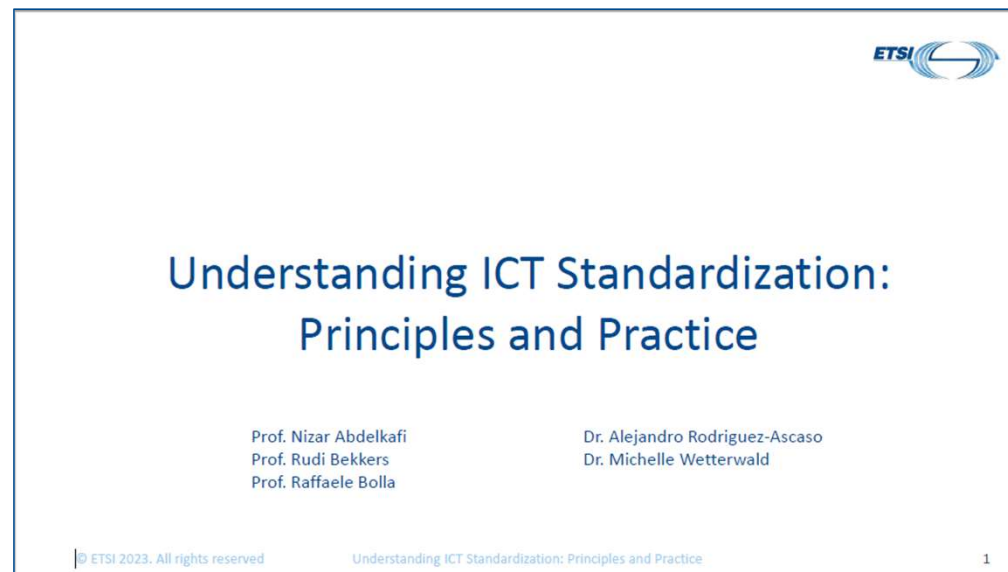- Every chapter contains a **glossary.**

3.10 LIST OF ABBREVIATIONS

- 3GPP: Third Generation Partnership Project
- AFNOR: Association Française de Normalisation (French Standards Association)
- ANS: American National Standard
- ANSI: American National Standards Institute
- API: Application Programming Interface
- ARIB: Association of Radio Industries and Businesses
- ATIS: Alliance for Telecommunications Industry Solutions
- BIS: Bureau of Indian Standards
- BS: British Standard
- BSI: British Standards Institution
- CCC: Car Connectivity Consortium
- CE (Marking): Conformité Européenne (European Conformity)
- CEN: Comité Européen de Normalisation (European Committee for Standardization)
- CENELEC: European Committee for Electrotechnical Standardization
- GSMA: Global System for Mobile Communications (GSM) Association
- HGI: Home Gateway Initiative
- HTML: HyperText Markup Language
- IAB: Internet Architecture Board
- ICT: Information and Communication Technology
- IEC: International Electrotechnical Commission
- IEEE: Institute of Electrical and Electronics Engineers
- IETF: Internet Engineering Task Force
- IS: International Standard
- ISO: International Organization for Standardization
- ISO/IEC JTC 1: Joint technical committee 1 of ISO/IEC
- IT: Information Technology
- ITU: International Telecommunication Union
- ITU-T: International Telecommunication Union—Telecommunication Sector
- IWA: ISO Workshop Agreement.
- JTC: Joint Technical Committee

2.8 GLOSSARY

- Standard: A "standard" is "a widely agreed way of doing something". Depending on the specific area of application, "doing something" may be replaced by, for example, "designing a product", "building a process", "implementing a procedure", or "delivering a service".
- Formal Standardization: Formal standardization is a well-defined process, open to any individual or organization, and its results are produced in consensus with all interested parties. Formal standardization is inspired by international directives on standardization, the most important being the principles produced by the Technical Barriers to Trade (TBT) Committee of the Word Trade Organization (WTO). The TBT committee proposed six principles for the development of international standards (see Chapter 4 for details): transparency, openness, impartiality and consensus, effectiveness and relevance, coherence, and development dimension.
- Standards Development Organization (SDO): An organization devoted to developing standards and that puts in place well-defined procedures to guarantee a fair development process, which is aimed at building consensus among involved contributors and ensuring the quality of the final deliverables
- SDO standard: A standard developed by an SDO.
- De facto standard: A "de facto standard", also known as "standard in actuality", arises when a winning solution is widely and independently adopted by different industries within a market segment and products developed on such a basis are widely accepted by customers.
- International SDO: International SDOs have members worldwide, sometimes also including representatives of National or Regional standard bodies, and their deliverables have worldwide coverage.

Slide set with all Contents of the Book

- The PDF file with all slides (349 slides) can be downloaded on ETSI's website:
  https://www.etsi.org/images/files/Education/Slideset_Understanding_ICT_Standardization.pdf

- A PPT file of the slides can be obtained upon request. An email should be sent to
  legal@etsi.org with copy to claire.desclercs@etsi.org

Understanding ICT Standardization: Principles and Practice

Prof. Nizar Abdelkafi   Dr. Alejandro Rodriguez-Ascaso
Prof. Rudi Bekkers   Dr. Michelle Wetterwald
Prof. Raffaele Bolla

© ETSI 2023. All rights reserved   Understanding ICT Standardization: Principles and Practice   1

10

Learning Objectives

- All chapters start with learning objectives

## 2 INTRODUCTION TO STANDARDS

LEARNING OBJECTIVES

- Students should be able to identify what the purpose of standards is and how standards impact people's everyday life.
- Students should know what a standardization process is. Furthermore, they should know what formal standardization and Standard Development Organisations (SDO) are.
- Students should be able to distinguish between a SDO standard and a de facto standard.
- Students should understand what benefits standards bring and what potential undesired drawbacks they may imply.
- Students should acquire a basic knowledge of the international, regional, and national standardization landscape, where multiple organizations operate and collaborate to create standards.
- Students should get a glimpse of major SDOs active in the ICT sector.
- Students should understand the basic concepts of the SDOs' processes and the characteristics of the main deliverables.

5 STANDARDIZATION AND INNOVATION

LEARNING OBJECTIVES

- Students should get insights into the interdependencies between innovation and standards/standardization.
- Students should understand how standardization and innovation can benefit each other.
- Students will learn some concrete examples how standardization and standards can boost innovation.
- Students will understand the relationships between research and standardization, in particular, how standards and standardization can be leveraged during the research process.
- Students will learn about the ways, in which standards and standardization can support innovation, both as a process and as an output in the sense of a technology or product, in particular, so-called innovation potential in standardization:
  - Efficient target-oriented innovation
  - Differentiation
  - Exceeding the requirements of standards
  - Business model innovation
  - Innovation impulses
  - Innovation communication
  - Absorption of innovation

Visualizations
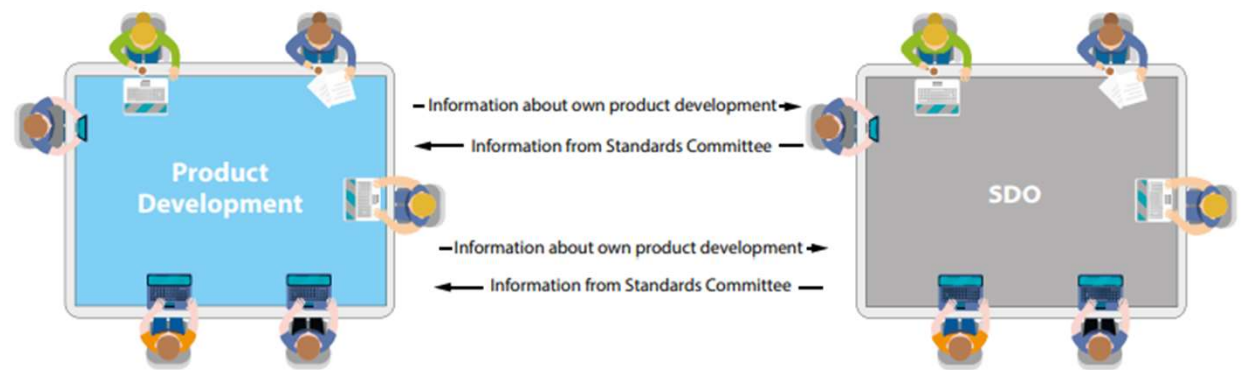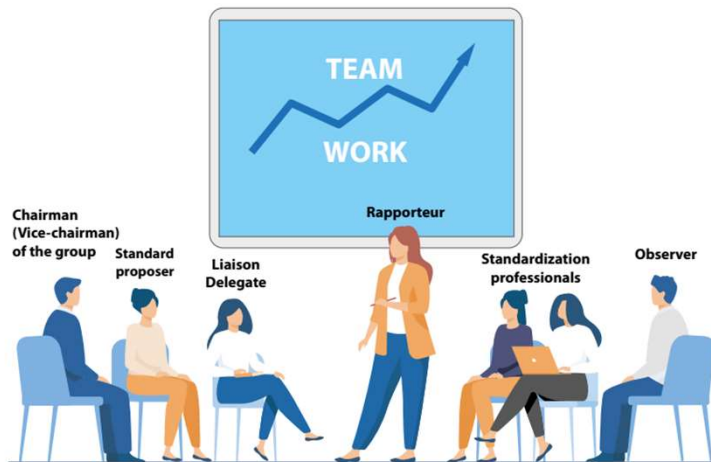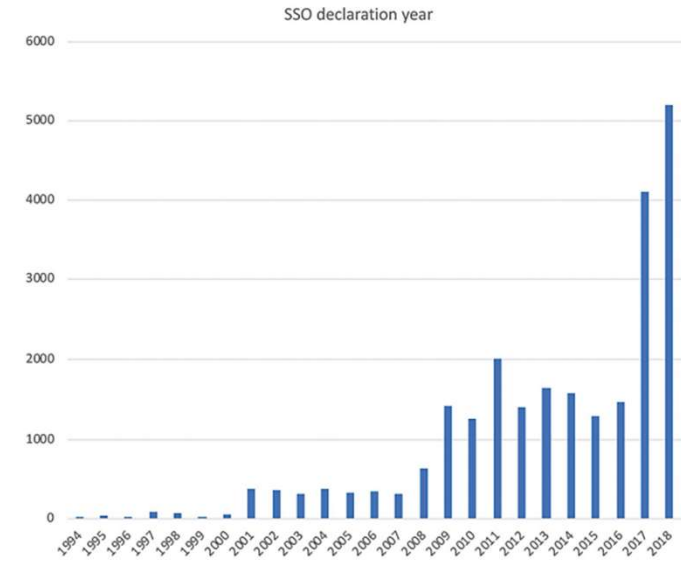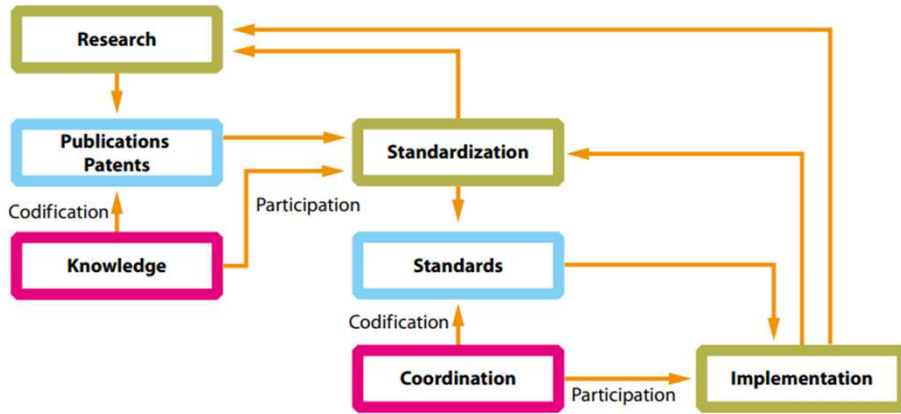
Examples

- Examples from real standardization practice to illustrate the key theoretical concepts
- All examples are inserted in grey boxes. Examples are provided throughout the book to support the learning process.
- Whereas the principles and concepts standardization hold true beyond the field of standardization, the examples in the book related to the realm of ICT.

EXAMPLE

A telecom services operator targeting involvement in Intelligent Transport Systems may need to follow standardization efforts related to telecom infrastructure, communication infrastructure and road infrastructure. However, the technical areas in which the operator would be able to significantly contribute on road infrastructure, for example, may be limited.

EXAMPLE 1

For example, the Global Standards Collaboration (GSC) group annually brings together the world's leading telecommunications and radio standards organizations to share work programmes and other information in a number of technical areas.

EXAMPLE 2

In the US, many private and public SDOs are active in all types of ICT domains. NIST is a federal agency, of which one of the missions is to promote innovation and competitiveness. On the other hand, ANSI serves as the coordinator of the private sector standardization system and also accredits that an organization can be recognized as SDO, as it complies with WTO TBT principles. Both organizations have signed a MoU, which defines their respective roles and their cooperation objective to strengthen US standards.

13

Case Studies

- The "case" can be a standardization document, a project, an event, an action, or a company that implemented a particular practice.

- Each case study is intended to make readers reflect on a subset of the book's learning objectives and messages

3.6 CASE STUDY: THE REVISION OF A NATIONAL STANDARD ABOUT TELECARE, FROM THE ICT ACCESSIBILITY PERSPECTIVE

The UNE 158401 standard was approved in 2007 by UNE, the Spanish official SDO. The objective and scope section of the document reads as follows: "This standard specifies the minimum requirements and the level of service that the telecare service must meet, both in its domiciliary and mobile versions. This standard does not cover the requirements for the applied technology".

Public administration agencies in the country, usually local authorities, or regional government in the case of telecare provision, hire private companies through calls for tenders. These companies provide the telecare services and equipment to eligible end users. In the calls for tenders, the professional and technical standing of the companies are assessed against the telecare standard. There are several hundreds of thousands of citizens from that country who benefit from telecare to enhance their safety and wellbeing. Hence, the economic and social impact of this standard is significant.

4.5 CASE STUDY: THE 3RD GENERATION PARTNERSHIP PROJECT (3GPP)

This case study analyses the standardization process at the 3GPP (see also a short description of this project in Chapters 2 and 3). Even if it is not an SDO per se, 3GPP is one of the most important standardization projects ever in the ICT domain, as it enabled the development of mobile telephony and connectivity. Since the specifications it prepares are set to be adopted by recognized SDOs, it follows a very well-defined process. This section presents the 3GPP process as an example of application of the concepts introduced in Chapter 4.

The 3rd Generation Partnership Project (3GPP) covers cellular telecommunications network technologies. 3GPP began its activities in 1998, when several ICT SDOs, including ETSI and ARIB, came together to develop a single standard for "third-generation" mobile telecommunications, in application of the fundamental coherence principle (3GPP 1998). A similar organization, the 3GPP2, was founded in parallel in the US to develop a competitive technology. Mobile standards converged to 3GPP when the evolution of the market required an evolution for faster mobile networks, as well as a global solution. It was named the Long-Term Evolution (LTE) cellular system, also known as 4G.

Quizzes and Solutions

- All chapters contain a series of multiple-choice questions in order to enable the readers to test their levels of understanding of the chapter contents straightaway.
- The solutions to the quizzes are provided at the end of the book for self-testing.

5.6   QUIZ

1 - WHAT IS INNOVATION?
(See Section 5.2.1 for hints)
a) *Innovation is a new invention.*
b) *Innovation happens only at the product and service level.*
c) *Innovation is the combination of invention and commercialization.*
d) *Innovation is incremental when there is a considerable improvement of performance within a short period of time.*

2 - AN ENTERPRISE RESOURCE PLANNING (ERP) SYSTEM THAT IS ALREADY USED BY OTHER COMPANIES IN A SECTOR, BUT ACTUALLY IMPLEMENTED FOR THE FIRST TIME BY A PARTICULAR COMPANY IS A …
(See Section 5.2.1 for hints)
a) *New-To-the-Market (NTM) innovation*
b) *New-To-the-Firm (NTF) innovation*
c) *New-To-the-World (NTW) innovation*
d) *Disruptive innovation*

3 - QWERTY IS…
(See Section 5.2.2 for hints)
a) *superior to DVORAK.*
b) *not a standard.*
c) *a SDO standard.*
d) *a de facto standard.*

15

Why should you use the textbook and accompanying teaching materials?

Book feature	Importance/advantage
Rich contents and easy to understand	Providing accessible contents to the interested reader
Modular design	Use of the teaching materials for a complete course or as a part of a course
Basic and more advanced contents	Guding the reader to where they should start from
Full Slideset about all contents	Use of the slideset to support teaching
Length of the book (280 pages)	A good book length that can encourage readers to use it.
Visual book full of real-life examples	Making ICT standardization an interesting and attractive to students, professionals and general readers
List of abbreviations and glossary	The book as a reference to get access to main concepts and acronyms in the field
Free download of the contents	Anyone can download the book and the slides

Looking ahead!

- Getting feedback from teaching material adopters around the world
- Extending the teaching materials with MOOCs (online teaching)
- Releasing a third edition of the book (ICT is a continuously developing field)
- Continuing to establish this book as a reference for ICT standardization, especially for the future generations that have to be more engaged in this field.
- Developing a website for the book with content updated continuously (blogs, vlogs, links to interesting material, etc.)
- Developing new teaching accessories such as standardization games
- ….

Looking forward to getting your ideas, suggestions and your support by adopting and/recommending the book in your community.

ETSI

2ND EDITION

Understanding ICT Standardization

PRINCIPLES AND PRACTICE

Prof. Nizar Abdelkafi   Prof. Rudi Bekkers   Prof. Raffaele Bolla
Dr. Alejandro Rodriguez-Ascaso   Dr. Michelle Wetterwald

17

Thank you for your attention

Contacts:

Prof. Dr. Nizar Abdelkafi: <u>nizar.abdelkafi@polimi.it</u>

Claire d'Esclercs: <u>claire.desclercs@etsi.org</u>

Follow us on:

18