



Aspetos Profissionais e Sociais da Engenharia Informática

Standards, FOSS
Rui L Aguiar, UA/IT

 Many slides adapted © ETSI 2021

1




Last sessions....

- What is informatics
 - Classifications
 - Historical evolution
- Transformative technologies
 - Internet
 - Mobile
 - IoT
- Importance of informatics
 - \$ € £
 - Job market and functions
- GDPR
 - Legal aspects
 - European framework
 - Use cases
- Cybersecurity
 - Crime, social and personal responsibility
 - reputation
 - Cybersec ecosystem and lawful interception
 - GDPR
- The different aspects associated to Intellectual Property

2

2



Objective of this class

- Notions on several (contradicting?) Concepts
 - The need for standards and exemplary landscape of mobile
 - Open Source

3

3



Open Source

Multiple slide credits to **FQSSID**

4

What is “open source” software?

- source = software in source code form
- open = freedom to:
 - View the source code
 - Run the software for any purpose
 - Modify the software in any way
 - Distribute the software and any modifications
- Other synonyms: libre sw, free-libre sw, FOSS, FLOSS
- Software development model
- Philosophy—share and collaborate
- Licensing Model
 - Not non-commercial; OSS almost always commercial

5

Typical OSS development model

```
graph LR; DC[Development Community] --> Dev[Developer]; Dev -- "Source Code" --> TR[Trusted Repository]; TR --> Dist[Distributor]; Dist --> User[User]; User -- "Bug Reports" --> TD[Trusted Developer]; TD --> Dev; User -- "Improvements (as source code) and evaluation results: User as Developer" --> Dev;
```

“Stone soup development”

- OSS users typically use software without paying licensing fees
- OSS users typically pay for training & support (competed)
- OSS users are responsible for paying/developing new improvements & any evaluations that they need; often cooperate with others to do so
- Goal: Active development community (like a consortium)


6



Open source software as a business

- *"Think 'free speech,' not 'free beer'"*
Richard Stallman
 - Branded distributions
 - Sell hardware, give away software
 - Sell services and support
 - Dual versions
 - Dual licensing
 - Value added software
 - Sell sponsorships
 - Sell ads and T-shirts

7



Licensing

- "Free" and "open" is not:
 - Public domain
 - Copyright "first sale"
 - Shareware or freeware
- Licensing makes it work
 - Control over use
 - Risk shifting
 - "To stay free, software must be copyrighted and licensed." Debian GNU/Linux Group

8

Copyright definition

Thanks Wikipedia.

Legal right that grants the creator of an **original work**

literary works

music

photography

paintings

motion pictures

software

exclusive rights to its use and distribution

reproduce

perform

modify

distribute

with the intention of enabling the creator to receive a **compensation**
for a **limited period of time***

**Specifics differ by jurisdiction.*

9

Exclusive rights exercise

João

Use it only in video games

Run it only on Intel processors

Pay me every time you sell it within your product

Filipe

Run it for any purpose

Free to modify it

Free to distribute it

Always credit the author


10

Derivative work

Expressive creation that includes mayor copyright-protected elements of an original previously created first work (underlying work)


Leonardo da Vinci
1519

Mona Lisa



Marcel Duchamp
1919

Additions to the Mona Lisa:
Moustache
L.H.O.O.Q.



*Copyright protection = Authors life + 70 years (depends on jurisdiction)

11

Derivative work

Expressive creation that includes mayor copyright-protected elements of an original previously created first work (underlying work)

DummyProgram - Notepad

```
File Edit Format View Help
import java.util.*;

class GetCurrentDateandTime
{
    public static void main(String args[])
    {
        int day, month, year;
        int second, minute, hour;
        GregorianCalendar date = new GregorianCalendar();
        day = date.get(Calendar.DAY_OF_MONTH);
        month = date.get(Calendar.MONTH);
        year = date.get(Calendar.YEAR);
        second = date.get(Calendar.SECOND);
        minute = date.get(Calendar.MINUTE);
        hour = date.get(Calendar.HOUR);
    }
}
```

DummyProgram - Notepad

```
File Edit Format View Help
import java.util.*;

class GetCurrentDateandTime
{
    public static void main(String args[])
    {
        int day, month, year;
        int second, minute, hour;
        GregorianCalendar date = new GregorianCalendar();
        day = date.get(Calendar.DAY_OF_MONTH);
        month = date.get(Calendar.MONTH);
        year = date.get(Calendar.YEAR);
        second = date.get(Calendar.SECOND);
        minute = date.get(Calendar.MINUTE);
        hour = date.get(Calendar.HOUR);

        System.out.println("Current date is "+day+"-"+month+"/"+year);
        System.out.println("Current time is "+hour+"-"+minute+"-"+second);
    }
}
```

12

6

Copyleft

A form of licensing that was initiated by the Free Software movement.

Copyright
Legal right that grants the creator of an original work exclusive rights to its use and distribution

Copyleft
Offering people the right to freely distribute copies and modified versions of a work
Exists within the legal structure of copyright

13

License categories

Copyright protected

Open source

Proprietary

Free Software Copyleft


Open source Permissive

**FOSS, FLOSS, OSS*



Public Domain

Copyright protection expired
or
Anonymous authorship

14




Free Software vs Open Source



| Free Software - Copyleft | Open Source - Permissive |
|---|---|
| <p>Governed by the Free Software Foundation (FSF)</p>  <p>They keep a list of accepted licenses GPL, LGPL, AGPL, MPL, EPL,...</p> <p>They are referred to as: Copyleft, Restrictive, protective, reciprocal...</p> | <p>Governed by the Open Source Initiative (OSI)</p>  <p>They keep a list of accepted licenses BSD, MIT, Apache License, ...</p> <p>They are referred to as: Permissive, Non-copyleft</p> |

**Both the OSI and the FSF have copyleft and non-copyleft licenses in their respective lists of accepted licenses*


15



Free Software vs Open Source

| Free Software - Copyleft | Open Source - Permissive |
|---|--|
| <p>Free Software Foundation (FSF) Founded in 1985 by Richard Stallman</p>  <p>Non-profit organization Defend the rights of all software users</p> <p>This is a social movement. They are “software activists”.</p> <p>Free software is software that ensures the user’s freedoms Run, Study, Share, Modify</p> | <p>Open Source Initiative (OSI) Founded in 1998 by Eric S. Raymond and Bruce Perens</p>  <p>Non-profit organization Educates about and defends open source</p> <p>Promotes this model of collaboration for companies.</p> <p>Open Source is what complies with the OSD Similar benefits but less restrictions</p> |


16



Types of OSS licenses

- Copyright law: Must have permission to copy software
 - Permission is given by a license
 - Proprietary software: Pay for a license to use a copy/copies
 - OSS licenses grant more rights, but still conditional licenses
- Over 100 OSS licenses, but only a few widely used
- Can be grouped into three categories (differing goals):
 - Permissive: Can make proprietary versions (MIT, BSD-new)
 - Weakly protective: Can't distribute proprietary version *of this component*, but *can* link into larger proprietary work (LGPL)
 - Strongly protective: Can't distribute proprietary version *or* directly combine (link) into proprietary work (GPL)
- The most popular OSS licenses tend to be compatible
 - Compatible = you can create larger programs by combining software with different licenses (must obey all of them)

17



OSS License Slide: Determining License Compatibility

Permissive

Weakly Protective

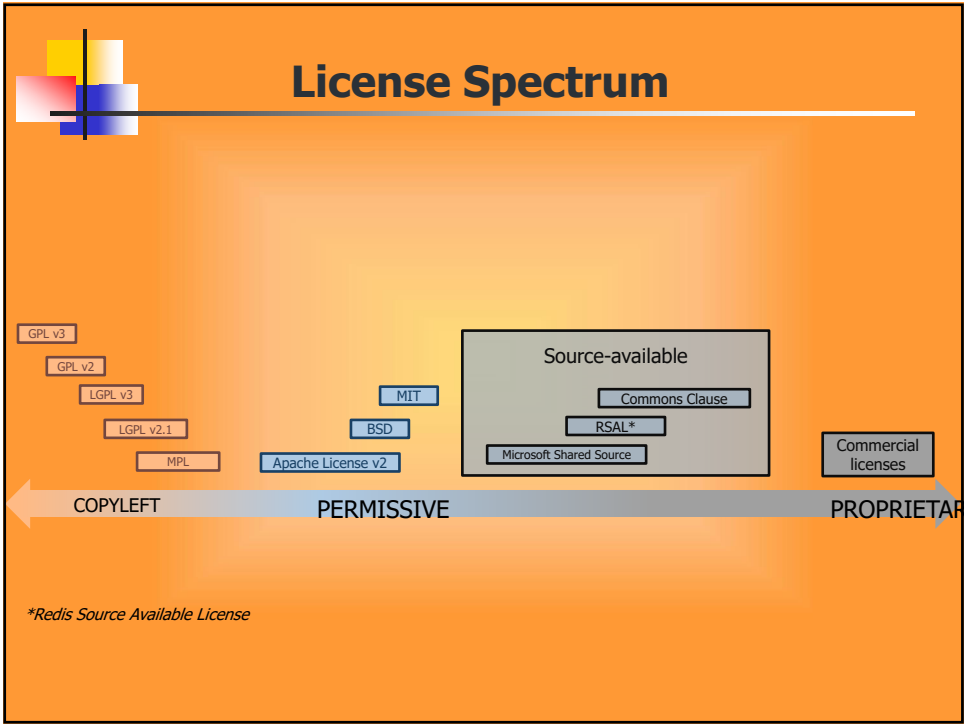
Strongly Protective

```
graph LR; subgraph Permissive; PD[Public Domain]; MIT[MIT/X11]; BSD[BSD-new]; Apache[Apache 2.0]; end; subgraph WeaklyProtective; LGPL21[LGPLv2.1]; LGPL21plus[LGPLv2.1+]; LGPL3plus[LGPLv3 (+)]; MPL[MPL 1.1]; end; subgraph StronglyProtective; GPLv2[GPLv2]; GPLv2plus[GPLv2+]; GPLv3plus[GPLv3 (+)]; Affero[Affero GPLv3]; end; PD --> LGPL21; PD --> LGPL21plus; PD --> LGPL3plus; PD --> MPL; MIT --> LGPL21; MIT --> LGPL21plus; MIT --> LGPL3plus; MIT --> MPL; BSD --> LGPL21; BSD --> LGPL21plus; BSD --> LGPL3plus; BSD --> MPL; Apache --> LGPL21; Apache --> LGPL21plus; Apache --> LGPL3plus; Apache --> MPL; LGPL21 --> GPLv2; LGPL21 --> GPLv2plus; LGPL21 --> GPLv3plus; LGPL21 --> Affero; LGPL21plus --> GPLv2; LGPL21plus --> GPLv2plus; LGPL21plus --> GPLv3plus; LGPL21plus --> Affero; LGPL3plus --> GPLv2; LGPL3plus --> GPLv2plus; LGPL3plus --> GPLv3plus; LGPL3plus --> Affero; MPL --> GPLv2; MPL --> GPLv2plus; MPL --> GPLv3plus; MPL --> Affero; GPLv2 --> Affero; GPLv2plus --> Affero; GPLv3plus --> Affero;
```

A→B means A can be merged into B

See <http://www.dwheeler.com/essays/floss-license-slide.html>

18




20

GNU General Public License

- Key terms:
 - Unlimited right to run program
 - Unlimited access to source code
 - Unlimited right to distribute verbatim copies
 - May create derivatives IF you agree to make the derivatives "free"
 - What is a "derivative"
 - When does "free" mean "no charge"?
 - License is "viral"
 - No warranties; disclaimer of consequential damages


21



BSD-style license


- Key concepts:
 - License grant: unlimited use, modification, distribution
 - No warranties; disclaimer of consequential damages
 - No endorsement
 - Attribution

22



SOURCE-AVAILABLE SOFTWARE

Uses **source code distribution model**
Does **NOT** meet all **open source** criteria



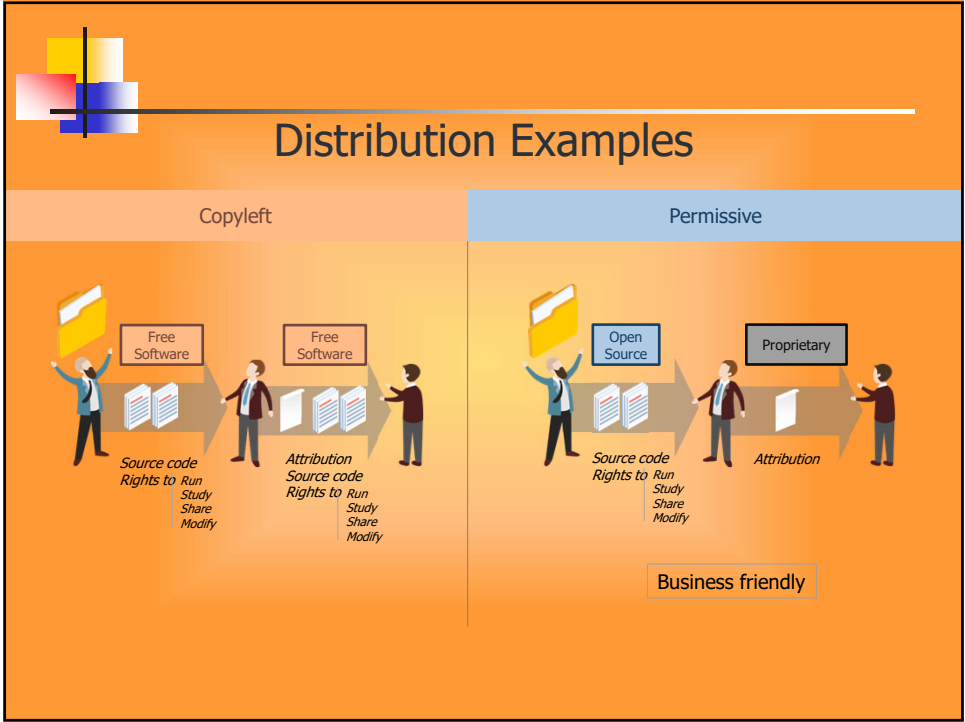
Started in 2018 by **Heather Meeker** and FOSSA (Commons Clause)

Commons Clause

- Redis Source Available License (RSAL)**
- GitLab Enterprise Edition License (EE License)**
- Mega Limited Code Review License**
- Microsoft Shared Source Initiative (2 out of 5 licenses)**

*FSFE Legal Network conference - Barcelona 2019

23



24

commonsclause.com

The Commons Clause.

"Commons Clause" License Condition v1.0

The Software is provided to you by the Licensor under the License, as defined below, subject to the following condition.

Without limiting other conditions in the License, the grant of rights under the License will not include, and the License does not grant to you, the right to Sell the Software.

For purposes of the foregoing, "Sell" means practicing any or all of the rights granted to you under the License to provide to third parties, for a fee or other consideration (including without limitation fees for hosting or consulting/ support services related to the Software), a product or service whose value derives, entirely or substantially, from the functionality of the Software. Any license notice or attribution required by the License must also include this Commons Clause License Condition notice.

On August 22, 2018 -> [Redis Labs](#) shifted some modules from AGPL to Apache + Commons Clause

25



Creative Commons Project

- Release of a set of copyright licenses free for public use
- Inspiration: GNU General Public License for software
- Objectives:
 - Creators retain copyright while licensing works as free for certain uses, on certain conditions
 - Develop web application to help people dedicate their creative works to the public domain (sharing)
- Fields of application:
 - Copyright protected works: websites, scholarship, music, film, photography, literature, courseware, etc.

4

26




Licensing Possibilities

| | |
|---|--|
|  | <i>Attribution (always, unless CC0)</i> |
|  | <i>No Commercial Use</i> |
|  | <i>No Derivative Works</i> |
|  | <i>Share Alike</i> |

6

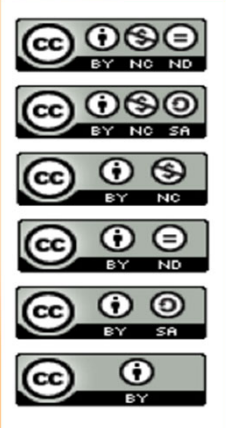
27



Creative Commons Licenses

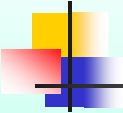
6 variations:

- Attribution Non-commercial No Derivatives
- Attribution Non-commercial Share Alike
- Attribution Non-commercial
- Attribution No Derivatives
- Attribution Share Alike
- Attribution




7


28



Standards - What?!?





29



Introduction to standards


- Standards support everyday life much more than people think
- Society recognized importance of standardized measurements thousands of years ago: e.g. weight, distance or length



- Development of a common reference system agreed upon people and institutions
- Rapid technological progress → need for standardization grows
- Especially in the area of Information and Communications Technologies (ICT)

30

30



What standards are

The most general definition for a «standard» may be

«a widely agreed way of **doing something**»

.... where, depending on the specific area of application, “**doing something**” may be replaced by, e.g., “**designing a product**”, “**building a process**”, “**implementing a procedure**” or “**delivering a service**”.

«Standard» (i.e. agreed and common) ways of doing things bring lot of benefits; our technological world without «standards» simply would not work (or, at least, it would be harder to make it work)

Note: standard vs protocol

31

Examples: Standards in everyday life

Using a Smartphone for browsing (some of possibly involved standards):

- User equipment regarding hardware characteristics, also taking into account safety issues
- Connectivity among user devices and wireless network as well as the functionality of the same network
- Functionality of the Internet and the protocols to support web browsing

34

Examples: Standards in everyday life

Using a Personal Computer (some of possibly involved standards)

A 2010 paper (Biddle & al., 2010) identifies 251 technical interoperability standards implemented in a laptop computer, but total number estimated to be over 500

Out of the 251 identified standards, "202 (80%) were developed by SDOs and 49 (20%) by individual companies"

35

Examples: Standards in everyday life

Switching on lights
(some of the standards involved)

CEN-CENELEC and ETSI standards for Smart Grids

IEC and CEN-CENELEC standards for **Generation System** (e.g. architectures, protocols and technologies for system monitoring and maintenance, power quality control, grid stability, balance demand and production)

IEC and CENELEC standards for electrical **Transmission and distribution** (e.g. architectures, protocols and technologies for monitoring and maintenance of assets, monitoring power flows and quality, system reconfiguration in case of faults, operate distributed energy sources)

IEC standards for electrical installations for buildings; IEC and CENELEC standards for architectures, protocols and technologies for **meeting and flexible management of customers** (demand, response)

36

36

Introduction

The standardization **landscape** is **rich and complex**, because of the variety in standard development organizations (SDOs) and the documents they produce...

37

37



Formal standardization, SDO standards, and regulation

- Standards are NOT regulations
 - While conformity with standards is voluntary, **regulations are compulsory**;
 - An item (product, service, process, etc.) that doesn't fit regulations is not allowed in the territory/market where those regulations apply;
 - On the contrary, non-compliance to standards doesn't limit 'by law' the diffusion of an item
 - Standards are often (fully or partially) captured into regulations, as this simplifies and accelerates regulatory work thanks to the directions of established best practices defined in standards
- Standards are NOT a set of thorough design rules
 - Standards are aimed at defining a minimum set of requirements for an item (product, service, process, etc.) in order to make it meet certain well-defined objectives (e.g., to guarantee a certain degree of interoperability or to define a minimum level of performance)
 - Many 'standard-compliant' implementations of the item are possible

40

40



Benefits of standards

Standards benefit:

- The economy
 - Economics of scale, facilitates trade
- Innovation
 - Setting quality levels, reducing risk
- The environment
 - Environmental sustainability, enhancing safety
- Industries
- Communities and individuals

41

41

Examples of benefits from Standards

Benefits of standards for industries (especially for newly established ones and SMEs)

+ Innovation

STANDARD

Ease new developments
(- risk, - investment,
+ opportunities)

+ Trade and competition

STANDARD

Enlarge potential market

+ Safety and sustainability

STANDARD

Fairer competition and less
risks of non-compliance
(widespread and shared
basic requirements)

42

42

Examples of benefits from Standards

Benefits of standards for communities and individuals

+ Innovation

STANDARD

Satisfaction of tangible and
intangible needs

+ Trade and competition

STANDARD

Best value for money

+ Safety and sustainability

STANDARD

Safer environment

43

43

Possible risks of Standards

- Standards may jeopardize innovation, as:
 - When established, standards may limit or delay the introduction of innovative (disruptive) solutions in the market
 - Introducing innovation into standards may take a long time
- Measures SDOs put in place to minimize risks:
 - Effectively managing the standardization processes by being open and responsive to the market innovation trends and to research impulses from the experts involved in the standardization activities
 - Establish open expert groups to explore innovation

44

Possible risks of Standards

- Standards may jeopardize fair competition among industries and Countries, as:
 - SDOs may be politicized, or unduly influenced by special interests
- Measures SDOs put in place to minimize risks:
 - Enlarge contributor base
 - Right balance between effectiveness and fairness

- Varied standardization landscape may carry to inconsistencies, as:
 - Standards produced by different SDOs may be in competition or partially overlap; consequent production of inconsistent or, at least, redundant requirements may strongly jeopardize standardization benefits
 - Risk of unfairness as some SDO may be misused for local or specific interests
- Measures to put in place to minimize risks
 - Users and contributors to standards must select the most appropriate SDO
 - SDOs promote liaisons and collaboration among themselves

All standards get bloated

45

Classification of SDOs

- Standardization landscape includes multiple SDOs that may differ in
 - Geographical coverage
 - International SDOs



These have members worldwide, which sometimes also include national or regional standard bodies, and their deliverables have worldwide coverage.

Regional SDOs



These have members (industries, academia and national SDOs) from countries that usually share, or are interested in promoting common practices and regulations.
 - Technical scope of activities (as per each SDO's statute)
 - Level of recognition from regulatory or political organizations
- SDOs often establish liaisons or set up common working groups to generically coordinate their activities or to join efforts on specific items

46

Classification of SDOs – International SDOs (examples)

- ITU
 - Since 1947 it's a specialized agency of UN, with study group made up by state members, sector members, associates from industry, international and regional standard organizations, and academia.
 - ITU sectors: ITU-T (electronic design and test specifications), ITU-R (global radio spectrum, satellite orbits), ITU-D (promotion of fair and affordable access to telecommunications)
- ISO
 - Independent, international non-governmental organization founded in 1946, with members from 160 country divided into hundreds of technical committees and subcommittees
 - ISO standards covers ICT, healthcare, energy and automotive.
- IETF
 - Governing body of the Internet as part of the Internet society (ISOC)
 - It is controlled by the Internet Architecture Board (IAB), which is both a committee of the IETF and an advisory body of the Internet Society
- ETSI
 - ETSI is a European Standards Organization (ESO), recognized regional standards body dealing with telecommunications, broadcasting and other electronic communications networks and services.
 - ETSI supports European regulations and legislation through the creation of Harmonised European Standards. Only standards developed by the three ESOs (CEN, CENELEC and ETSI) are recognized as European Standards.
- ARSO
 - Main goals: harmonize national and/or sub-regional standards as African Standards, to initiate and coordinate the development of African Standards (ARS) with reference to products that are of particular interest to Africa, such as agriculture and food, civil engineering, chemistry, and chemical engineering, and to encourage and facilitate the adoption of international standards by member bodies.
- PASC
 - main objectives: to strengthen ISO and IEC international standardization programmes, to improve the ability of Pacific Rim SDOs to participate in these programmes effectively, to improve the quality and capacity of standardization and to promote standardization

47

Classification of SDOs - Geographical coverage

National Standard Development Organizations (NSDO)

National SDOs (NSDOs or NSB) operate at the single country level and issue country-specific standards; they often collaborate with International and Regional SDOs.

Some relevant NSDOs outside Europe are:

 **ANSI**
American National Standards Institute

 **JSA**
JAPANESE STANDARDS ASSOCIATION SINCE 1945

 **ARIB** **tsdsi**

 **CCSA**

 **Standards Council of Canada**
Conseil canadien des normes

 **SAC**
中国国家标准化管理委员会
Standardization Administration of the P.R.C.

 **TTA**

 **atis**

 **TTC**
Telecommunications Technology Committee

48

48

Geographical scope of organizations and standards

Standardization Structures:

| | National level e.g. Germany | Regional level e.g. Europe | International |
|--------------------|---|---|---|
| General |  |  |  |
| Electrotechnology |  |  |  |
| Telecommunications |  |  |  |

49

49

24

Classification of SDOs - Examples of scope of activities

- A non exhaustive overview of the ICT ecosystem, where International, Regional and National SDOs, Professional Organizations and Industrial Consortia operate

| Organization | Typical technical scope of activity |
|--------------|---|
| ITU | Interoperable telecom specifications incl. architecture, services, protocols, addressing / numbering plans |
| ISO | ICT architecture (OSI model) services, protocols incl. application protocols |
| IEC | Electrotechnical standards, incl. connectors, electrical safety and tests |
| ETSI | Standards for ICT-enabled systems, applications and services |
| CEN | Household appliances, Intelligent Transportation and Mobility, Smart Grids and Smart Metering, Cybersecurity, Blockchains |
| CENELEC | Electrotechnical standards, incl. connectors, electrical safety and tests, ECM |
| IEEE | All LAN specifications: IEEE 802.xx, including cabled LANs, Token Ring and Bus, Wireless LANs WLAN, e.g. WiFi |
| IETF | All internet related specifications including protocols, generic applications, addressing rules (IP, url) |

50


50

Classification of SDOs – Examples of liaisons among SDOs

- A non exhaustive overview of the ICT ecosystem, where International, Regional and National SDOs, Professional Organizations and Industrial Consortia collaborate through liaisons and Standard Initiatives



51

51



Classification of SDOs

- SDOs can create groups/projects, possibly also involving industries, for cooperating in the definition of specific standards
 - 3GPP
 - It consists of SDOs operating in the telecommunication field in countries and regions across the globe
 - Shared environment in which to produce the reports and specifications that define mobile radio technologies (radio access, core transport network, service capabilities and hooks for non-radio access to the core network, and for interworking with Wi-Fi networks)
 - OneM2M
 - Purpose is to develop technical specifications, which address the need for a reference Machine-to-Machine Service Layer that can be embedded within various hardware and software.
 - One of the main goal is to involve organizations from M2M-related business domains, such as telematics and intelligent transportation, healthcare, utilities, industrial automation, smart homes, etc.



52

52



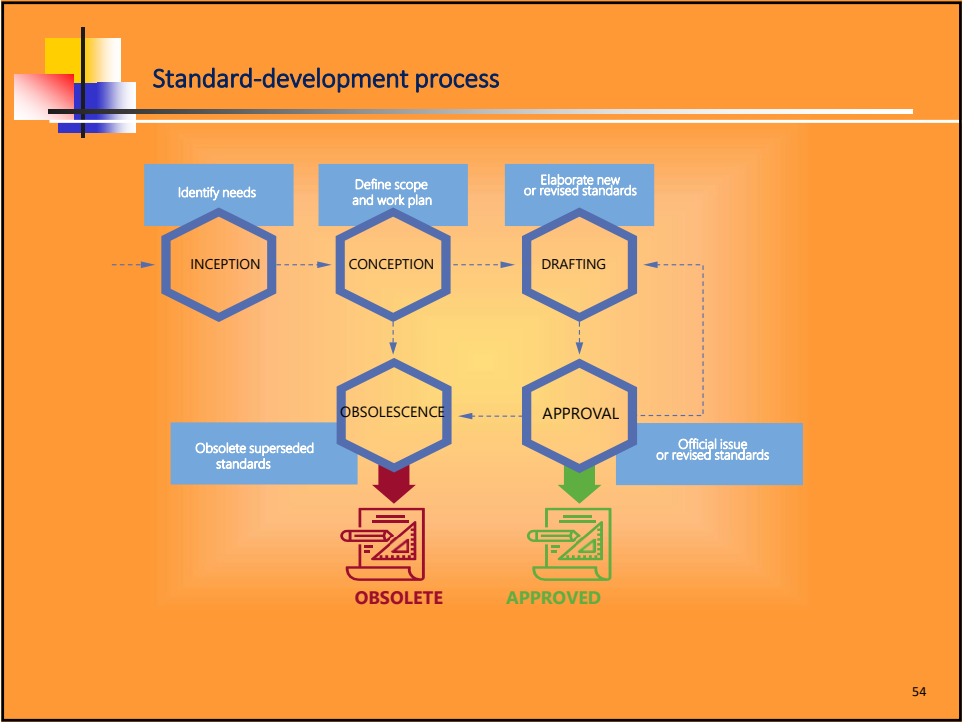
Classification of SDOs - Affiliation

- In addition to SDOs, there are other organizations that do not strictly or entirely use the formal standardization procedures but aim at defining standard in a specific area
 - Example Industrial Fora/ Consortia: they are composed of groups of companies that temporarily join their efforts on specific subjects to realize, accelerate, complement, or promote the development of standards on them



53

53



54

How to find a standard

The procedures described here in order to identify standards related to a specific product/service are a simple example of how a beginner may proceed (depending on seniority, knowledge or specific goals the steps can change)

- Select relevant SDOs
 - by technical scope (which corresponds to the typology that the product/service is targeted for)
 - by geographical scope (which corresponds to the geographical market that the product/service is targeted for)

Note: Evolution of standards needs to be monitored to be informed about SDOs’ scope and possible liaisons

- Identify selected SDOs’ relevant specification documents and their relevance
 - SDOs may produce different kinds of documents such as technology roadmaps, product/service requirements, product/service technical specifications, regulations produced on behalf of regulatory bodies and product/service test specifications

55

Select relevant SDOs

First step: to identify relevant SDOs according to geographical scope and technical domain

Example

| Organization | Headquarters | Geographical scope | Domain of activity | Affiliate organizations / members |
|----------------|-----------------|--------------------|--------------------|---|
| ITU | Geneva (CH) | International | Telecom | National SDO / Industries |
| ISO | Geneva (CH) | International | ICT | National SDO |
| IEC | Geneva (CH) | International | Electrotechnical | National SDO |
| ETSI | Sophia Ant (FR) | Regional (Europe) | Telecom | National SDO / Industries / Research Institutes / Government bodies |
| CEN | Brussels (BE) | Regional (Europe) | ICT | National SDO |
| CENELEC | Brussels (BE) | Regional (Europe) | Electrotechnical | National SDO |
| IEEE | New York (US) | International | ICT | Professionals |
| IETF | Fremont (US) | International | ICT | Professionals |

Understanding structure and formalism of the standards

Clearly identify standard document's objectives and area of application

Standard documents explicitly claim scope and applicability, usually in introductory sections of the document

Examples

ITU

Recommendation ITU-T G.9905

Unified high-speed wireless-based home networking transceivers - Multiple input-multiple output specifications

Scope:

This Recommendation ITU-T G.9905 specifies the basic characteristics of a multiple-input-multiple-output (MIMO) high-speed low-coverage broadband receiver capable of operating over power-line carrier waves. This Recommendation includes the definition and architecture for Recommendation ITU-T G.9904 and ITU-T G.9906, but an explicit code is not added. A MIMO low-coverage receiver (MIMO-LWR) transceiver is able to transmit or receive data from multiple physical units, and provide a service for up to 75 port end-nodes in a star-like bus topology for providing networked local area and extending the network (i.e., access capability) of the same service. This Recommendation also specifies the means for MIMO transceiver for

ETSI

ETSI EN 301 489-1 V1.2.2 (2011-09)

Electromagnetic compatibility and Radio spectrum Matters (ERM); Electromagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements

Foreword

The European Standard EN 301 489-1 has been prepared by ETSI Technical Group 1, Electromagnetic Compatibility and Radio Spectrum Matters (ERM).

The present document has been produced by ETSI as part of the European harmonized standard EN 301 489-1 V1.2.2, which is intended to be used in conjunction with the EMC Directive 2002/95/EC and the EMC Directive 2004/104/EC.

The present document is intended to be used in conjunction with the EMC Directive 2002/95/EC and the EMC Directive 2004/104/EC.

IEEF

Network Analysis Tools

Abstract: This document defines the requirements for the development and testing of network analysis tools.

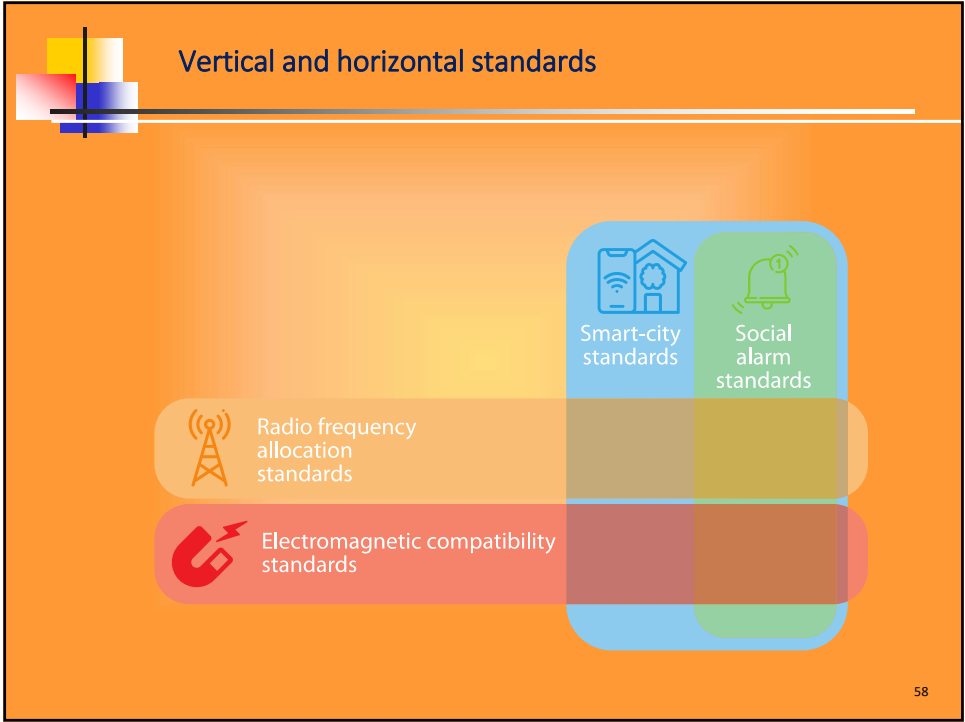
Keywords: Network analysis tools, network simulation, network modeling, network performance evaluation.

History of This New Edition:

This document specifies the common standards track protocol for the Internet community, and requires implementation and maintenance of the standards track protocols. It is the basis for the development of the "Internet Engineering Task Force" (IETF) standards track protocols.

Copyright: All rights reserved. No part of this publication may be reproduced without prior written permission of the IETF.


57



58



63




IPRs can be relevant to standards and standardization

- IPRs can be relevant to standards and standardisation in different ways:
 1. Standards are text documents, and the question of copyright arises
 2. Standards are often known by a name and associated with certain logos (or symbols or emblems, think of GSM, Wi-Fi, Bluetooth and CD)
 - Often, the SDO will be copyright owner of the name
 - But not always: the well-known 'GSM' logo is owned by the GSM Association (GSMA), and the trademark 'Wi-Fi', is owned by the Wi-Fi Alliance
 - Often these trademarks are associated with specific licencing conditions (with certification processes).
 3. The implementation of a standard into a product or service may require the use of certain intellectual property rights
 - May require mandatory software code

64

64




The tension between patents and standards

- The patent system and the standardisation system are both institutionalized to serve the public benefit
- Yet, they have an uneasy relationship, which creates tension and calls out for thoughtful considerations and policy
 - Underlying reason:
 - patents aim to promote innovation by granting temporary rights to exclude others from using technological innovations,
 - whereas standards aim to promote innovation by an endeavour to make technical solutions available to all interested parties without any undue barriers
- This tension specifically pronounced for so-called **Standard Essential Patents (SEPs)**, without the use of the technology protected by that patent, it is impossible to make a product that satisfies the standard

65

65




The tension between patents and standards

While patented technology can bring innovative and valuable solutions into a standard, the inclusions of a specific technology can also raise a number of concerns

| | |
|-------------------------------------|--|
| NON-AVAILABILITY OF LICENCES | SDOs and their participants, after having finalized and published a standard, find out that one or more owners of essential patents are not willing to license these |
| EX POST PATENT HOLD-UP | SEP owners, aware of the fact that implementers have no choice other than obtaining a license from them, use the resulting bargaining power to demand a significantly higher licensing fee than they could have obtained in a licensing negotiation where implementers were not yet 'locked into' the standard |
| ROYALTY STACKING | The total amount of royalties for a single product that implements that standard mounts up to such a level that the product is no longer commercially viable |
| UNDUE DISCRIMINATION | This refers to the situation where a SEP owner treats implementers differently |

66



The tension between patents and standards

- Q: How many SEPs are there? A: Nobody knows
 - Many SDO policies require participants to disclose information on patents that are potentially essential. A recent study for the European Commission showed that per February 2019, parties declared around 260,000 patents as potentially essential for ETSI standards, which can be grouped into slightly over 25,000 patent families
 - Patent families group patents on the same invention but applied for in different countries
 - Yet, a *potential*/SEP is not a factual SEP
 - At the time of such a declaration, the precise content of the final standard is not yet known, and the technology in the declared patent may eventually not be included in the standard at all. Furthermore, by the time of such declaration, the ultimate scope of the patent may not be yet known either – this only becomes known at the moment when that patent is actually granted (or granted at all)

In 2017, the European Commission announced it wants to increase transparency in this field, and noted that it is desirable that information on factual essentiality would be available to market players

67

67

IPR policies at SDOs

SDO IPR policies can be categorized into two main categories:

| Policy type | Description | Examples |
|------------------------------|---|------------------------------|
| COMMITMENT-BASED POLICIES | (A) Members have the obligation to inform ('disclose', 'declare') the SDO when they believe they own patents that may be or may become essential to a standard. (B) (B) Owner of disclosed patents are requested to commit to making licenses for these patents available specified conditions, if the patent indeed becomes essential | ISO, IEC, ITU, ETSI and IEEE |
| PARTICIPATION-BASED POLICIES | As is a condition of membership, all members of the SDO must be willing to license all their essential patents at specified conditions, if the patent indeed becomes essential. Opt-out possibilities may exist | W3C, HDMI Forum |

If a commitment is missing, the SDO will seek to develop a standard not requiring the patent

Examples of specified conditions:

Fair, Reasonable and Non-Discriminatory (FRAND, sometimes referred to just as RAND)

"Royalty Free"

68

68

The tension between patents and standards

Patent that may well be a SEP:

Patent that is not a SEP:

(but may nevertheless be valuable!)

69

69

Patent pools

No pool

(34 licensing agreements needed)

Patent pool

(11 licensing agreements needed)

There is a whole business ecosystem associated to the “pool” concept.
Litigation is the only way of imposing patent rights, and patent pools may be used as deterrent.
recall: patent trolls.

70


70

IPR, standards, and the legal system

- When parties turn to the legal system (courts), three bodies of law are relevant here:
 - Patent law
 - is relevant here because it is this body of law that allows a patent holder to prevent others from making, using, selling, or importing the patented invention without permission
 - Private law
 - is relevant because it governs contracts and other relationships between companies and other parties
 - Competition/antitrust law
 - is important because it places restrictions on the conduct of parties (or groups of parties) that have a dominant market position
- There have been quite some court cases on SEPs.
Famous cases include Microsoft vs. Motorola (2013), In re Innovatio (2013), TCL v Ericsson (2017), and Huawei/ZTE (2015)

71

71



Other resources

- Robert W. Gomulkiewicz, *De-bugging Open Source Software Licensing*, 64 U. Pitt. L. Rev. 75 (2002)
- Robert W. Gomulkiewicz, *How Copyleft Uses License Rights to Succeed in the Open Source Software Revolution and the Implications for Article 2B*, 36 Hous. L. Rev. 179 (1999)