



International Organization of Legal Metrology

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Organisation Internationale de Métrologie Légale

# The role of Legal metrology in Quality Infrastructure

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The system comprising the organizations (public and private) together with the policies, relevant legal and regulatory framework, and practices needed to support and enhance the quality, safety and environmental soundness of goods, services and processes.

The quality infrastructure is required for the effective operation of domestic markets, and its international recognition is important to enable access to foreign markets. It is a critical element in promoting and sustaining economic development, as well as environmental and social wellbeing.

It relies on

- metrology,
- standardisation,
- accreditation,
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## Definition of legal metrology

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“Legal metrology is the practice and the process of applying **regulatory structure and enforcement** to metrology. It comprises all activities for which **legal requirements** are prescribed on **measurement, units of measurement, measuring instruments and methods of measurement**, these activities being performed by or on behalf of **governmental authorities**, in order **to ensure an appropriate level of credibility** of measurement results in the national regulatory environment....”

*[OIML D 1: 2012 “Considerations for a law on metrology”]*

- Measurements may fall within the scope of legal metrology when:
  - those affected have conflicting interests
  - those affected do not have the competence or the possibility to evaluate the reliability of the measurement results
  - legal evidence is needed of measurement reliability
  - health & safety require reliability of measurement

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# Why do we need legal metrology?

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- In legal metrology:
  - measuring instruments are designed for operators with no competence in measurement
  - measurement procedures are described simply in the instrument's operating manual
  - environmental conditions are not controlled, so instruments must be designed for a range of environmental conditions and disturbances
  - operator impartiality cannot be assumed, so instruments must be protected against fraud
- Confidence in a measurement is based on confidence in the instrument and on regulatory surveillance



# Who looks after metrology at the international level?

## Scientific metrology

- Bureau International de Poids et Mesures
- Established in 1875
- Sèvres, France

Bureau  
International des  
Poids et  
Mesures



## Legal metrology

- Organisation Internationale de Métrologie Légale
- Established in 1955
- Paris, France



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- Founded 2003 to coordinate activities in favour of developing countries by international organisations
    - Metrology: BIPM, OIML
    - Standardisation: IEC, ISO, ITU, UNECE
    - Accreditation: IAF, ILAC
    - Capacity building: ITC, UNIDO
  - Conformity assessment is an important component
  - No longer just “developing countries”, but countries with developing Quality Infrastructure
  - Considering changing name to reflect wider remit, but definitions of quality infrastructure vary



# Legal metrology has been with us for a long time!

**“Throughout the realm there shall be the same yard of the same size and it should be of iron”**

***Assize of Measures, 1196***



**“There shall be standard measures of wine, ale, and corn (the London quarter), throughout the kingdom. There shall also be a standard width of dyed cloth, russett, and haberject, namely two ells within the selvedges. Weights are to be standardised similarly.”**

***Magna Carta, 1215***



# How legal metrology affects you

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- Consumer level
  - shops / markets / filling stations / utilities
  - Affects everyone's daily life**
- Industrial level
  - processed / packaged products
  - trade in measuring instruments
  - Affects a large number of companies in a given country**
- National level
  - international trade in raw materials / fuels
  - Affects national economies**



# When does legal metrology affect you?

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- Every time you buy fruits, vegetables, meat, fish ...
- Every time you buy products in a box, a can, a jar ...
- When you use utilities at home – electricity, gas, water ...
- When you fill your car with fuel ...
- When you drive – speed, alcohol, emission controls ...
- When you visit the doctor or hospital ...
- When you go to work – levels of light and noise ...

*Do you think about these things?  
... or does “somebody look after them” for you?*





## Who looks after these things?

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- If you live in an industrialised country, you don't think of these things:
  - “Somebody” looks after all that!
  - “Somebody” has standards of weight, volume, ...
  
- If you live in a country without a legal metrology system, you still don't think about these things,  
  
*but:*
  - “Somebody” doesn't look after all that!
  - The standards may not even exist in your country!

## Trade

- Makes it fairer
- The poorest get the right quantity for the little money they have
  - staple foodstuffs
- Farmers get the correct payment for their work
- The economic conditions of the country improve, and poverty is reduced





## Surveillance of prepackaged products

- Excessive under-filling is very common
- Example – a study in Jordan showed that many cans of olive oil which should contain 2.7 L only really contained 1.8 L!
- Again, fairer trade, better economic conditions



## Road safety

- Overloaded lorries
- Speeding
- Blood alcohol level
- Road accidents are very expensive, and often affect the youngest / poorest
- In Vietnam, the cost of road accidents is estimated to be 5 % of GDP



## Health

- Improvements in basic healthcare benefit many
- Improvements in the health of the poorest
- Reduction in costs to public finances



## Export of bulk raw materials

- Ensures measurement of products is fair and that correct price is paid
- Ensures governments receive correct taxes on exported products
- Improves national economy





- The OIML is an intergovernmental organisation established by treaty in 1955
- The members of the OIML are countries (Member States)
- One country = one vote
- Each country is represented
  - in the **OIML Conference**, by a delegation designated by their government
  - in the **International Committee of Legal Metrology (CML)**, by a CML Member designated by their government
- The CML Member is normally the person responsible for national legal metrology

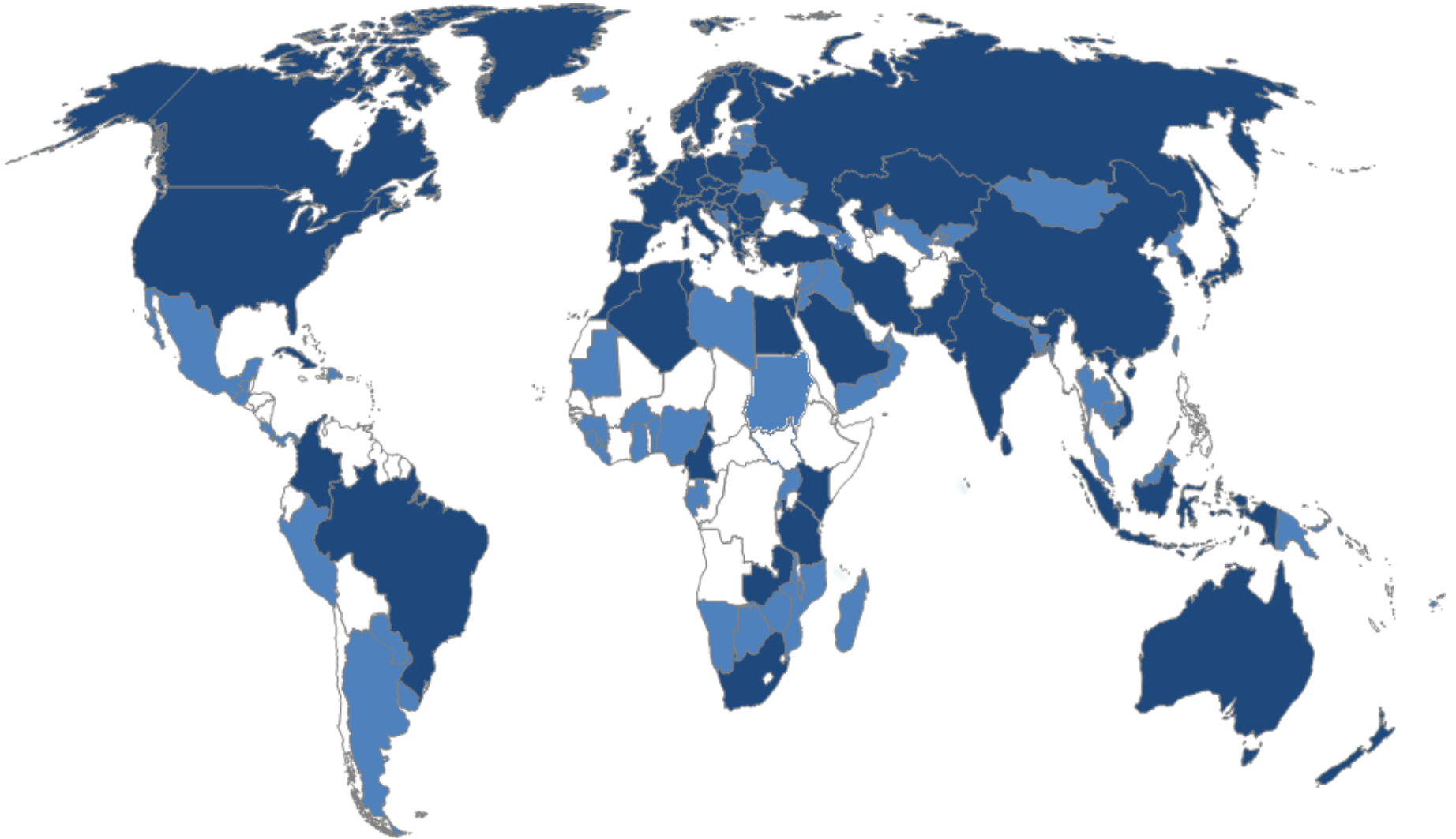


- Member States (currently 62)
  - Pay an annual fee based on their population (4 classes)
  - May participate fully in any of the OIML's technical work
  - Obligated to vote on draft OIML publications during their development
  - Each Member State has one vote
  
- Corresponding Members (currently 66)
  - Pay fixed annual fee = 1/10 minimum Member State fee
  - May participate in all OIML technical work and comment
  - No voting rights at any level



# OIML Membership

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# OIML structures







# What does the OIML do?

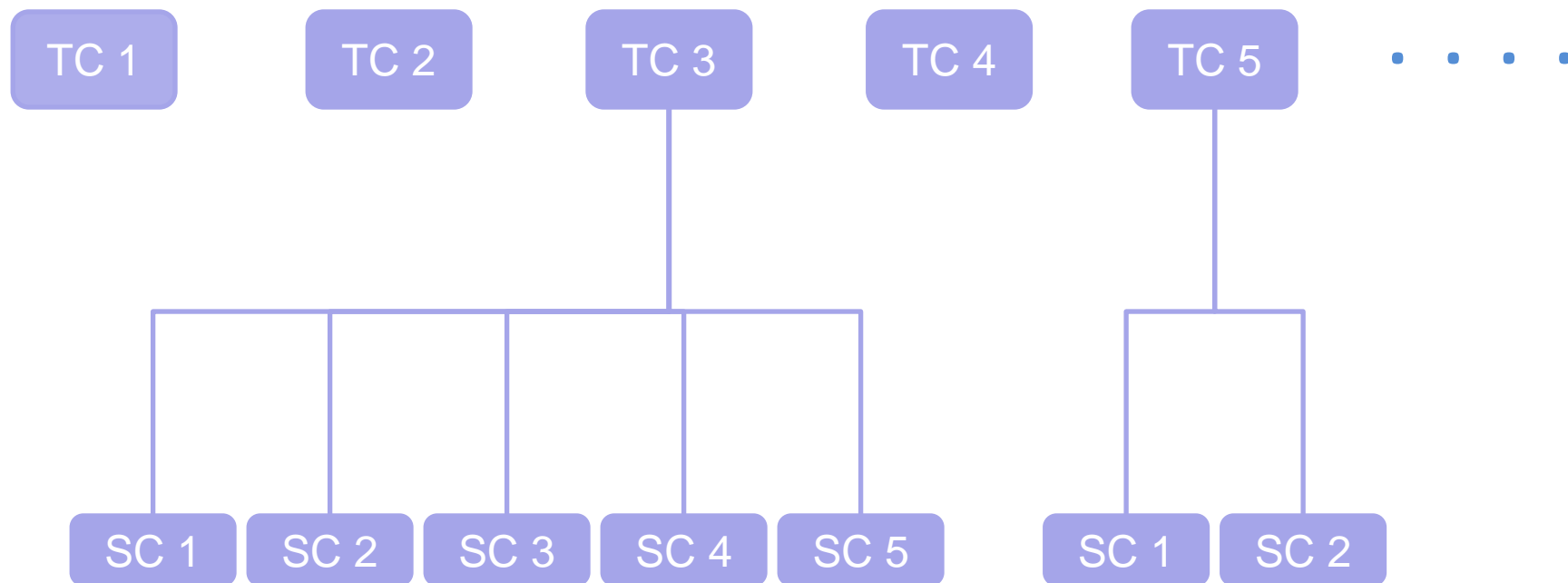
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- Produces OIML International Recommendations
  - Model regulations
- Produces OIML International Documents
  - Best practice
- Produces other publications
  - Vocabularies, guidance, seminar reports, expert reports



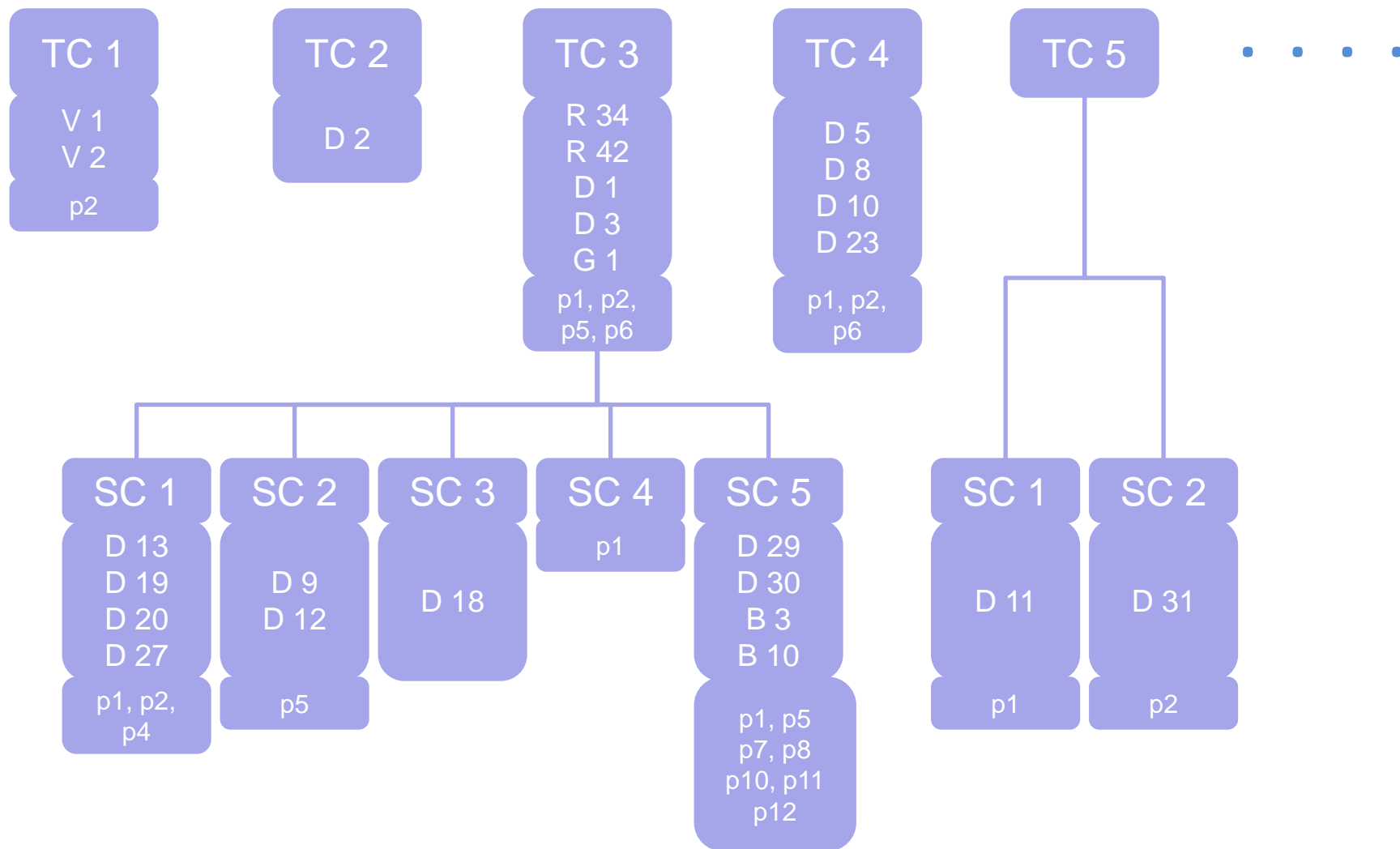
# The structure of the work

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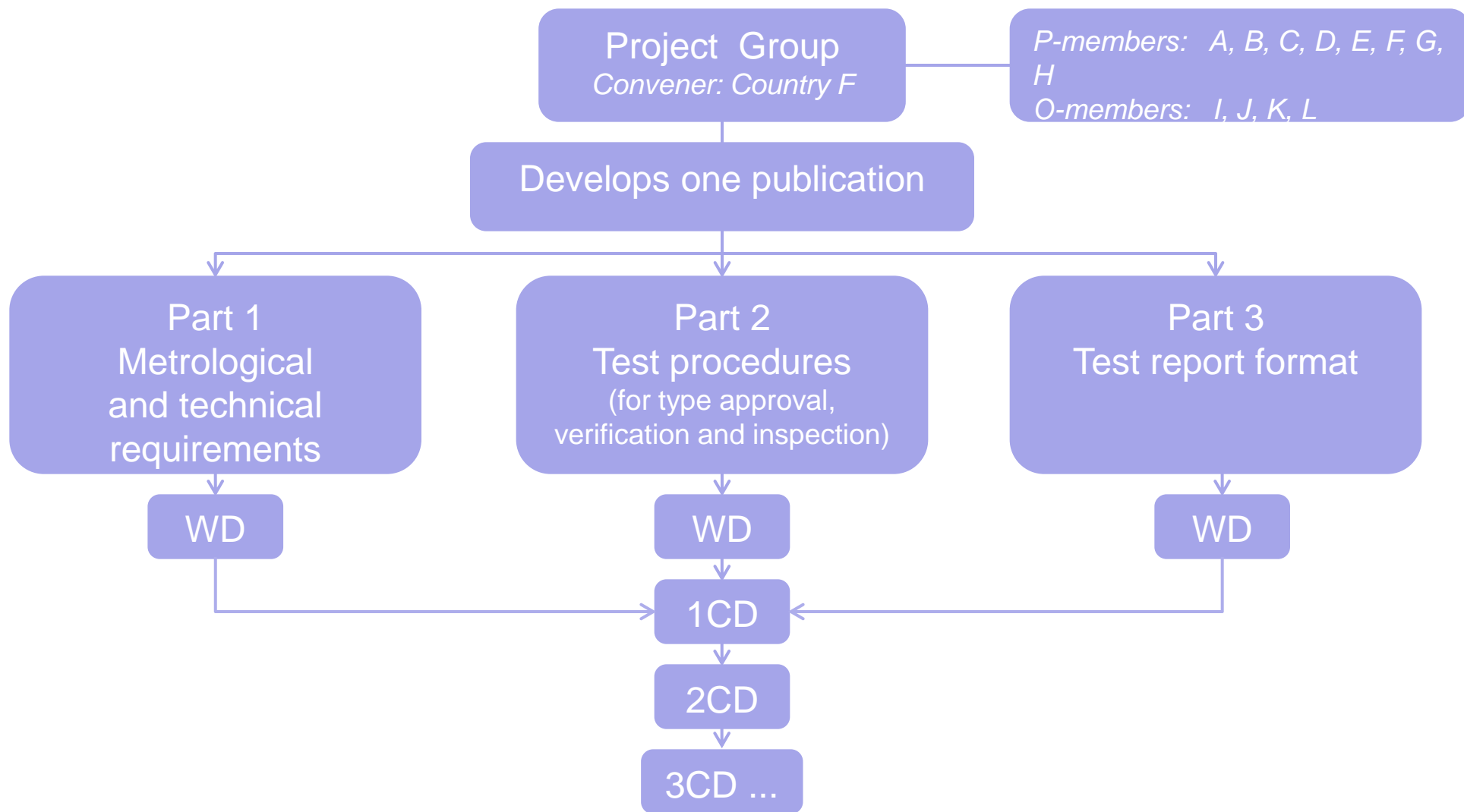


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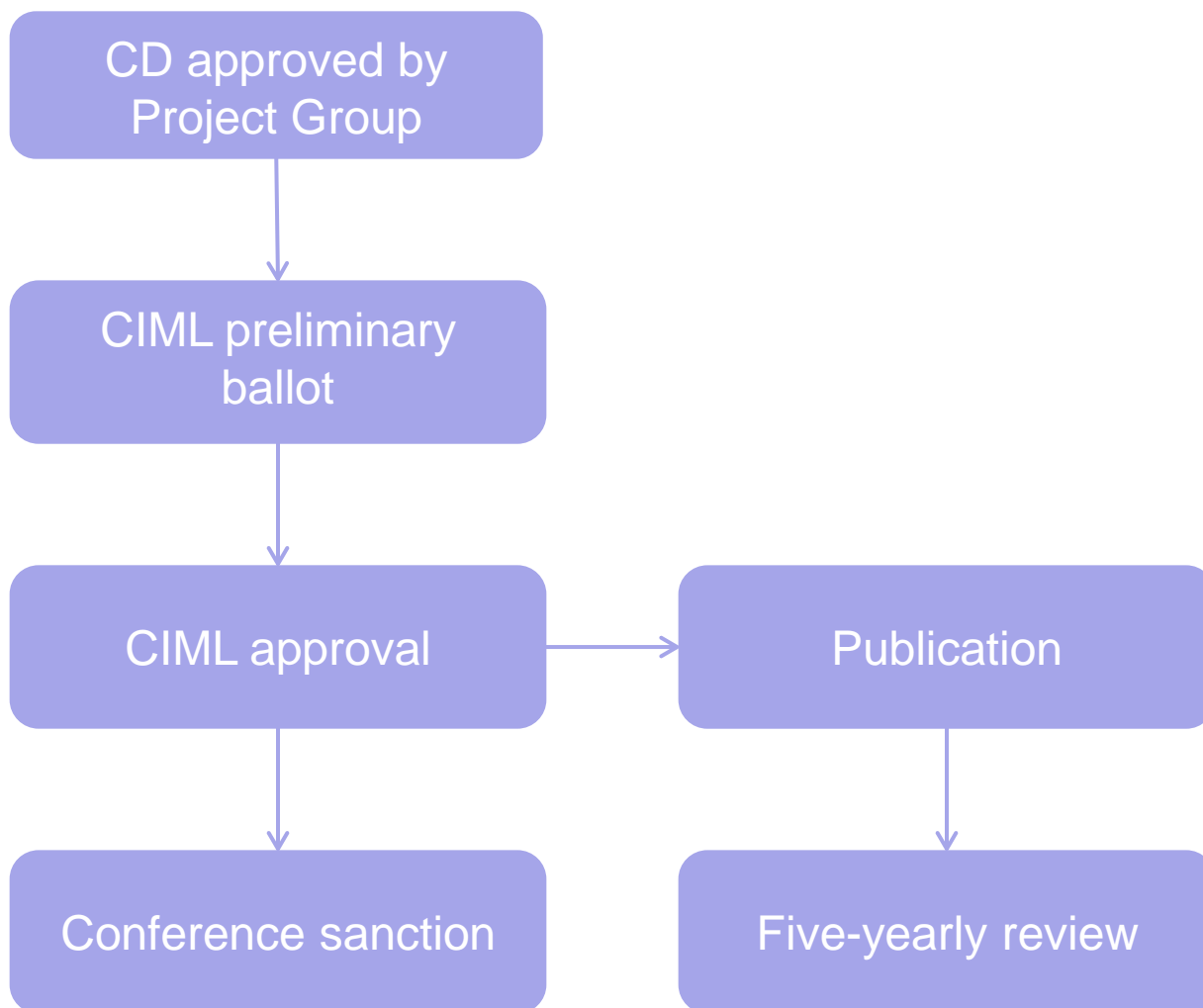
# The work of Project Groups





# The work of Project Groups

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# Implementation of OIML Recommendations

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- Recommendations have are not directly applicable
- Applied in national or regional legislation
- Following CIML approval and Conference sanction, Member States have a moral obligation to use Recommendations
- Recognised as “appropriate international standards” in terms of the WTO Technical Barriers to Trade Agreement



Where to start?

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## OIML D 1

### *Considerations for a law on metrology*

Current version – approved October 2012

Project to revise – approved October 2017



# National metrology infrastructure

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- **Legislative framework**
  - laws and regulations containing metrological requirements
- **Governmental authority**
  - responsible for the national metrology policy and for the coordination of other Departments' metrology activities
- **One or more institutes**
  - responsible for tasks assigned at the national level for the implementation of the national metrology policy
- **System of national measurement standards and dissemination of legal units**
  - in order to ensure traceability





# National metrology infrastructure

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- System (voluntary) for the accreditation of calibration laboratories
  - and, if needed, test laboratories, inspection bodies and certification bodies
- Structures for the dissemination of metrological knowledge and competence
  - training, education, consultants, etc.
- Metrological services for industry and the economy
  - calibration, service/repair, training, advice, type testing, verification, etc.



This policy must:

- determine the government's action on metrology
- commit all ministries and agencies (in their own area of responsibility)
  - ministries must take into account the capabilities of the national metrology infrastructure to supply reliable measurement results when regulating
- support the development of the national metrology infrastructure
  - scientific and technological
  - national economy
  - development of enterprises
  - protection of consumers, citizens and the environment
  - international recognition of the national metrology infrastructure.



# Organisation of authorities

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No obligation to have everything in governmental administrations, but it is recommended that, as a minimum, they:

- manage the national metrology policy
  - guarantees the implementation of an appropriate metrology infrastructure
  - guarantees its continuity
- define the regulations and their enforcement

The role of governmental administrations in other areas depends on the infrastructure and existing competencies

- Central Metrology Authority (CMA)
- Local Metrology Authorities (LMAs), if necessary
- National Metrology Institutes (NMIs)
  - one or more reference laboratories
  - scientific and legal metrology may be in a single body
  - several structural possibilities:
    - public institute with its own laboratories
    - private institute with its own laboratories, under the authority of the state, taking into account the problems of unfair competition and national security
    - public agency coordinating public or private institutes
- System for local verification / inspection



# Legal units of measurement

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- Units of the *Système International d'Unités* (SI)
  - adopted by the General Conference on Weights and Measures and recommended by the OIML for the quantities covered by the System
- Units used for quantities not covered by the SI
  - specified by a national authority
  - based on international reference if possible
- Customary units
  - specified by a national authority
  - according to the needs of international trade
  - specific uses (air or maritime navigation, health care, military)
  - safety reasons



# National measurement standards

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System set up to maintain and disseminate the legal units

- according to the needs of the country
- if they are primary standards
  - they must be regularly compared with other national primary standards
- if they are not primary standards
  - they must be traceable by means of the primary standards of another country
- national measurement standards are the most accurate standards of that country



One or more institutes designated by the State to:

- establish, maintain, and improve the national standards
- disseminate the legal units according to the needs of the country
  - participate in corresponding international activities
- provide advice and support on metrology to the government, commerce and the public
- provide a sound metrological basis for the national accreditation system



- provide advice and support on legal metrology to the government, commerce and the public
- technical work and coordination on legal metrology
  - type approval
  - coordination and technical support for the initial and subsequent verification, and inspection of measuring instruments and for market surveillance
- participate in international work on legal metrology





## National institutes

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- must be impartial
- their missions of general interest must be financed from public funds
- their commercial products and services must not create unfair competition

Regulations – necessary to:

- protect the interests of individuals and companies
- protect the national interest
- protect public health and safety
  - in conjunction with environmental and medical services
- meet the requirements of international trade

In the following domains:

- measurements
- prepackages
- measuring instruments



# Regulations on measurements

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- define quantities to be used according to the method of sale
- prescribe that certain measurements are to be used in certain transactions or in application of the law
- define the list of measurements subject to legal metrology controls
- provide metrological requirements (including uncertainties)
- provide the means for legal control
- make the use of legal units compulsory
- may specify a measurement method and require the use of measuring instruments subject to metrological controls



# Regulations on prepackages

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For the quantity of product contained in a prepackage, these give:

- metrological requirements
- means of legal control

These regulations must require that:

- the nominal content shall be marked
- the nominal content shall be expressed in legal units

These regulations may require that:

- certain authorised quantities are used
- unit price information is shown



# Regulations on prepackages

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These regulations may specify:

- the conformity marks
- that manufacturers and/or importers must be registered
- that records of control operations undertaken by manufacturers and/or importers shall be made available to the legal metrology officials
- that a quality system shall be used by manufacturers and/or importers
- the procedures and criteria for legal control
- the recognition of conformity marks applied according to systems in other countries or to systems established by international organisations



# Regulations on measuring instruments

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These regulations shall specify:

- the list of instruments subject to legal control
- that legal units must be used
- the applicable metrological performance and technical requirements
- the marks to indicate conformity with legal requirements (type approval mark, verification mark), as well as their use in preventing unauthorised access or adjustments
- the means for restricting access to certain components or functions of the instrument (including software)



# Regulations on measuring instruments

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These regulations may establish legal control and supervision for the listed instruments to:

- assess the initial conformity of the instruments to the legal requirements, at the design stage (type approval) and at the manufacturing stage (initial verification)
- guarantee that instruments maintain their metrological characteristics in use (re-verification, in-service inspection, market surveillance)
- guarantee that instruments are correctly installed and used in appropriate, defined conditions



# Regulations on measuring instruments

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These regulations may:

- establish requirements for those who install, adjust and maintain measuring instruments
- allow for the seizure of a measuring instrument, or the prevention of its use, in the case of an infringement, pending a decision by the legal authorities





# What should your legislation cover?

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# What should your legislation cover?

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## Example of legal controls: fuel dispenser – OIML R 117

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Determination of flowrate

Accuracy

Minimum measured quantity

Delivery interruptions

Gas elimination device

Variation in the internal volume of the hose

Endurance

Variations in temperature and humidity

Variations in supply voltage

Short interruptions in the electrical supply

Electrostatic discharge

Electromagnetic susceptibility



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Examples of general offences:

- sale of a quantity less than the indicated quantity
- taking more than the indicated quantity
- representing the quantity in any way which intends to mislead or deceive another person
- affixing fake approval or verification marks
- not registering, when this is required
- not making available records, when this is required
- hindering the activities of legal metrology officials

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List of specific offences concerning:

- measurements shown in advertising material or other public communications
- the use of legal units
- regulations on measurements
- regulations on prepackages
- measuring instruments subject to legal controls





# Challenges to the establishment of a legal metrology system

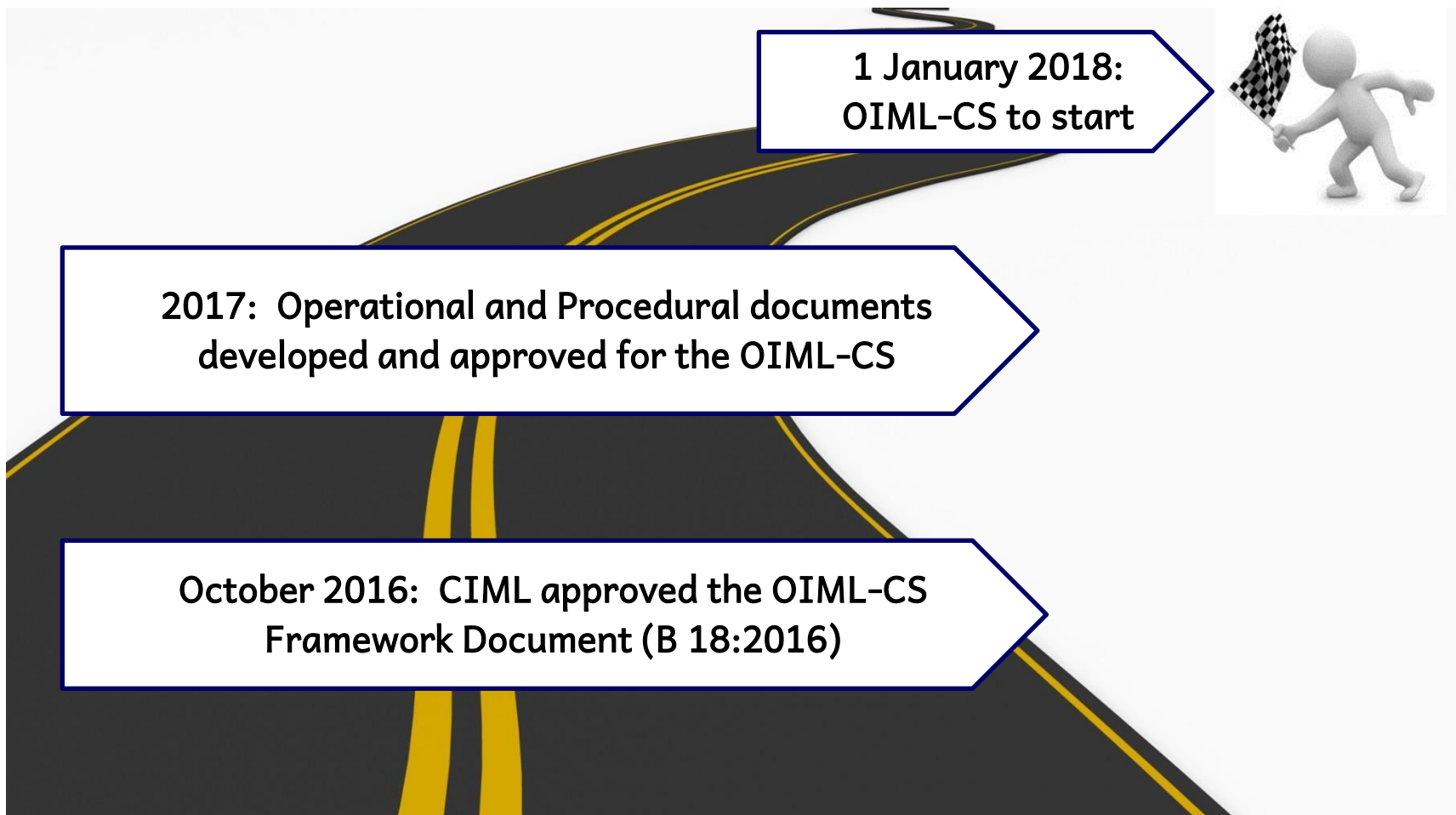
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- Obtaining governmental budgets
- Drafting a metrology law
  - use OIML D 1
- Decide which fields of metrology to regulate
- Draft regulatory texts
  - use OIML publications (Recommendations, Documents, ...)
- Establishment of the necessary bodies
- Training of personnel
- Awareness-raising
  - political, industrial, public
- Budget to ensure the continuity of the system



# New OIML-CS to replace existing Certificate System and MAA - Road-map

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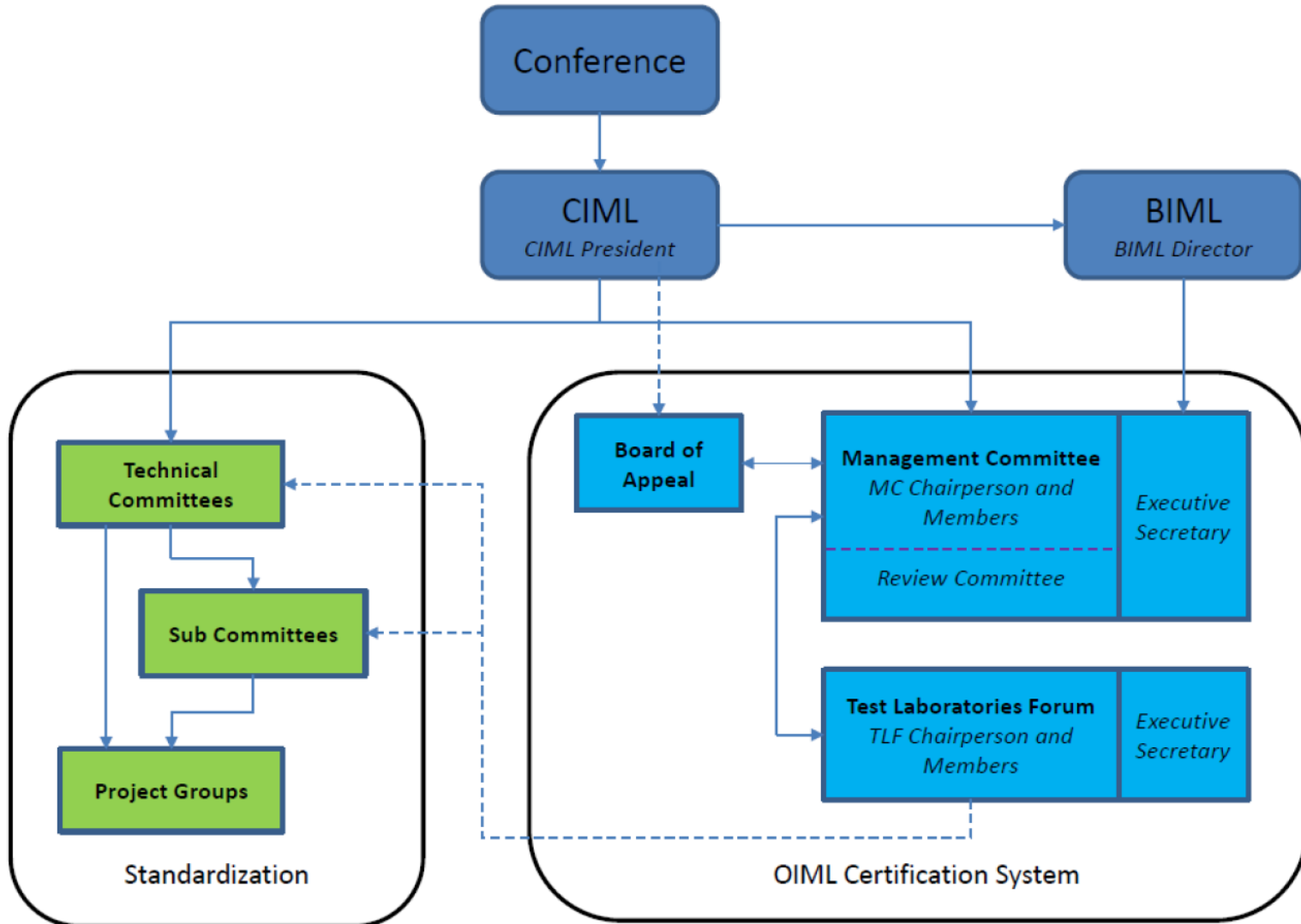
# Features of the new OIML-CS

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- Voluntary system, but signing the single ‘Declaration’ commits in principle the signatories to abide by the rules of the OIML-CS
- Aims to facilitate, accelerate and harmonize type approval of measuring instruments subject to legal control, and to reduce unnecessary re-testing
- Issuing Authorities in both schemes must comply with ISO/IEC 17025 *and* ISO/IEC 17065
- However, evaluation of compliance is different:
  - For Scheme B - “self-declaration” (with supporting evidence)
  - For Scheme A - accreditation or peer assessment
- Peer/accreditation assessments to make use of approved experts (joint arrangement with ILAC-IAF)
- Aim for all OIML Recommendations to be in Scheme A by 2020
- ... possible OIML Conformity to Type system in the future?

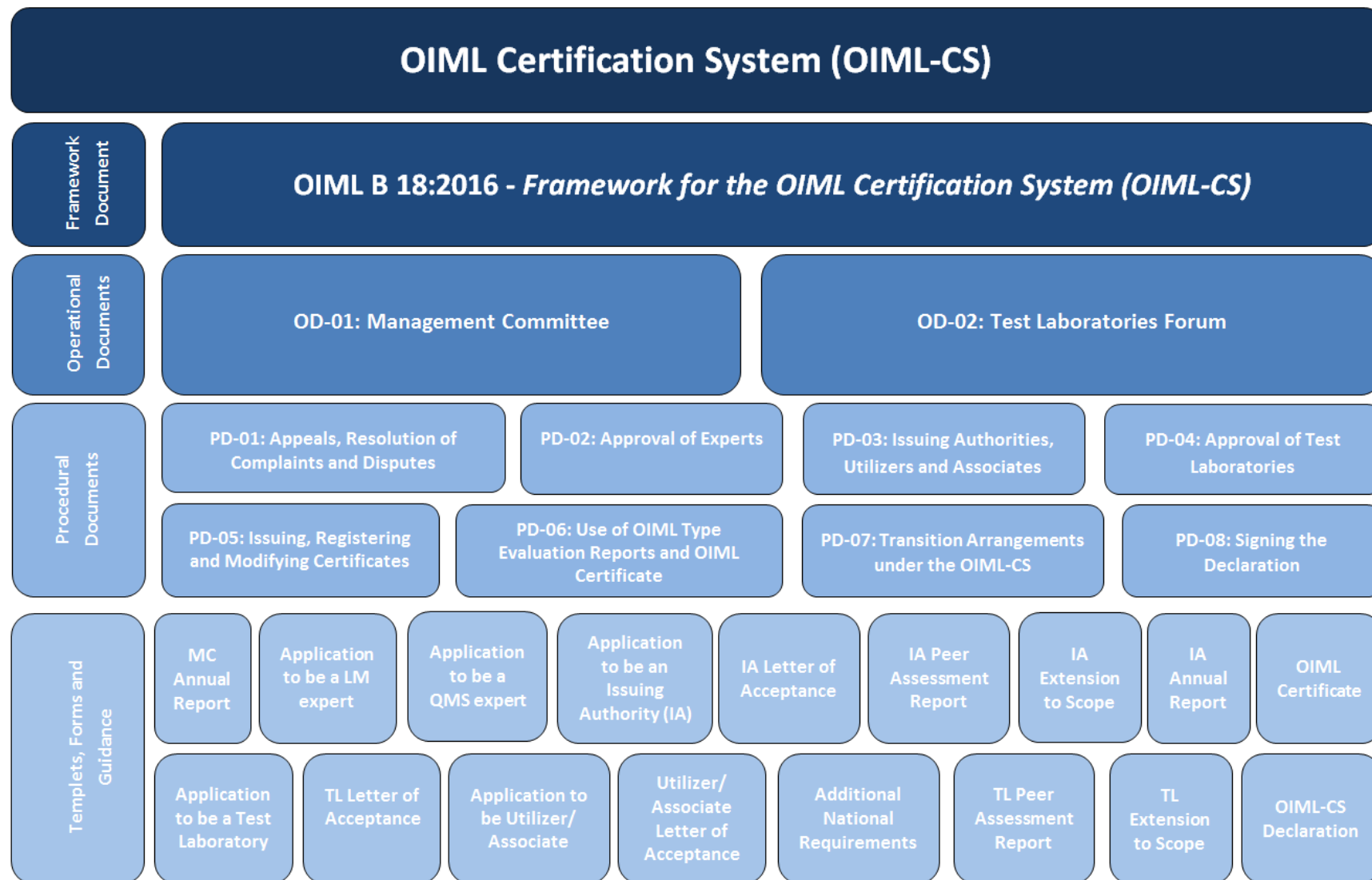


## How is the OIML-CS organised?





# OIML-CS document structure





# OIML help for Countries and Economies with Emerging Metrology Systems (CEEMS)

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- Advisory Group established in October 2013, Terms of Reference approved in October 2017
- Seminar “*Metrology in daily life*” held in Chengdu, P.R. China on 14-15 May 2015
- Seminar “*Developing an OIML package for assistance to Countries and Economies with Emerging Metrology Systems (CEEMS)*” held in Arcachon, France, with 2015 CIML Meeting
- “Virtual” Pilot training centres
  - Two training courses in July and August 2016 in China
  - African training course in November 2017 in Nairobi
  - Interest in setting up similar training elsewhere





# ACP EU TBT Programme e-learning project






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- Project suggested by ACP EU TBT Programme following OIML CEEMS seminar in Arcachon
- Aims to establish comprehensive metrology e-learning package using standard open-source platform
- Hosted on OIML servers for sustainability
- Courses available to **anyone** (subject to registration)
- Further courses will be added even though the ACP EU TBT Programme has ended

*[lms.oiml.org](https://lms.oiml.org)*

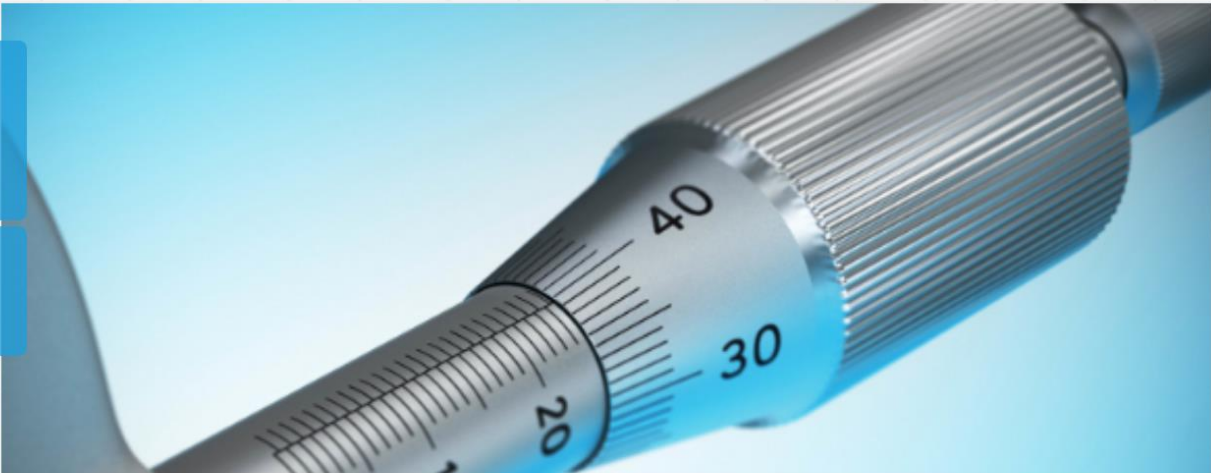



Courses





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Online users


Calendar



40%

Introduction to Metrology as...


COURSE >





0%


e-Learning Platform Guide




COURSE >








All Courses


Public Resources



Dashboard













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Legal Metrology in detail




Course Learning Guide



Course Discussion Forum




Final test




Course Certificate


Course Modules




Basic concepts of Legal Metrology




Legal Metrology in a Nutshell




Examples of regulation of metrology from European and other countries




Metrology and Trade



Metrology and Statistics



OIML Certificate System and engagement with the OIML and RLMOs



Control of measurements



**Thank you**

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**Thank you**

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