Units

The Consultative Committee for Units (CCU)

The Consultative Committee for Units (CCU) deals with the central goal and most important task of the Metre Convention:

- It advises the International Committee on Weights and Measures (CIPM) in all matters concerning the International System of Units (SI),…
- … in particular, on how to establish, maintain, and disseminate the SI at the state of the art of science and adapted to the evolving needs of its users across the world.
- It disseminates knowledge about the SI and about its practical realization not only to metrology experts but also to the general public.

Scope of the CCU

- Structuring, developing and disseminating the SI
- Advice to the CIPM concerning units of measurement
- Preparing successive editions of the SI Brochure
- Educating the general public about the SI

Areas of impact and stakeholders

- Uniform and correct measurements underpin all national and international trade
- CGPM Member States and Associates represent 97 % of world economic power
- Involve other international stakeholders such as OIML, ISO, IEC, CIE, IUPAP, IUPAC
- The SI Brochure is adopted as an official reference by almost all countries

Main achievements

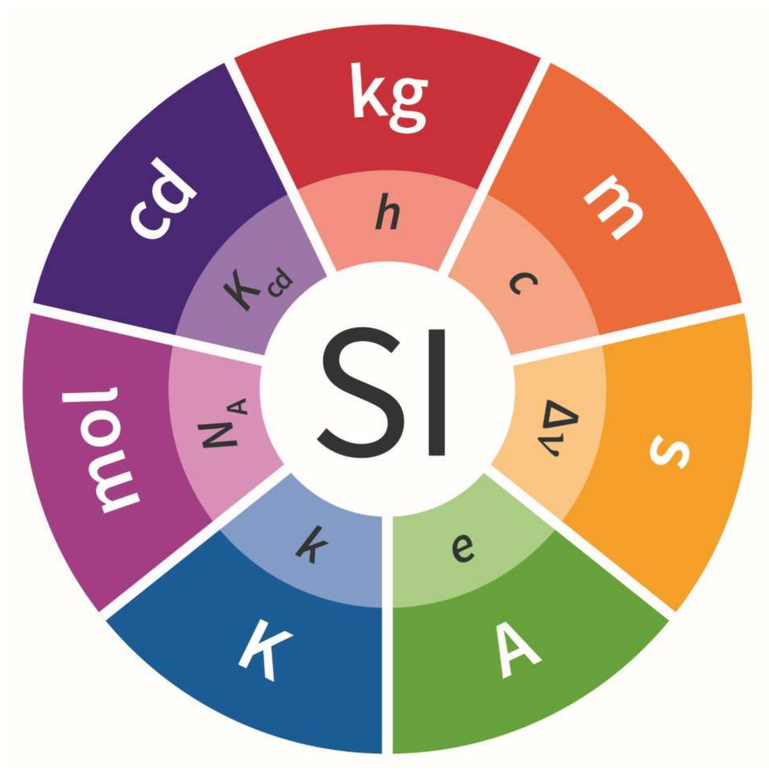
Preparation for the redefinition of four base units (kg, A, K and mol) in 2018

The CCU prepared decisions by the CIPM and the CGPM on the adoption of the new definitions

- Definition of the units is independent of any particular realization
- No scale values or ranges are preferred (in principle, 1 kg will be as easy or as hard to realize as 10 g or 10^{-27} kg)
- Technical advances will no longer necessitate the redefinition of a unit…
- … but instead translate directly into a better realization of that unit (update of the *mise en pratique*)
- A number of fundamental constants and conversion factors will have a reduced or even zero uncertainty
- Explicit constant formulation

The CCU has prepared the public for the upcoming new-style SI

- Together with the BIPM, the CCU has expanded the information on the revised SI on the BIPM webpages
- The CCU has prepared a draft of a new edition of the SI Brochure



The Revised SI

The International System of Units, the SI, is the system of units in which:

- **the unperturbed ground state hyperfine transition frequency of the caesium 133 atom $\Delta\nu_{Cs}$ is 9 192 631 770 Hz,**
- **the speed of light in vacuum *c* is 299 792 458 m/s,**
- **the Planck constant *h* is $6.626\,070\,15 \times 10^{-34}$ J s,**
- **the elementary charge *e* is $1.602\,176\,634 \times 10^{-19}$ C,**
- **the Boltzmann constant *k* is $1.380\,649 \times 10^{-23}$ J/K,**
- **the Avogadro constant N_A is $6.022\,140\,76 \times 10^{23}$ mol^{-1},**
- **the luminous efficacy of monochromatic radiation of frequency 540×10^{12} Hz K_{cd} is 683 lm/W.**

Key challenges for the future

Prepare the redefinition of the second for 2030 or later

- Encourage and monitor research on optical and nuclear transitions whose frequencies could be candidates for redefining the SI second
- Close collaboration with the Consultative Committee for Time and Frequency and the Consultative Committee for Length
- This will probably be the last redefinition of a unit of the SI

Monitoring the implementation of the revised SI and advisory activities related to the SI

- Continue work on matters concerning units of measurement
- Encourage work on practical realizations of the new definitions

CCU membership

President: Prof. J. Ullrich, PTB, CIPM Vice-President

Executive Secretary: Dr E. de Mirandés, BIPM

Members: CEM, Rosstandart, METAS, KRISS, LNE, NIM, NIST, NMIJ/AIST, NPL, NRC, PTB

Liaisons: CIE, CODATA, IAU, ICRU, IEC, IFCC, ISO, OIML, IUPAC, IUPAP

23rd meeting of the CCU in September 2017 Chaired by Prof. J. Ullrich