

## **Strategy for the Consultative Committee for Units, CCU, for the period 2016 to 2023**

### **1. General Information:**

***Name:***

Consultative Committee for Units (CCU)

***Working Groups:***

No permanent Working Groups, but *ad-hoc* small Task Groups when necessary on a temporary basis (for instance the Brochure Drafting Group, which is currently active)

***Date established:***

1964, to replace the "Commission for the System of Units", set up by the CIPM in 1954

***Number of Members:***

17 Members, composed of 10 international organizations and 7 NMIs, plus 3 Personal Members, and 3 invited NMIs, no observers, President: Prof Joachim Ullrich since 1<sup>st</sup> January 2014

***Number of participants at last meeting:***

47 persons, 1 person excused. The 10 international organizations, the 7 Member NMIs and the 3 invited NMIs were represented. We typically had from 15 to 20 invited experts at our meetings (6 invited experts at the last meeting)

***Periodicity of meetings:***

At present 2 to 3 years

***Date of last meeting:***

15 and 16 June 2016, its 22<sup>nd</sup> meeting

### **2. Terms of Reference**

The work of the CCU is concerned with matters related to:

- providing advice to the CIPM about units of measurement, in general,
- the development and improvement of the International System of Units (SI), the preparation of successive editions of the SI Brochure, including the Concise Summary of the SI and any other summaries relevant for metrology institutes, industry, university and school teachers as well as for the general public,
- providing information and advice on units and their use to a wide range of international bodies and individuals who approach the BIPM seeking such information,
- monitoring and commenting on the *mises en pratique*, by providing advice to the CIPM as to their scientific foundation, overall consistency and harmonization.

### 3. Description of activities and achievements up to and including 2016

The year 1999, although a significant year for other Consultative Committees in that it marked the beginning of the CIPM MRA, was not a particular year of note for the CCU. The SI and the SI Brochure have not been directly affected by the introduction of the CIPM MRA. From its creation in 1964 the main task of the CCU has been to oversee the development of the SI and to prepare the successive editions of the SI reference document the SI Brochure, now in its 8<sup>th</sup> edition. In its early years the CCU made many important recommendations and took initiative to build what is now the formal structure of the SI, with its base and derived units, units with special names, and the formalism of their use. The first four editions of the Brochure, beginning in 1970, were published in French only but since the 5<sup>th</sup> edition in 1985 it has been published bilingually in French and English.

Great care is taken with the language, not only for the precision of the meaning but also because it is translated into many other languages as well as being used by people whose mother tongues are neither French nor English. The quality and clarity of the original text, now the English one, is thus of great importance. The current edition, the 8<sup>th</sup> was published in 2006 and included for the first time a four-page Concise Summary and (in English only) a folded credit-card sized pocket version of the Summary. The Brochure is of course freely available on the BIPM website but is also published in hardcopy.

The SI Brochure is the most important and widely used publication of the BIPM. It is the result of work by many people, both inside and outside the BIPM, and its production requires a high level of scientific knowledge and experience.

A further ongoing activity of the CCU is to monitor and comment on the *mises en pratique* of the definitions of SI units by providing advice to the CIPM as to their scientific foundation, overall consistency and harmonization. The *mises en pratique* are prepared by the appropriate Consultative Committee in each case, and, after approval by the CIPM, are then published in Appendix 2 of the Brochure on the BIPM website, where they may be revised more frequently than new editions of the Brochure. During 2015-2016 a draft of the 9<sup>th</sup> Edition of the SI Brochure has been produced by the *CCU drafting team* taking into account comments from the whole CCU as well as from NMI Directors and CC Presidents.

The most important activity of the CCU in recent years has been the preparation of a major revision of the SI, which has been referred to as the “Revised SI”. The revision includes new definitions of the kilogram, ampere, kelvin and mole, and a new way of presenting the entire system by fixing the numerical values of a set of seven “defining constants”. This is the subject of Resolution 1 of the 24<sup>th</sup> CGPM. The proposed changes embodied in Resolution 1 were widely discussed in the respective Consultative Committees, in the CCU and in scientific meetings outside the BIPM. The CCU had the responsibility of bringing together the views of the individual Consultative Committees and arriving at a consensus with the many international bodies represented on the CCU. This was what happened in 2010 when the CCU unanimously adopted the draft which became Resolution 1 of the 24<sup>th</sup> CGPM.

16 June 2016

As part of the task of informing the public about the proposed changes to the definitions of the SI base units, a special page of the BIPM website was created. This is not only to inform but also to stimulate discussion and encourage awareness of the changes. It includes a file of Frequently Asked Questions (in French and in English), and a current draft for the revised SI Brochure that will be published as soon as the revised SI is adopted. In addition, encouraged by the CGPM, the CIPM has established a task group to promote awareness of the revised SI. This task group is composed by communication professionals from NMIs and met for the first time in January 2016 at the BIPM with the CCU President as the Chair.

The CCU working group on angles and dimensionless quantities (WGADQ) met on the 25th of February 2015 to examine the treatment given in the Brochure to “dimensionless quantities” as angles, frequency rates and counting quantities. The possible introduction of the radian as a base unit was considered as well as the introduction of the dimension “number” along with the unit “one”. No consensus was reached on any subject so all the arguments were subsequently presented to the CCU in 2016 for further consideration.

The CCU meeting that took place on June 15<sup>th</sup> to 16<sup>th</sup>, 2016 approved a close-to-final version of the 9<sup>th</sup> edition of the SI Brochure based on the *drafting team* version and taking into account new developments that had appeared by then.

#### **4. Stakeholders (who they are and their level of involvement)**

The bodies having a direct interest and concern in the activities of the CCU, are:

1. the CIPM, which must be properly advised on matters related to the SI,
2. the National Metrology Institutes and the Designated Institutes, which use the SI every day in their business, and
3. the international organizations that are members of the CCU, which disseminate the SI to their members.

On a much wider scale, a clear and accessible statement of the SI and how it should be used is essential not only for the scientific, technical, industrial and educational communities but also for society as a whole. Research and development, manufacturing, trade, medicine, protection of the environment and consumer protection all depend on accurate and reliable measurement, hence on the proper application of the SI. For all these reasons an authoritative guide to the SI is required, which is provided by the SI Brochure. These days, such information is sought online and thus the BIPM website plays and will play in the future an increasingly important role.

## 5. Future Scan (2016-2023)

The future activities of the CCU will be apparent from the description of our activities already reviewed under 3 and 4 above. It is likely that the CCU will need to meet at roughly two-yearly intervals for the indefinite future to fulfil its responsibilities.

### Specific tasks until 2018

- With the goal to present the 9<sup>th</sup> edition of the SI Brochure in French and English to the CGPM in 2018 the following steps will be taken:
  - The next CCU meeting is scheduled for the 5-7 September 2017 to take final decisions prior to the final approval by the CIPM in the October meeting in 2017 and the adoption of the Revised SI by the 26<sup>th</sup> CGPM
    - approval of the numerical values of the fundamental constants that will be proposed to be fixed
    - final approval of the 9<sup>th</sup> edition of the SI Brochure in French and English
    - final approval of the Draft Resolution on the Revised SI to be submitted to the 2018 CGPM)
    - final approval of the Concise Summary of the Revised SI
  - November 2018: The 9<sup>th</sup> edition of the SI Brochure be ready in French and English by the time of the CGPM.
- Similarly, within the next 5 years increasing attention from the stakeholders as well as from the public is expected and CCU will develop means to prepare the broad scientific, technical, industrial and educational community for the redefinition. There may also be meetings of other Consultative Committees that the President will attend in order to further support harmonizing views, if needed. Even in the years directly after redefinition one might still expect a lot of public attention and CCU along with its President will further work towards explanation and general acceptance.
- Another current CCU activity presumably extending until 2018 or even beyond is developing advice for the presentation of units for dimensionless quantities, including counting quantities. Here, a systematic approach will be developed, synchronized and harmonized with parallel efforts within ISO/TC12 where work is in progress.

From 2020 onwards one might expect that a three-year or even longer period between CCU meetings will be sufficient, which will be decided at the time.

- Within this longer perspective, new realisations of the units in terms of the defining constants will emerge along with new proposals for the *mises en pratique*. CCU will monitor these developments, take care of the consistency of the overall system and provide scientific advice to the CIPM. The CCU will update the Brochure accordingly along with other updates that might become necessary.
- An important task for the CCU will be to follow closely developments towards a new definition of the SI second in terms of an optical transition and provide advice to the CIPM.