

## Joint Committee for Guides in Metrology

Minutes of the meeting held on Monday 6 December 2021  
via Zoom

Present:

Dr Walter Bich (WG1 Convenor)  
Dr Jerzy Borzysimski (OIML)  
Dr Charles Ehrlich (WG2 Convenor, OIML)  
Ms Mercè Ferrés Hernández (ISO)  
Prof. Philippe Gillery (IFCC)  
Prof. Luca Mari (IEC)  
Prof. Zoltan Mester (IUPAC)  
Dr Martin Milton (JCGM Chairman, BIPM)  
Prof. Pavel Neyezhnikov (CIPM)  
Mr Erik Oehlenschlaeger (ILAC)  
Mr Robert Sitton (JCGM Executive Secretary, BIPM)  
Prof. Jürgen Stohner (IUPAC)  
Dr Carl Williams (IUPAP)

### 1. Opening of the meeting and welcome by the Director of the BIPM

The Director of the BIPM, Dr Martin Milton, welcomed the participants.

### 2. Approval of the agenda

The provisional agenda dated 13 October 2021 (JCGM/2021-00-Agenda) was approved.

### 3. Approval of the minutes of the meeting of 7 December 2020

The minutes of the previous JCGM meeting (JCGM/2020-10), which had been approved by correspondence, were confirmed.

### 4. Review of the decisions taken at the December 2020 meeting

The decisions of the December 2020 meeting were reviewed during the reports of Working Group 1 and Working Group 2.

### 5. Report from Working Group 1 (GUM)

The report of WG1 activities in the period December 2020 to December 2021 was presented by Dr Bich, Convenor of WG1. The report focused on the changes to the WG1 guidance documents since December 2020. For full details see document JCGM/2021-02.

The Chairman thanked Dr Bich and invited questions. It was asked if there are any outstanding issues with the GUM that will need to be addressed over the next few years. Dr Bich said that one of the main outstanding issues is how to deal with the problem of the unreliability of the standard uncertainty for small samples when calculated using the sample standard deviation of the mean, as in the current GUM (JCGM 100). A formula based on the Student's *t*-distribution, used in the rejected CD, gives a larger standard uncertainty, but approximately the same expanded uncertainty. The proposed formula was rejected mainly because it cannot be applied if *n* is less than

four. WG1 had argued that this could be overcome using prior knowledge of the performance of the measurement process. A new procedure is being assessed that combines the expected performance from previous experimental results with the standard deviation of the current measurement in a scientifically rigorous way. This leads to a simple formula that can be used by practitioners with no need for detailed scientific knowledge. Dr Bich added that there are no particular concerns regarding Type B evaluations in the GUM.

Ms Ferrés Hernández drew attention to Decision 1 of the 19th meeting of the JCGM (2014). It states that updates to JCGM 110 that include new examples shall not require formal approval but simply be communicated to the JCGM Member Organizations (MOs). However, there are now substantial technical discussions taking place over the examples that are to be included in JCGM GUM-5:202X *Guide to the expression of uncertainty in measurement – Part 5: Examples of uncertainty evaluation*. Ms Ferrés Hernández asked if there should be an approval process for these examples by the MOs and expressed a concern that technical examples may be added that have not been approved. The Chairman recalled that the examples added to the existing individual sections of the GUM will already have been approved. Dr Bich said that the first draft of the GUM-5 will be circulated to the MOs as a committee draft for comment and approval. Any examples that are added to the GUM-5 after this approval process will simply illustrate aspects of measurement uncertainty evaluation that are described in detail in existing documents that have already been circulated and approved. He recalled that the GUM-5 had been kept separate to the other documents in the suite to allow this flexibility when new examples are added. This process was put in place to avoid having to recirculate the document for approval following each addition. Following a discussion, it was agreed that WG1 should circulate GUM-5 committee drafts to the MOs when there are updates; if there are no substantial objections within a specified period, the document will be considered to be approved. Dr Bich will propose text for the introduction to reflect that the GUM-5 is considered as an informative annex to the entire suite of GUM documents and as such has a special status regarding the approval process.

Dr Bich was asked about the timeline for GUM documents that are under development and the vision for WG1. He replied that a roadmap is available, which outlines the schedule. He said that JCGM GUM-1:202X will be circulated in early 2022. The first CD of JCGM GUM-5:202X should be ready for circulation by the end of 2022. The revision of the supplements (JCGM GUM-7:202X and JCGM GUM-8:202X) will be carried out in the second half of 2023. A draft motivation and scope document will probably be available for approval by the JCGM at its December 2022 meeting.

The Chairman asked if there is any convergence of views in WG1 and WG2 over ‘measurement uncertainty’. Dr Bich said that he is optimistic about reaching consensus within WG1 regarding the definitions of the following terms: measurement uncertainty; standard measurement uncertainty; coverage interval; and expanded uncertainty. He was unsure if these definitions would be accepted by WG2. Dr Ehrlich said that WG2 had asked WG1 to propose a new definition of measurement uncertainty for inclusion in the VIM4 CD, however WG1 had expressed difficulties in reaching agreement over the definition. WG2 has taken the position that, in this case, it will retain the current proposed definition of measurement uncertainty. The issue will be readdressed later in the development of the VIM4 or will be postponed for the VIM5. Dr Ehrlich was of the opinion that the convergence within WG1 is for the formal definition of measurement uncertainty to change from a quantitative/mathematical definition to a qualitative/non-mathematical definition, which mentions ‘doubt’ or ‘uncertainty’ about the true value of a measurand. This would change the nature of the formal definition and its acceptability among the metrology community is uncertain. He recalled that no comments had been received from the VIM4 1CD circulation requesting a change in the definition of measurement uncertainty from a mathematical to a non-mathematical definition, including from WG1. He suggested that this proposed change could be put to the metrology and VIM user community via a questionnaire, which will be discussed under §6. If a non-mathematical definition of measurement uncertainty is chosen it will have significant implications for a number of other entries in the VIM4.

## 6. Report from Working Group 2 (VIM)

The report of WG2 activities in the period December 2020 to December 2021 was presented by Dr Ehrlich, Convenor of WG2. For full details see document JCGM/2021-02. The report included a proposal by WG2 to circulate a questionnaire among the JCGM MOs to support its work in the decision-making process following the receipt of the comments from the VIM4 1CD circulation. A draft version of the questionnaire is presented in the Annex to document JCGM/2021-02.

The Chairman thanked Dr Ehrlich for the report and noted that 2021 had been a landmark year for WG2 with the circulation of the VIM4 1CD and the webinar on the VIM4 in May 2021, which had allowed wider engagement and consultation with its stakeholders and the broader metrology community. He invited questions. Prof. Gillery recalled that the VIM is used by many communities and that the definitions should reflect the metrological applications in fields such as medical biology. Consensus on the definitions should be found among the different communities and the proposed questionnaire could act as a forum to allow each community to provide its views on the VIM4.

Mr Oehlenschlaeger noted that many of the comments received from the VIM4 1CD circulation had been on the notes and examples rather than the definitions. He suggested that a questionnaire may not be needed if the individual comments received from the circulation are addressed and added that it may not be possible to answer questions such as the use of ‘doubt’ in the entry for measurement uncertainty via a questionnaire (see document JCGM/2021-02). Dr Ehrlich replied that WG2 will focus on the comments on the definitions and added that the philosophy during the development of the VIM4 had been to keep certain details out of the definitions and to include them in the notes. He acknowledged that certain notes do not have a direct bearing on the definitions and these will not be part of the initial focus of WG2 when replying to comments. He reiterated that WG1 has made significant progress towards defining measurement uncertainty as ‘doubt about the true value of a measurand’ and that this poses a dilemma for WG2. The proposal to include a question on this subject in the questionnaire has been discussed with WG1 as it would provide useful feedback for WG1 as to whether the community is ready to accept such a change. Mr Oehlenschlaeger suggested that any questions posed in the questionnaire should be very clear. He added that it is unclear whether the guiding principle on how to proceed with the VIM4 should be the responses to the questionnaire or the original comments received from the circulation of the VIM4 1CD.

Prof. Mari said that the IEC had set up a strategic committee to review the draft questionnaire. It had suggested that the questionnaire can be used as a strategic tool by the JCGM to have a ‘single voice’ when replying to the comments that arose from the VIM4 circulation.

Ms Ferrés Hernández commented that ISO believes that the questionnaire will allow some of the fundamental issues with the VIM4 to be resolved. She asked if there is a terminologist on WG2 and if not, whether one would be useful in development of the VIM. Prof. Mari agreed that a terminologist would be useful for WG2, however this not an issue for the questionnaire.

Dr Williams proposed that the VIM could be made more concise, focusing on a set of targeted definitions with as few notes as possible. This would improve the clarity of the document and may eliminate some of the problems in reaching consensus among the MOs. Dr Ehrlich suggested that IUPAP should supply some examples to illustrate how this could be achieved. He proposed the addition of a question to the questionnaire to determine if the MOs would prefer to see a simplified VIM with fewer notes. He cautioned that removing notes from the VIM would require a significant amount of work to decide what should be discarded. Prof. Mari reiterated that the questionnaire is intended to resolve strategic issues and any proposal to add or delete notes would not affect the strategic questions.

Prof. Mester said that IUPAC supports the process of consulting as widely as possible on the development of the VIM, however he cautioned that the proposed questionnaire is likely to generate the same strategic ambiguities that were found with the comments from the VIM4 1CD circulation. He expressed optimism that although many comments had been received following the VIM4 circulation, the majority did not apply to the underlying concepts and there had been agreement on many issues.

Dr Ehrlich, speaking as an OIML representative to the JCGM, said that the OIML supports the questionnaire and is deciding the level within the organization's hierarchy that should provide responses to the questions.

Following a discussion, the JCGM agreed a course of action that is captured in Decision 1. It was noted that the questionnaire should contain clear guidance on how WG2 should proceed if the results are inconclusive. Ms Ferrés Hernández said that the next circulation of the VIM4 should be for approval, so any outstanding issues should be addressed before its circulation and added that the questionnaire should be clear as to what is expected from the MOs.

**Decision 1** The JCGM agreed to allow WG2 to continue working on the responses received from the VIM4 1CD circulation and to circulate a questionnaire amongst the MOs if required. Such a questionnaire should only address points of principle that would influence more than one definition in the VIM and that could not be resolved by WG2 from the responses received from the CD circulation.

Prof. Neyezhnikov recalled that the CCU Working Group on Core Metrological Terms (CCU-WG-CMT) had been looking into how the proposed new terms and changes in the VIM4 will affect national legislation. He added that there had been no consensus within the CCU-WG-CMT on the definitions of quantity, quantity value and unit.

The Chairman thanked the members of both WG2 and WG1 for their work during 2021.

## **7. Development of a logo for the JCGM**

The JCGM chairman said that two MOs had not supported the adoption of the proposed JCGM logo in the circulation after the last meeting. He agreed to discuss the scope of use of the proposed JCGM logo with these two MOs bilaterally to seek to allay any concerns about its possible use alongside their own official logos. He said that a compromise would be that the proposed logo would not be used on official publications. This would not diminish the value of the proposed logo on, for example, PowerPoint slides, websites and working documents to promote the work of the WGs and the JCGM.

## **8. Actions taken by Member Organizations since the last meeting**

No actions were reported during the meeting.

## **9. Any other business**

Dr Bich recalled that the JCGM Charter mentions that the JCGM takes responsibility for maintaining and updating the VIM and the GUM in their two versions (English and French). He noted that the VIM is published with both language versions in the same document. The GUM was published first in English, with a French language version being published separately and subsequently to the English version. The French version of some of the GUM supplements was prepared by AFNOR, with assistance from French-speaking members of WG1. Dr Bich said that WG1 does not have the resources to maintain the French-language versions of the documents that it produces. He added that discussions with the JCGM chairman and the WG2 Convenor recognized the benefit of having the dual language versions of the VIM, however there is not the same need for French versions of the GUM documents. He asked if there is scope to change the JCGM Charter to give flexibility to WG1 so that it does not have to produce an 'official' French language version of the GUM.

It was agreed that the Chairman and Dr Bich will draft revised text for the charter to cover this proposal, which can be presented to the MOs for voting at the December 2022 meeting of the JCGM.

## **10. Date of the next meeting**

The next meeting will be held on 5 December 2022.