

# News from the JCGM-WG1

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**MEETINGS** The JCGM-WG1 meets twice per year, normally at the BIPM. During the meetings, the drafts of the documents under development are reviewed and discussed in detail. The most recent meeting was held on 4 – 7 December 2018 and the next meeting is planned for May 2019.

**MEMBERSHIP** Hidetaka Imai (ILAC) resigned during 2018. Rüdiger Kessel (corresponding member for IUPAC) and Michael Krystek (ISO) left in March 2019. New member is Hideyuki Tanaka from NMIJ, Japan, as OIML representative.

## GUIDE TO THE EXPRESSION OF UNCERTAINTY IN MEASUREMENT - NEW PERSPECTIVE

After the largely negative reception of the first Committee Draft of the revised GUM, circulated at the end of the year 2014, a change of perspective was deemed to be necessary, where “the GUM” would become the whole suite of documents published by JCGM-WG1 and the technical novelties introduced in the rejected Committee Draft would be included in a document co-existing with JCGM 100:2008. Existing documents would be suitably updated and further documents would be published to meet the new needs in the field of uncertainty evaluation. To cite just an example, there is a growing awareness that the result of the examination of nominal properties is not complete without a statement concerning the uncertainty associated with the examination.

The JCGM approved the new perspective in 2017, and the JCGM-WG1 has started its implementation.

## DOCUMENTS IN CIRCULATION OR IN PREPARATION

### JCGM 103. Guide to the expression of uncertainty in measurement – Developing and using measurement models

The first Committee Draft of this document was circulated among the Member Organizations and the National Metrology Institutes in Nov. 2018. 18 sets of comments were received by the dead-line of end of March 2019.

The document had been planned since the beginning of the activity of JCGM-WG1. Its drafting started before the establishment of the new perspective about the GUM and was completed when the new perspective was already in place. In this sense, it represents a bridge between the old and the new scenarios. This document provides

guidance on defining the measurand, and on developing and using a measurement model. The various stages of modelling, from that of the measurement principle to that of systematic effects are discussed, and different types of models from different fields, including statistical models, are considered.

## Guide to the expression of uncertainty in measurement – Introduction

In the new perspective, this is the overarching document in the suite of documents under the common title “Guide to the expression of uncertainty in measurement” (GUM), providing a brief introduction to measurement uncertainty and the GUM. Its aim is to promote appropriate methods for the evaluation of measurement uncertainty by using the GUM. This document will aid the reader in identifying the relevant documents for addressing the problem at hand. It will contain hyperlinks to the suite of documents. It also will provide references to other relevant material, including that from other organizations, for a broader understanding. The JCGM-WG1 is working at the document, which will be the next to be circulated.

## JCGM 110. Examples of uncertainty evaluation

The idea of a separate examples document was confirmed and approved by the JCGM. This choice will allow greater flexibility whenever new examples will be made available. The examples will illustrate various methods of uncertainty evaluation, thus concerning the whole suite of documents published by JCGM-WG1.

An EMPIR Joint Research Project, n-02 EMUE Advancing measurement uncertainty – comprehensive examples for key international standards, was established in 2017 under the initiative of several European members of the JCGM-WG1. Its deliverables will provide valuable input to JCGM 110.

The following documents should be developed at a later stage:

- *JCGM 107. Applications of the least-squares method*
- *JCGM 108. Bayesian methods*
- *JCGM 109. Statistical Models and Data Analysis for Inter-Laboratory Studies (with applications to Key Comparisons)*

## OTHER BUSINESS

- **A JCGM poster at the 26<sup>th</sup> CGPM in Versailles.** The New Perspective for the GUM was presented and well received by the attendance.

## PUBLICATIONS

The existing publications are listed below with their current titles. The titles will be updated according to the new perspective.

### JCGM 100:2008. Guide to the expression of uncertainty in measurement, GUM 1995, with minor modifications

Current version of the GUM. A revision of this document is in progress (see above).

Freely available in electronic (PDF) form from the websites of the [BIPM](#) and [OIML](#), and published in paper and PDF forms by [ISO](#) under the name “ISO/IEC Guide 98-3:2008”.

### JCGM 101:2008. Evaluation of measurement data — Supplement 1 to the “Guide to the expression of uncertainty in measurement” — Propagation of distributions using a Monte Carlo method

General method for uncertainty evaluation, of particular interest for measurement models with a high level of complexity, or to evaluate a coverage interval for a non-linear model or in case of non-gaussian input quantities. In these cases the method, being more general than that described in the GUM, gives more reliable evaluations.

Freely available in electronic (PDF) form from the websites of the [BIPM](#) and [OIML](#), and published in paper and PDF forms by [ISO](#) under the name “ISO/IEC Guide 98-3:2008/Suppl 1:2008”.

### JCGM 102:2011. Evaluation of measurement data — Supplement 2 to the “Guide to the expression of uncertainty in measurement” — Extension to any number of output quantities

Generalization of the GUM and of its Supplement 1 to the case of multivariate output quantities.

Freely available in electronic (PDF) form from the website of the [BIPM](#) and [OIML](#), and published in paper and PDF forms by [ISO](#) under the name “ISO/IEC Guide 98-3:2008/Suppl 2:2011”.

### JCGM 104:2009. Evaluation of measurement data — An introduction to the “Guide to the expression of uncertainty in measurement” and related documents

Introductory document extensively hyperlinked to the other JCGM documents.

Freely available in electronic (PDF) form from the websites of the [BIPM](#) and [OIML](#), and published in paper and PDF forms by [ISO](#) under the name “ISO/IEC Guide 98-1:2009”.

### JCGM 106:2012. Evaluation of measurement data — The role of measurement uncertainty in conformity assessment

Guidance document to calculate acceptance limits necessary to assess the conformity of an item to a specification.

Freely available in electronic (PDF) form from the websites of the [BIPM](#) and [OIML](#), and published in paper and PDF forms by [ISO](#) under the name “ISO/IEC Guide 98-4:2012”.