

News from the JCGM-WG1

MEETINGS The JCGM-WG1 traditionally meets twice per year, normally at the BIPM. Since the beginning of the COVID-19 pandemic, the meetings are held remotely. During the year 2022, to compensate for the shorter duration of the online meetings, three meetings will be held. The most recent meeting was held from 31 May to 3 June and the next meetings are planned for September (online) and December (hopefully at the BIPM).

MEMBERSHIP No changes in the membership.

Complete membership can be found [here](#).

GUIDE TO THE EXPRESSION OF UNCERTAINTY IN MEASUREMENT - NEW PERSPECTIVE

Under the New Perspective, “the GUM” is the whole suite of documents published by the JCGM-WG1, thus broadening the scope of the first edition of that fundamental document. A first document, GUM Part 6, has been published (see below). Existing documents, suitably updated, will be renumbered and re-published as parts of the suite and new parts will be added to meet the evolving 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.

DOCUMENTS IN PREPARATION

JCGM GUM-1:202x Guide to the expression of uncertainty in measurement – Part 1: Introduction

In the new perspective, GUM-1 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 the suite. 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 with their new numbering for addressing the problem at hand. It will contain hyperlinks to documents in the suite. It also will provide references to other relevant material, including that from other organizations, for a broader understanding. This document will replace JCGM 104:2009.

The first Committee Draft of the document was circulated among the JCGM Member Organisations and, through the BIPM, among the National Metrology Institutes. Comments (generally positive) are being received, and it is expected that a second Committee Draft will be circulated for approval within the year 2022. Publication is expected early in 2023.

JCGM GUM-5:202x Guide to the expression of uncertainty in measurement – Part 5: Examples

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. They will also cover various areas of measurement.

GUM-5 is considered as an informative annex to the entire suite of GUM documents and as such has special status regarding the approval process of its updates following the first publication. The latter would contain a limited number of examples and will be subject to the usual approval procedure, whereas the subsequent updates including new examples will undergo a simplified procedure.

The following documents (working titles) will be developed at a later stage:

- *JCGM GUM-2 Concepts*
- *JCGM GUM-9 Statistical models and data analysis for interlaboratory studies*
- *JCGM GUM-10 Applications of the least-squares method*
- *JCGM GUM-11 Bayesian methods*
- *JCGM GUM-12 Basic methods for uncertainty propagation*

OTHER BUSINESS

- **Definition of measurement uncertainty.** JCGM-WG1 held several extra meetings devoted to the specific topic of definitions of terms related to measurement uncertainty, to be offered to JCGM-WG2. The definition that was decided for measurement uncertainty is

measurement uncertainty
uncertainty of measurement

doubt about the true value of the measurand that remains after making a measurement

NOTE 1 Measurement uncertainty can be described fully and quantitatively by a probability distribution on the set of possible values of the measurand. It can be described summarily and approximately by a quantitative indication of the dispersion (or scatter) of such distribution.

NOTE 2 For scalar measurands, measurement uncertainty can be described summarily by, for example, the standard uncertainty, a coverage interval with specified coverage probability, or by selected quantiles of the probability distribution in Note 1. For multivariate measurands, measurement uncertainty can be described, for example, by the covariance matrix or by a coverage region, with specified coverage probability.

NOTE 3 When a quantitative expression is impractical, measurement uncertainty can be expressed using an ordinal scale of levels of confidence in the assigned value.

- **Metrology and meteorology.** JCGM-WG1 established a fruitful cooperation with the [Expert Team on Measurement Uncertainty](#) (ET-MU) of the World Meteorological Organisation (WMO). The convener of JCGM-WG1 gave in February 2022 a presentation on the activity of the WG at an ET-MU meeting, and a [joint online workshop on Measurement uncertainty in meteorology and climatology](#) was held in May 2022. Further initiatives, such as contributing several presentations, joint and individual, at the [BIPM-WMO joint workshop on Metrology for Climate Action](#) in September 2022, are under way. Several abstracts involving WG1 members have been submitted to the workshop

PUBLICATIONS

Existing publications are listed below with their current titles.

All the documents published prior to the new perspective will be revised and updated in view of their publication as parts of the GUM suite.

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

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-normal input quantities. In these cases the method, being more general than that described in JCGM 100, 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”.

This document, suitably revised, will be re-published in due course as GUM-7.

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 JCGM 100 and JCGM 101 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”.

This document, suitably revised, will be re-published as GUM-8.

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”.

This document will be succeeded by GUM-1, described above.

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”.

This document was reviewed by the WG1 in view of its re-publication as GUM-4. It was decided that the document is technically sound and only needs some minor updates in order to include recent developments in the field. This task will be undertaken at a later stage.

JCGM GUM-6:2020. Guide to the expression of uncertainty in measurement — Part 6: Developing and using measurement models

This is the first document published as a part of the GUM under the new perspective. It provides guidance on developing and using a measurement model and covers the assessment of the adequacy of a measurement model. The document is of particular interest to developers of measurement procedures, working instructions and documentary standards.

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 98-6:2021”