**Report to JCGM on JCGM-WG2 Activities**

**for December 2020 JCGM Meeting**

**From Charles Ehrlich, Chairman, JCGM WG2**

**Executive Summary**

There are currently 16 members of JCGM-WG2, with all eight of the JCGM Member Organizations represented.

The main technical activity of JCGM-WG2 since the last JCGM meeting has been to further develop and refine a Working Draft of the Fourth Edition of the VIM (VIM4 WD), which will be ready for circulation for comment as a first Committee Draft (VIM4 CD) to the JCGM Member Organizations shortly after the December 2020 JCGM and WG2 meetings.

The VIM4 CD incorporates clarifications and more simplified language that had been presented in the Annotated VIM3, and more fully incorporates entries on nominal properties than were in the VIM3. Furthermore, several significant content-related changes have been introduced in the VIM4 CD.

Also under consideration, for decision by the JCGM, are publishing options of the VIM4 (e.g., electronic, machine-readable, hard copy, structure, languages), as well as whether the VIM4 needs to be produced jointly in English and in French.

While the Covid-19 pandemic caused some initial delays, it eventually led to increased virtual interactions among WG2 members (most notably, through the use of Focus Groups) and between WG2 and WG1 members (concerning VIM entries pertaining to ‘measurement uncertainty’), with the outcome of a more thoroughly reviewed and revised document.

**Brief Report**

WG2 Membership:

There are currently 16 members of JCGM-WG2, although four of them are not very active (details available upon request).

Instruction from JCGM to WG2 in 2018:

Decision 1 of the December 2018 JCGM meeting was: “JCGM requests WG2 to complete a consultation among its members in order to finalize the text relating to nominal properties in chapter 6 of the working draft discussed at the December 2018 JCGM meeting. A complete draft of the ‘VIM4’ (including the minimally revised versions of chapters 1-5 and the new chapter 6) will be circulated as a committee draft (CD) to the JCGM member organizations for their comments after the June 2019 WG2 meeting.”

Technical Activity of WG2 in 2019 and 2020:

WG2 spent considerable effort since the last JCGM meeting consulting with colleagues to further develop and refine chapter 6 of the VIM4 Working Draft (latest version available upon request), which required more time than originally anticipated but resulted in a more thoroughly vetted chapter 6. During that same time, WG2 moved beyond the minimally revised versions of chapters 1-5 to incorporate a number of significant clarifications and simplifications in language – along the line of what had been presented in the Annotated VIM3 – and content-related improvements (such as about ‘quantity’ and ‘value of a quantity’). A key strategy for this development has been to smoothen the VIM3 distinction between the “error approach” (sometimes called “true value” approach) and the “uncertainty approach” (as they are presented in the VIM3 Introduction), by rewording the definitions that in the VIM3 (and sometimes even in the VIM2) referred to true values to instead refer to just values or reference values, depending on the situation, with explicit mention of true values deferred to Notes. The rationale for these changes is elaborated in a planned companion document titled “Significant Changes from the VIM3 to the VIM4” (latest draft also available upon request). For transparency, the intention is to make this document available together with the VIM4 CD.

The Covid-19 pandemic led to the June 2020 WG2 meeting being held virtually (and to the June 2020 JCGM meeting being postponed until December 2020). WG2 used this additional time to conduct a series of virtual Focus Group meetings that allowed for intense discussions on focused sets of related VIM4 entries that wouldn’t have otherwise occurred. Most of these Focus Group meetings were among groups of WG2 members, but outside experts were also included for some of them. In addition, a special Focus Group of WG2 and WG1 members, focused on VIM entries pertaining to ‘measurement uncertainty’, met several times, with subsequent special WG1 meetings. However, it was ultimately decided that the complexity of the topic warranted waiting until a later edition of the VIM to incorporate any changes on this.

Strategy and timeframe for completing and publishing the VIM4:

The WG2 plan is to circulate the first Committee Draft of the VIM4 to the JCGM Member Organizations for review and comment shortly after the next JCGM and WG2 meetings, being held virtually in December 2020. This 1st VIM4 CD will most likely be circulated as a PDF file.

The WG2 thinking is to give a three-month review and comment period to the JCGM Member Organizations, which would result in comments being returned to WG2 likely in April 2021. WG2 would then review the comments and incorporate those comments that it accepts into a second Committee Draft of the VIM4 probably by July 2021, at which time that second Committee Draft would again be sent to the JCGM Member Organizations for comment and, this time, vote (which will probably be another three-month consultation). Assuming that the second Committee Draft passes the vote, WG2 would again need to review and incorporate those comments that it accepts. It is envisioned that a version of the VIM4 ready for publication (in whichever formats are agreed by the JCGM in December 2020) could be finalized by WG2 at its December 2021 meeting.

Publication options for the VIM4

As discussed at the last JCGM meeting, WG2 would like to use a web-based format for the VIM4, similar to the web-based format used for the “Annotated VIM3”. This approach could be used to generate pdf files as required, customized to individual needs. For example, a version containing only the definitions relevant to nominal properties could be generated. Using a web-based format would also allow for more flexibility concerning the order of presentation of entries (e.g., alphabetical ordering versus ordering based on concepts), and facilitate the introduction of supplementary material such as explanatory texts and possibly translations into other languages.

Since the last JCGM meeting, additional options for publication of the VIM4 in an electronic/digital format have been discussed in WG2, as detailed in the Annex to this Report.

In parallel to the review and voting process for the VIM4 described in the previous section of this Report, development work could be performed on the two options for an electronic/digital version of the VIM4 (labeled in the Annex as Development Line 1 and Development Line 2). It is anticipated that design and implementation of these options could be performed in the first months of 2021, well before the VIM4 would be ready for publication.

Translation of the VIM4 into French

At the December 2018 JCGM meeting there was discussion about whether an element should be added to the JCGM Charter on whether future versions of the VIM need to be produced jointly in both English and in French. No decision was taken, and so this should now be decided since the VIM4 will likely be published before the next JCGM meeting.

**ANNEX**

**Strategies for electronic/digital formats in which to provide the VIM4**

The JCGM/WG2 (VIM) is in the final stages of preparation of a first Committee Draft of the fourth edition of the *International Vocabulary of Metrology* (VIM4). This short note addresses issues and options under consideration about what forms of publication of the VIM4 should be considered, with respect to electronic/digital formats.

1. Publication of the VIM1 and VIM2

The first two editions of the VIM were published and copyrighted in hardcopy form by ISO, in the name of the organizations involved in the development. For the VIM1 in 1984 the organizations were BIPM, IEC, ISO and OIML. For the VIM2 in 1993 the organizations were BIPM, IEC, IFCC, ISO, IUPAC, IUPAP and OIML. Electronic versions of these documents were made available in PDF and only as alternatives to the paper version.

1. JCGM Charter and publication of the VIM3

The Joint Committee for Guides in Metrology (JCGM) was Chartered in December 2009, taking over responsibility of the VIM from ISO/TAG 4.[[1]](#footnote-1) The JCGM Charter[[2]](#footnote-2) specifies in Annex A.2.1 that “JCGM Guidance documents are prepared in LaTeX or Word, from which PDF versions, including hyperlinks, can be readily produced. The final version of a document, approved by the member organizations, constitutes an ‘official version’, owned by the JCGM”, and in A.2.2 that “JCGM official documents are distributed in PDF format to member organizations for publication according to paragraph 7.1.6 of the Charter. Member organizations may publish JCGM documents in PDF format or as paper copies against payment [or] for free taking into account the provisions of paragraph A.2.4.”.

The VIM3 was prepared in Microsoft Word, and first published in 2007/2008 in PDF by several of the JCGM member organizations. ISO also sold a paper version.

1. Annotated VIM3

In order to address questions and provide clarifications to some VIM3 entries, an Annotated VIM3 was developed by JCGM/WG2 as an interim document, to bridge the interval between the VIM3 and the VIM4. The Annotated VIM3 took advantage of existing digital technology and was published in HTML format on the BIPM website, accessible where there is also the link for downloading the PDF version. This provided a range of additional options, including searchability, alphabetical indexing, cross-linking, and hovering over certain terms providing visible definitions without having to go to another page. Moreover, each VIM entry was given a web address (e.g., <https://jcgm.bipm.org/vim/en/1.1.html>) for easing searchability across the web and making the reference to given entries in publications possible.

1. Publication options being considered for the VIM4

*Baseline*. The VIM4 has been developed with word processors (Microsoft Word and LibreOffice Writer), and so its “master” version – from which any other version would be obtained – could remain in a word processor related format (e.g., docx), according to the JCGM Charter. From this the PDF version would be generated to be officially released to JCGM member organizations.

*Development Line 1: improving user experience*. In view of the positive feedback received on the format and the functionalities of the Annotated VIM3, JCGM/WG2 has already presented to the JCGM the suggestion to make the VIM4 also accessible in HTML format on the web, and not only as a PDF file. This would allow offering for the VIM4 the same functionalities experimented with the Annotated VIM3, and possibly adding some more, like more sophisticated search facilities. This first line of development would then be aimed at improving the user experience of those who access the VIM.

*Development Line 2: adding machine readability*. In the context of the current endeavors of adding “machine readable” functions to metrological resources, sometimes informally called the “digital SI”, a second and complementary line of development could be pursued. The content of the VIM4 could be made accessible via a public Application Programming Interface (API), so to allow developers to effectively write software able to acquire some content of the VIM4 and exploit it for improving their own software systems, for example, by automatically displaying a VIM4 definition when required in context, thus enabling an explicit and consistent connection between the VIM and, e.g., BIPM documents and resources such as the KCDB. The HTTP API could be designed so that the format of the text returned by each call could be specified for flexibility, as, e.g., XML or JSON (the functions that the API could expose could be: get the list of all entry ids; get an entry by id; get the list of all entries given a search condition; and so on).

1. Analysis and decisions to be made

The experience of the Annotated VIM3 shows that there are no specific problems in pursuing Development Line 1, and that the currently available resources of JCGM/WG2 would be sufficient for producing an HTML version of the VIM4. On this matter, the main activity to be done – possibly also by someone external to JCGM/WG2 who may contribute to the design stage – could be of identifying new functionalities to be added or improvements to the functionalities in the Annotated VIM3, and revising all components that contribute to the user experience (user interface, texts, etc.) of the HTML pages.

The actual feasibility of Development Line 2 has also been recently proven with the realization of a prototype that exposes an API for some sample functions[[3]](#footnote-3). Also in this case there seem to be no specific problems of realization, and the currently available resources of JCGM/WG2 would be sufficient for producing a system with an effective API for the VIM4. Given the fact that no such system has been activated so far, particularly in this case the contribution of someone external to JCGM/WG2 would be important in the design stage of the API.

For both Development Lines, but particularly in the case some functionalities of machine readability will be introduced, the legal conditions of accessibility and reusability of the information made accessible via the web should be decided and described, thus possibly revising the JCGM Copyright as in the VIM3 and the GUM (for example by adopting a Creative Commons license).

Furthermore, these developments suggest considering the opportunity of revising the JCGM Charter, for specifying more explicitly all conditions related to the treatment of the online publication of JCGM documents.

Finally, both Development Lines, but Development Line 2 in particular, could be exploited as the basis for a strategic project aimed at creating a software platform able to host and to provide a single interface to the VIM and related vocabularies.4

1. Timeframe

Given the current plans of circulating the first Committee Draft of the VIM4 to the JCGM Member Organizations for review and comment shortly after the next JCGM meeting, in December 2020, in the case during that meeting the JCGM will make some decisions about what is described here – thus in particular Development Lines 1 and 2 – the related activities of both design and implementation could be performed in the first months of 2021, while waiting for the finalization of the Committee Draft.

1. The Member Organizations of the JCGM were first BIPM, IEC, IFCC, ISO, IUPAC, IUPAP and OIML, with ILAC joining later. [↑](#footnote-ref-1)
2. <https://www.bipm.org/utils/en/pdf/JCGM-charter.pdf>. [↑](#footnote-ref-2)
3. The prototype is accessible (though the lack of optimization makes it quite slow) at the address [vim-api-test.azurewebsites.net](https://vim-api-test.azurewebsites.net/).

4 Examples could be the International vocabulary of legal metrology (VIML) and the Vocabulary on nominal property, examination, and related concepts for clinical laboratory sciences (VIN). Of course, the scientific responsibility for these vocabularies would remain with the respective organizations (in the examples, OIML for the VIML and IFCC and IUPAC for the VIN). The VIML already has an HTML version (viml.oiml.info) produced with the same software system as the Annotated VIM3. [↑](#footnote-ref-3)