National Type Evaluation Program (NTEP)
2023 Software Sector Meeting Summary

September 20th – 21st, 2023 / Milwaukee, WI
Day 1 in conjunction with the NTEP Measuring Sector

INTRODUCTION

The charge of the National Type Evaluation Program (NTEP) Software Sector is important in providing appropriate type evaluation criteria for software-based weighing or measuring device based on specifications, tolerances and technical requirements of *NIST Handbook 44* Section 1.10 General Code, Section 2 for weighing devices, Section 3 for liquid and vapor measuring devices, and Section 5 for taximeters, grain analyzers, and multiple dimension measuring devices. The sector's recommendations are presented to the NTEP Committee each January for approval and inclusion in *NCWM Publication 14 Technical Policy, Checklists, and Test Procedures* for national type evaluation.

The sector is also called upon occasionally for technical expertise in addressing difficult *NIST Handbook 44* issues on the agenda of the National Conference on Weights and Measures (NCWM) Specifications and Tolerances (S&T) Committee. Sector membership includes industry, NTEP laboratory representatives, technical advisors and the NTEP Administrator. Meetings are held annually, or as needed and are open to all NCWM members and other registered parties.

Suggested revisions are shown in **bold face print** by ~~**striking out**~~ information to be deleted and **underlining** information to be added. Requirements that are proposed to be non-retroactive are printed in ***bold faced italics***.

Table A
Table of Contents

Table B
Glossary of Acronyms and Terms

Acronym	Term	Acronym	Term
BIML	International Bureau of Legal Metrology	OIML	International Organization of Legal Metrology
CC	Certificate of Conformance	OWM	Office of Weights and Measures
EPO	Examination Procedure Outline	PDC	Professional Development Committee
NCWM	National Conference on Weights and Measures	S&T	Specifications and Tolerances Committee
NIST	National Institute of Standards and Technology	SMA	Scale Manufacturers Association
NTEP	National Type Evaluation Program	WELMEC	European Cooperation in Legal Metrology

Details of All Items
(In order by Reference Key)

WELCOME

Since the Software Sector meeting is a joint meeting with the Measuring Sector, some time will be allocated to meet and greet both new and familiar faces.

STATUS REPORTS – RELATED NCWM AND INTERNATIONAL ACTIVITY

Attendees of the 2023 NCWM Interim and Annual Meeting are asked to share any relevant comments or discussion that took place during the open hearings, or the NCWM standing committee working sessions or voting sessions. Results related to items on our Agenda will be of particular focus.

Dr. Katya Delak and Mr. Jan Konijnenburg from NIST OWM, will provide a synopsis of international activity that relates to the work of the sector. (See appendix B)

JOINT SESSION PROGRESS REPORT, ACTIVE ITEMS OF MUTUAL INTEREST

This is the third joint meeting of these groups. To make sure we make the most of the time a quick review of the agenda items from both Sectors will be held to identify those that require collaboration, so all participants have a solid foundation for discussion. As part of this review, items of importance or interest should be allocated more time during the joint session day.

CARRY-OVER ITEMS

1. Software Identification / Markings

Source:
NTEP Software Sector

Background:
See the 2022 Software Sector Meeting Summary for more background on this item.

G-S.1.1. Location of Marking Information continues to use the terminology "Not-Built-For-Purpose". We would prefer to reduce the usage of that term and "Built-For-Purpose" (or eliminate them altogether). Those categories continue to blur as time goes by. It was acknowledged that it is always more difficult to alter the general code.

Darrell Flocken recommends that we plan a review of the contents of HB44 to verify that it correctly reflects our understanding of the intent. From there, we can clarify matters within Pub. 14, potentially within a checklist. Then we can come back to determine whether any changes are needed to HB44. Jim Pettinato expressed concern that eliminating differences between Not-Built-For-Purpose and Built-For-Purpose will require significant modification, rather than a simple tweaking of G.S.1.

G-S.1.1. effectively provides exceptions to some of the requirements for hard marking of a limited class (software). Specifically, it provides an exception to the required marking of serial number. If G-S.1. had an exception added, similar to what is now in G-S.1.1., that may forge a path toward accomplishing what we hope to achieve.

While having the terms Built-For-Purpose and Not-Built-For-Purpose isn't ideal, the changes that have already been made, implemented January 2022, have resulted in a huge improvement. Darrell Flocken confirmed that displaying CC numbers is becoming much more common. He sees them frequently in the field (e.g. grocery store scale software).

Discussion:
There is no intent to modify G.-S.1 further at this time. This agenda item will remain a standing item, allowing a placeholder to get feedback and address any issues with software identification, either in the type evaluation process, or in the field.

It was commented in the meeting that often, manufacturers are reluctant to continuously display the CC due to the limitations on screen real estate. Inspectors and evaluators definitely prefer this option.

It was recommended to add the commonly used 'hamburger' style menu icon to the list of acceptable options for top level menu in Publication 14.

If we decide to make any changes to our Pub 14, we need to submit them by November, so that there's time to incorporate them in the 2024 update. In fact, this should probably be added as a specific agenda item, going forward.

Conclusion:
The Sector agreed that continuously displaying CC # on not built-for-purpose devices is still preferable. The Sector will add the 'hamburger' style menu icon to the Publication 14 list. Updates to Publication 14 will be submitted prior to the deadline.

2. Software Protection / Security

Source:
NTEP Software Sector

Background:
See the 2022 Software Sector Summary for additional background on this item.

The Sector continued to develop a proposed checklist for *NCWM Publication 14*. The information requested by this checklist is currently voluntary, however, it is recommended that applicants comply with these requests or provide specific information as to why they may not be able to comply. Based on this information, the checklist may be amended to better fit with NTEP's need for information and the applicant's ability to comply.

The labs using this checklist on a trial basis indicated that there was some confusion as to versions/wording. There may be more than one version in circulation. The version shown in Appendix A of the Software Policy shall be used henceforth.

The bulk of the feedback to date has been that the checklist needs some guidance to complete. Once the Sector has satisfactorily included language within Pub. 14 to address this point, we will consider this agenda item finalized.

Once the Conference adopts the Software Policy document, we can review, modify and/or enhance the requirements for software security within that document moving forward. The language in other Publication 14 sections that will be redundant can be removed at their convenience.

Discussion:
The current Publication 14 Software Technical Policy document lists some examples of means to provide software security, but they're very high level and simplistic. It was suggested that we add much more depth, and reference appropriate sections of the Handbook, e.g., "facilitation of fraud", for any requirements in the checklist. There's concern that this isn't sufficient for NTEP to be incentivized to grow their level of expertise in hacking / software security.

We discussed the issue of redundant wording in multiple Sectors' Pub 14's. At the moment it doesn't seem to be a critical issue because the wording doesn't conflict. Once other Sectors are familiar with the Software Technical Policy content, we may want to advocate that they remove their text or replace it with a reference to our document.

It was suggested that we cross-reference D31, to see what could be justified from HB44. Further discussion led to the suggestion that might be easier to start with WELMEC 7.2.

Conclusion:
It was decided that as an exercise for the Sector, we would take some time on Day 2 to walk through the list of requirements in WELMEC 7.2, and determine if some of these may be immediately applicable to our checklist. The result of this exercise will be captured in a new draft revision of the Software Technical Policy & checklist.

3. NTEP Application for Software and Software-based Devices

Source:
NTEP Software Sector

Background:
See the 2022 NTEP Software Sector Meeting Summary for additional history on this agenda item.

The purpose of initiating this item was to identify issues, requirements and processes for type approving device applications, specifically for not-built-for-purpose software since it is now explicitly allowed. It was suggested that it may be useful to the labs to devise a separate submission form for software for these applications. What gets submitted? What requirements and mechanisms for submission should be available? Validation in the laboratories - all required subsystems shall be included to be able to simulate the system as installed.

Feedback from the field is that there is interest in removing the acceptance of the "or higher" terminology from NTEP policy. The pushback on that is the cost, of course. There's also the issue that it typically results in delays in getting critical software updates to the field. Vere Miller pointed out that agile methodology and the push to produce software changes quickly makes any delay introduced based upon reevaluation undesirable to manufacturers.

The checklist covers some of this, but a list of particular software-specific sealable parameters would be better. Jim Pettinato pointed out that the list of sealable parameters is currently based upon the device type, not something solely isolated to software. Darrell Flocken receives a lot of questions regarding what is sealable in software.

Discussion:
NTEP has crafted and is using a new application for software at this time. During the NIST update discussion, it was communicated that the NTEP Committee policy for software will be adding a requirement for an application for software upgrades, i.e., an application must be submitted to update the certificate for new metrologically significant software revisions. This is intended to eliminate certificates with language indicating that 'software version X and higher' is acceptable. This requirement will be non-retroactive for existing certificates. It is expected that this type of application will be significantly less expensive than the standard $950 submission fee; the expectation is it would be around $150. The details haven't been fully worked out, but it might be implemented via an approved software version table on the certificate.

Both Measurement Canada (i.e. MAL) and OIML have a similar policy, and it may be possible that any evaluation from those jurisdictions may be acceptable to submit to NTEP so manufacturers don't have to duplicate effort (mention was made of MRA potentially applying for Canada). This suggestion should be brought up in the January meeting. In general, bug fixes aren't going to require evaluation.

One concern that was expressed is how long this process may take. The goal of NTEP is to achieve a fast turnaround of these types of applications; a 2-3 week turnaround could be typical. Measurement Canada can vary between a week (if nothing appears to be metrologically significant) to up to a month, as a yardstick for comparison.

Conclusion:

The Sector offered to review the application and provide feedback if desired. Sector members (particularly manufacturers) seemed accepting of the change in NTEP policy (as other jurisdictions already require this) and appreciative of a lower-cost option for modification acceptance application submissions.

4. Training of Field Inspectors

Source:
NTEP Software Sector

Background:
See the 2022 NTEP Software Sector meeting summary for more background on this item.

At the 2022 meeting, the presentation was reviewed and discussion held, and additional comments were heard. For example, it was reported that problems often occur in the field due to the instructions on the CC no longer working. POS's and taxi meters are often particularly problematic. Feedback from the field is that giving manufacturers options isn't the best way to handle this; preferably they should only have one acceptable way to do it – or limit the options to only hard-marking or continuously display. Unfortunately, there are often limitations to what the manufacturers can do, so a one-size-fits-all approach is a problem as well. Jan Konijnenburg pointed out that if the instructions on the CC to access the needed information have changed, then the instrument is no longer in compliance with the certificate.

Jim Pettinato asked for additional volunteers to provide examples of how their CC documents how to access the information a field inspector needs.

Darrell Flocken advised that, given the purview of this sector, we should limit our approach to giving the field inspectors the tools they need to walk up to, for example, a POS system and be able to figure out whether it's running the correct software.

This circles back around to enhancing the training presentation further, e.g. collecting more examples from existing certificates with instructions for viewing version numbers and accessing audit trails, so training can be developed with specific real-world examples. Eric Wechselberger provided an example during the meeting. Updating the training presentation to reflect best practice and current issues will be an ongoing effort.

Discussion:
The current training presentation has several examples of approved devices and how to find the software identifier, and we're always looking for more. It'd be helpful to get a Point of Sale system example, particularly. In 2024 we'll be presumably be meeting in conjunction with the Grain Analyzer Sector – it would be beneficial to get an example of that device type as well.

It is assumed that our presentation hasn't been used very often, probably because not many people are aware that it exists. State inspectors typically obtain such training internally. We should consider promoting this training tool and perhaps investigate additional channels for distribution.

Ohio has ~125 inspectors, and NTEP has been asked to give them some training in November. It's too late to add our presentation to their agenda, but it can be given to them for regional training (in Ohio) in 2024.

Conclusion:
The presentation is in need of an update, to reflect the current state of affairs, e.g. slide 12 is no longer "The Near Future". Action item – Jim Pettinato volunteered to go over the presentation and make any needed updates.

5. New Publication 14 Section specific to Software

Background:
See the 2021 NTEP Software Sector meeting summary for additional background.

For the past several years, the Sector has been working toward completing a new section of Publication 14 entitled NTEP Software Technical Policy, containing the following sections:

See the NTEP Software Sector Technical Policy draft document as circulated with the Agenda for the full content.

During the 2022 Software Sector meeting, the group reviewed the current draft, and decided that the boilerplate text that was copied from the Administrative Policy should be removed from our Pub 14 and replaced by a reference to that document.

When discussing additional content that should be added to our Pub 14, Darrell Flocken suggested we add information regarding what to consider when upgrading software. For example, we could add guidance for sealing methodology, security, and unauthorized modification. We may not need to go into detail on audit trails, for example, since that's already addressed by NIST documentation. We can also discuss facilitation of fraud.

The group allocated the 2nd day of the meeting to furthering the content of the draft Pub 14 Software Policy document, with the goal of finalizing the draft for adoption At the end of the 2022 meeting, it was the general opinion of all that we'd made sufficient progress to move the Policy document forward to adoption.

Discussion:
The focus of this agenda item will be revised to reflect maintenance on Pub 14 since it's no longer new… the Software Technical Policy is now available on the NCWM website. As mentioned in previous item discussion, the Sector plans to add some depth to the Security section in Pub 14 during a working session on Day 2.

It was recognized during the meeting that the checklist that was created to provide guidance for applicants is very close in appearance to the checklists being used by individual device type publication 14 checklists used by the evaluating labs. It was proposed that we align our checklist to allow use by the labs in a similar manner. A change to the title of our Pub 14 indicating that the incorporated checklist is supplemental might be necessary. The NTEP Committee will probably be fine with this approach, but the labs may dislike having to apply two checklists.

Conclusion:
We will incorporate this activity into the planned work session on Day 2. The Sector will include the addition of appropriate references to Handbook 44 sections to the checklist items, as well as additional content.

NEW ITEMS

6. Investigate how to best address third party software-based devices that may or may not have the potential to modify metrologically significant information prior to generating recorded representation

Source:
Dmitri Karimov, Liquid Controls

Background:
This item was submitted in 2023 for potential discussion at both the Measuring and Software Sector meetings.

Synopsis of submission:

- Third-party (often hand-held) electronic devices that interact with electronics registers
- These devices take the transaction data from the register and might modify this information prior to printing
- There is not clarity in Pub 14 how these devices are to be evaluated and what these devices are permitted and not permitted to do
- We have many requests from third party vendors to write software for such third-party devices and we are not sure what info we are allowed to pass on to them and if they can manipulate measurement data prior to printing

Discussion may revolve around specific examples of issues that have arisen, or concerns regarding the type approval or field verification of this type of software. What is the guideline for determining metrological significance?

Discussion:
This agenda item was addressed during the Measuring Sector meeting on 9/19. “First-final” (first indication of final quantity/measurement) effectively resolves this issue, though that’s largely dependent on the state performing inspections since HB44 doesn’t have an actual definition for “first-final”.

There are some certificates that indicate they are only usable with equipment from particular manufacturers. Others indicate that they can use “general” equipment, in which case during type approval they’re typically tested with a couple sets of equipment. Beyond that, the manufacturer is responsible for ensuring it works correctly, regardless.

Conclusion:
Since NTEP’s scope of evaluation currently focuses on devices, not on systems, it is not obvious how we can proceed in addressing these situations. If that scope changes at some future point, we can revisit.

7. Next Meeting

Background:
The sector is on a yearly schedule for NTEP Software Sector Meetings. Now that we've adopted a joint meeting system, the next Sector joint meeting will likely coincide with one of the remaining Sector meetings.

Discussion:
If we continue with our joint meetings, 2024 would be in conjunction with the Grain Analyzer sector.

The Grain Analyzer Sector meeting is scheduled for August 13th, 2024, near the Kansas City Airport. They recently haven't needed a full day, so we may want to begin the joint meeting the afternoon of the 13th.

Conclusion:
The 2024 Software Sector meeting will tentatively be held on 8/13 (half day PM) and 8/14, pending agreement from the Grain Analyzer sector chair.

Appendix A – Acceptable Menu Text/Icons for Weights Measures information

Menu Text examples	*Icon examples*	*Essential characteristics*
Information Info		Top level menu text or icon • Icon text is a lower case “i” with block serifs • Text/icon color must contrast with the background color • Icon may have a circular or rectangular/rounded border Activation of this menu text/icon may invoke a second level menu text/icon that recalls metrology information.
Menu Main Menu *‘Hamburger’ icon or variant, common particularly on smaller screens*		Top level menu text or icon • Text/icon color must contrast with background color • Icon may have a rectangular/rounded border Activation of this menu text/icon may invoke a second level menu text/icon that recalls metrology information.
Help **?** About	 	Top level menu text or icon • Icon text is a question mark • Text color must contrast with the background color • Icon may have a circular or rectangular/rounded border Activation of this menu text/icon may invoke a second level menu text/icon that recalls metrology information.
Metrology Metrological Information	 	Top or second level menu text or icon • Icon text is an upper case “M” • Text color must contrast with the background color • Icon may have a circular or rectangular/rounded border.
Weights & Measures Weights & Measures Info	W&M or W/M	Top or second level menu text or icon • Icon text is W&M or W/M or similar • Text color must contrast with the background color • Icon may have a rectangular or rectangular/rounded border.

Appendix B – 2023 NIST OWM Report to Software Sector on International Activity

Status of OIML work on D31 (TC5/SC2/p4)

The CIML preliminary ballot of the newly revised D31 was completed in April 2023 and final approval is anticipated at the CIML meeting that will take place this October. This iteration has introduced sections covering remote verification, cases where artificial intelligence/machine learning or dynamic modules may be used by software, and a new set of terms related to measurement-related data and metadata.

The convenors of TC5/SC2/p4 are submitting a project proposal to the CIML for approval of an immediate revision of D31. If approved, the convenors recommend the following for the revision:

a. Moving measurement-device specific options related to implementation of software requirements into one clause.
b. Including an annex with visual representations of how the document may be used.
c. Having technical requirements be grouped according to the protected and/or secured item.
d. Separating clauses that address more than one requirement into separate subclauses.
e. Making the difference between requirements and technical explanations more evident.
f. Including technical interventions to deal with a full audit trail should.

OWM will share any draft items with the US National Working Group as they are made available. Currently the US National Working Group consists of Katya Delak, Jim Pettinato, Derrick Bender, Eric Bollerman, Michael Brown, Todd Gray, Teri Gulke, Dmitri Karimov, Jan Konijnenburg, Kyle Messerly, Joe Porthouse, and Xin Wang.

Digitalization

The Digital NIST project first kicked off with a workshop last September is still underway, though much of the work is being done solely in house to develop the capabilities for producing machine-readable calibration reports. At this time, no major updates have been made available to the public.

OIML Digitalization Task Group

The OIML Digitalization Task Group is largely focused on socializing concepts of digitalization through hosting a workshop in tandem with the October CIML meeting and collaborating with other signatories of the Joint Statement of Intent on the Digital Transformation in the International Scientific and Quality Infrastructure by OIML. This Joint Statement (JSI) is also linked to the work of the International Committee for Weights and Measures (BIPM), where the Task Group on the Digital SI has been working to develop methods for secure data exchange based on the SI. Signatories to the JSI aside from the BIPM and OIML include the Committee on Data (CODATA), the International Measurement Confederation (IMEKO), the International Science Council (ISC), the International Electrotechnical Commission (IEC), the International Laboratory Accreditation Cooperation (ILAC), and the International Organization for Standardization (ISO). The BIPM and OIML are also working to establish a JSI Hub through which efforts of the signatories can be socialized and shared.

Discussions on digitalization in metrology have been ongoing in a number of different fora. Within the Interamerican System of Metrology (SIM), there are regular meetings on Metrology for Digital Transformation (M4DT) in which presentations are given on various digitalization projects in the member states. The Asia-Pacific Legal Metrology Forum (APLMF) has a focus group on digital transformation (APMP-DXFG) and has likewise held informative webinars. IMEKO TC 6, the digitalization technical committee, held a conference on Metrology and Digital Transformation in September 2022 (M4Dconf 2022).

Within the OIML Digitalization Task Group, Katya Delak is chairing a subgroup on OIML Smart Standards. Early discussion on digitalization within OIML have led to suggestions that the path forward should consider the following:

- Developing machine-readable certificates and reports;
- Defining which information should be machine-readable that would also be available to interconnected devices relevant to the full range of activities relevant to quality infrastructure, including standardization, calibration, certification, market surveillance, accreditation, regulation;
- Using common SI terminologies so that solutions are interoperable;
- Enabling the use of digital twins for remote assessment of devices;
- Developing capabilities to enable continuous quality and conformity assessment checks.

Early work may involve the development of a common understanding of topics and terms, outlining the role of metrology in digital transformation. The work will also be informed by ongoing work on smart standards taking place in IEC SG12.