Appendix E

National Type Evaluation Program (NTEP)
Software Sector Meeting Summary

August 27 - 28, 2014
Atlanta, Georgia

INTRODUCTION

The charge of the 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, *Specifications, Tolerances, and Other Technical Requirements for Weighing and Measuring Devices*, 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 National Type Evaluation Program (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.

Proposed revisions to the handbook(s) are shown as follows: 1) deleted language is indicated with a **bold face font using ~~strikeouts~~** (e.g., **~~this report~~**), 2) proposed new language is indicated with an **<u>underscored bold faced font</u>** (e.g., **<u>new items</u>**), and 3) nonretroactive items are identified in *italics*. There are instances where the Sector will use red text and/or <mark>highlighted</mark> text to bring emphasis to text that requires additional attention. When used in this report, the term "weight" means "mass."

Note: It is the policy of the National Institute of Standards and Technology (NIST) to use metric units of measurement in all of its publications; however, recommendations received by NCWM technical committees and regional weights and measures associations have been printed in this publication as submitted. Therefore, the report may contain references in inch-pound units.

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Table B
Glossary of Acronyms and Terms

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

Details of All Items
(In order by Reference Key)

WELCOME/INTRODUCTIONS

Since the first day of this year's Sector meeting was a joint meeting with the Weighing Sector, there was some time set aside to meet and greet both new and familiar faces. In addition, the Software Sector gave a brief presentation outlining the problems they've been asked to consider and some of the consensus that has been reached.

STATUS REPORTS – RELATED NCWM AND INTERNATIONAL ACTIVITY

Attendees of the 2014 NCWM Interim Meeting were asked to share any relevant comments or discussion that took place during the open hearings or NCWM Standards and Tolerances (S&T) Committee working sessions.

Dr. Ambler Thompson, NIST, Office of Weights and Measures (OWM), provided a synopsis of international activity that relates to the work of the sector.

JOINT SESSION PROGRESS REPORT, ACTIVE ITEMS OF MUTUAL INTEREST

Since this is the first joint meeting of the Sectors, it is expected that some time will be required to review the agenda items of the Sectors that require collaboration, so all participants have a solid foundation for discussion. As part of this review, items of particular importance or interest should be allocated more time during the joint session day.

SOFTWARE SECTOR PRESENTATION

Mr. Doug Bliss, Software Sector technical advisor, gave a short presentation on the current issues being addressed by the Software Sector (see Appendix B) to the joint group. The presentation was well received; and generated some discussion. Mr. Adam Oldham pointed out that WELMEC doesn't go into minute detail regarding what is metrologically significant. He also asked how the manufacturer is intended to demonstrate the separation of software. Mr. Jim Pettinato responded that he thinks this will likely be a "paperwork demonstration," and that eventually we'll need to go into more detail on the subject. There was discussion of OIML's requirements, and how they're becoming less stringent over time.

Mr. Rainer Holmberg asked whether there have been problems with fraudulent software in the marketplace. Mr. Jim Truex said that instances have occurred in Los Angeles County, California, and Detroit, Michigan. There was also a problem with zero tracking that was found. Mr. Mike Wedman also related situations he'd encountered in the field that obviously did not provide sufficient protection of the software.

Mr. Truex attempted to explain the direction we've been going in – though we are looking to OIML/WELMEC, there is no intent to go to their extent of detail.

The checklist that has been in development for inclusion in NCWM Publication 14 by the Software Sector was brought up during this discussion (see Agenda Item 3); it was pointed out that the Weighing Sector has already agreed to put the checklist into NCWM Publication 14.

CARRY-OVER ITEMS

1. Software Identification/Markings

Sources:
- 2009 NTEP Software Sector agenda Item 3 and 2010 S&T Item 310-3, G-S.1 Identification (Software)

- 2010 Final Report of the S&T Committee:
  https://ncwm.net/content/annual-archive or
  https://www.nist.gov/sites/default/files/documents/pml/wmd/pubs/2011/06/13/08-st-10-annual-final.pdf

- 2010 Software Sector Summary:
  https://www.ncwm.net/committees/ntep/sectors/software

- 2011 Software Sector Summary:
  https://www.ncwm.net/committees/ntep/sectors/software.

- 2011 Final Report of the S&T Committee (NCWM Publication 16 and addendum sheets):
  https://ncwm.net/content/annual-archive or
  https://www.nist.gov/sites/default/files/documents/pml/wmd/pubs/2011/12/13/08-st-11-annual-final.pdf.

- 2012 Software Sector summary:
  https://www.ncwm.net/committees/ntep/sectors/software/archive

- 2012 Final Report of the S&T Committee:
  https://www.nist.gov/sites/default/files/documents/pml/wmd/pubs/2013/07/09/08-st-12-annual-final.pdf.

- 2013 Software Sector Summary:
  http://www.ncwm.net/resources/dyn/files/981560z45f7a5f5/_fn/12_Software_Sector_Activity.pdf.

- 2013 Final Report of the S&T Committee:
  https://www.nist.gov/sites/default/files/documents/pml/wmd/pubs/2013/12/27/08-st-13-annual-final.pdf.

- 2014 Final Report of the S&T Committee:
  https://www.nist.gov/sites/default/files/documents/2016/09/27/08-st-14-annual-final.pdf.

Background:
Local weights and measures inspectors need a means to determine whether equipment discovered in the field has been evaluated by NTEP.   If so, the inspector needs to know at a minimum the CC number.   From this starting point, other required information can be ascertained (e.g., the software version or revision identifier of the software installed in an electronic device at the time it was evaluated).   NIST Handbook 44 currently includes three options for marking of the CC:

1. permanent marking;

2. continuous display; and

3. Recall using a special operation.

Additional background information relative to this item can be found in *2014 NCWM Publication 16* at:
http://www.ncwm.net/resources/dyn/files/1217541z1019c056/_fn/4-ST-Pub16-2014-CORRECTED-06-12-2014.pdf.

During its 2013 meeting, the WS, at the request of the SS, reviewed and provided feedback on the following SS proposal to amend NIST Handbook 44 General Code Paragraphs G-S.1.Identification and G-S.1.1. Location of Marking Information for Not-Built-For-Purpose, Software-Based Devices:

NIST Handbook 44 – Proposed Changes:

G-S.1.   **Identification.** – All equipment, except weights and separate parts necessary to the measurement process but not having any metrological effect**,** shall be clearly and permanently marked for the purposes of identification with the following information:

(a)   the name, initials, or trademark of the manufacturer or distributor;

(b)   a model identifier that positively identifies the pattern or design of the device;

   (1)   The model identifier shall be prefaced by the word "Model," "Type," or "Pattern." These terms may be followed by the word "Number" or an abbreviation of that word. The abbreviation for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., No or No.). The abbreviation for the word "Model" shall be "Mod" or "Mod." Prefix lettering may be initial capitals, all capitals, or all lowercase.
   [Nonretroactive as of January 1, 2003]
   (Added 2000) (Amended 2001)

(c)   a nonrepetitive serial number, except for equipment with no moving or electronic component parts and ~~not-built-for- purpose software-based software devices~~ <u>software</u>;
   [Nonretroactive as of January 1, 1968]
   (Amended 2003)

   (1)   The serial number shall be prefaced by words, an abbreviation, or a symbol, that clearly identifies the number as the required serial number.
   [Nonretroactive as of January 1, 1986]

   (2)   for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., S/N, SN, Ser. No., and S. No.).
   [Nonretroactive Abbreviations for the word "Serial" shall, as a minimum, begin with the letter "S," and abbreviations s of January 1, 2001]

(d)   *the current software version or revision identifier ~~for not-built-for-purpose software-based electronic devices~~, which shall be directly linked to the software itself;*
   [Nonretroactive as of January 1, 2004]
   (Added 2003) **(Amended 20XX)**

   (1)   The version or revision identifier shall be prefaced by words, an abbreviation, or a symbol, that clearly identifies the number as the required version or revision.
   [Nonretroactive as of January 1, 2007]
   (Added 2006)

   (2)   Abbreviations for the word "Version" shall, as a minimum, begin with the letter "V" and may be followed by the word "Number." Abbreviations for the word "Revision" shall, as a minimum, begin with the letter "R" and may be followed by the word "Number." The abbreviation for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., No or No.).
   [Nonretroactive as of January 1, 2007]
   (Added 2006)

   (3)   <u>**The version or revision identifier shall be accessible via the display. Instructions for displaying the version or revision identifier shall be described in the CC. As an exception, permanently marking the version or revision identifier shall be acceptable under the following conditions:**</u>

      (a)   <u>**The user interface does not have any control capability to activate the indication of the version or revision identifier on the display, or the display does not technically allow the**</u>

> *version or revision identifier to be shown (analog indicating device or electromechanical counter) or*
>
> (b) *the device does not have an interface to communicate the version or revision identifier.*
>
> (e) an NTEP CC number or a corresponding CC Addendum Number for devices that have a CC.
>
> *(1) The CC Number or a corresponding CC Addendum Number shall be prefaced by the terms "NTEP CC," "CC," or "Approval." These terms may be followed by the word "Number" or an abbreviation of that word. The abbreviation for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., No or No.)*
> *[Nonretroactive as of January 1, 2003]*
>
> The required information shall be so located that it is readily observable without the necessity of disassembly or a part requiring the use of many means separate from the device.
> (Amended 1985, 1991, 1999, 2000, 201, 2003, ~~and~~ 2006**, and 201X**)
>
> > **G-S.1.1.** **Location of Marking Information for** ~~**Not-Built-For-Purpose**~~ **All Software-Based Devices.** – *For* ~~*not-built-for-purpose*~~ *software-based devices, either:*
> >
> > *(a) The required information in G-S.1. Identification. (a), (b), ~~(d),~~ and (e) shall be permanently marked or continuously displayed on the device; or*
> >
> > *(b) The CC Number shall be:*
> >
> > > *(1) permanently marked on the device;*
> > >
> > > *(2) continuously displayed; or*
> > >
> > > *(3) accessible through an easily recognized menu and, if necessary, a submenu. Examples of menu and submenu identification include, but are not limited to, "Help," "System Identification," "G-S.1. Identification," or "Weights and Measures Identification."*
> >
> > *Note: For (b), clear instructions for accessing the information required in G-S.1. (a), (b), and (d) shall be listed on the CC, including information necessary to identify that the software in the device is the same type that was evaluated.*
> > *[Nonretroactive as of January 1, 2004]*
> > (Added 2003) (Amended 2006 **and 20XX**)

See the 2013 WS Final Report to view the feedback provided by the WS on the SS's proposal to amend paragraphs G-S.1. and G-S.1.1. and for additional background information relating to this item.

This item was also a "Developing" item on the 2014 S&T Committee's agenda and remains so on the 2015 S&T Committee's agenda. During the 2014 NCWM Annual Meeting, NIST OWM provided the following comments concerning the SS's proposal:

The following two concerns and suggestions were provided concerning the changes proposed to subparagraph GS.1.(d):

1. Deleting the words "for not-built-for-purpose software-based electronic devices" creates the implication that all equipment manufactured as of January 1, 2004, except weights and separate parts necessary to the measurement process but not having any metrological effect, would be required to be permanently marked with a current software version or revision identifier. OWM questions whether or not it is the Software Sector's intent to require a software version or revision identifier be marked on equipment that is not electronic. If not the intent, OWM suggests that the Sector consider adding text to better clarify

the type of equipment intended to be addressed by this proposed change and offers the following additional text for consideration:

(d) the current software version or revision identifier **for software-based electronic devices,** which shall be directly linked to the software itself;

2. The proposed changes, if adopted, would require a current software version or revision identifier be marked on both built-for-purpose and not-built-for purpose software based equipment manufactured as of January 1, 2004. If it is the intent of the Sector to require that a current software version or revision identifier be marked on built-for-purpose software based equipment, then the Sector might consider proposing that such a requirement be non-retroactive or that it become enforceable at some future date considering the time and cost involved in updating equipment already in service.

The following additional feedback was provided by OWM concerning the Software Sector's proposed changes to paragraphs G-S.1. and G-S.1.1.:

•   It is not clear what equipment would be affected by the proposed changes to G-S.1.(c). By proposing that the word "software" be added, is the exception intended to apply to the software itself or to equipment in which the software is installed?

•   In the proposed additions to G-S.1.(d)(3)(a), it is not clear what is meant by the phrase "or the display does not technically allow the version or revision identifier to be shown." The examples "analog indicating device" and "electromechanical counter" do not provide enough information to lead one to conclude that the intent is to address such things as numeric-only displays. That is, numeric-only displays that don't have the capability of displaying abbreviations for "version" or "revision" as noted in earlier comments originating from the Sector.

•   NIST, OWM recommends adding some examples to clarify the types of devices described in paragraph G-S.1.(d)(3)(b).

•   NIST, OWM agrees with the Software Sector's assertion that it may be possible to eventually eliminate G-S.1.1. at some future date.

OWM noted that a joint meeting of the Software and Weighing Sectors is planned in August 2014 to consider the current proposal and to try and reach agreement on the changes necessary to paragraph G-S.1. NIST, OWM encouraged the two Sectors to consider its comments and feedback when considering any changes to the language currently proposed for G-S.1. The approach used in the past has been for the Sectors to review the proposal in separate meeting sessions; however, this has not resulted in a proposal amenable to all Sectors. OWM believes that it might be more expedient for all of the Sectors to collaborate in a single joint meeting to try and reach agreement on the changes needed.

Following the 2014 NCWM Annual Meeting, members of NST, OWM's Legal Metrology Devices Program (LMDP) were requested to provide additional input on the proposal to modify G-S.1. and G.S.1.1. in consideration of the goals of the SS and the comments provided during the 2014 Open Hearings of the S&T Committee relating to this item.

The following is a list of the goals provided by the SS in modifying G-S.1. and G.S.1.1. as communicated to the members of NIST, OWM's LMDP:

1. Remove the existing distinction between software identification requirements for built-for-purpose and not-built-for-purpose devices.

2. To require that all software-based devices have a software version or revision identifier for metrologically significant software.

3. Require that <u>certified</u> software versions or revision identifiers for metrologically significant software is recorded on the CC for access by inspectors.

4. Software itself does not require serial numbers.

5. Require that software-based devices version or revision identifier shall be accessible via the display and user interface and only if device's display is incapable of displaying the identifier or has no display and/or interface; then permanently marking the version or revision identifier shall be acceptable (e.g., digital load cell).

6. Nonretroactive as of January 1, 2016, if passed by the NCWM in July 2015.

NIST, OWM's LMDP developed the following proposed draft alternative changes to G-S.1. based on the SS's request for additional input on how best to meet its goals and forwarded them to the Chairman of the SS for consideration at the 2014 WS/SS joint meeting:

Amend NIST Handbook 44: G-S.1. Identification and G-S.1.1. Location of Marking Information for Not-Built-For- Purpose, Software-Based Devices as follows:

G-S.1. Identification. – All equipment, except weights and separate parts necessary to the measurement process but not having any metrological effect, shall be clearly and permanently marked for the purposes of identification with the following information:

(a) the name, initials, or trademark of the manufacturer or distributor;

(b) a model identifier that positively identifies the pattern or design of the device;

(1) The model identifier shall be prefaced by the word "Model," "Type," or "Pattern." These terms may be followed by the word "Number" or an abbreviation of that word. The abbreviation for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., No or No.). The abbreviation for the word "Model" shall be "Mod" or "Mod." Prefix lettering may be initial capitals, all capitals, or all lowercase.
[Nonretroactive as of January 1, 2003]
(Added 2000) (Amended 2001)

(c) *a nonrepetitive serial number, except for equipment with no moving or electronic component parts and* ~~*not-built-for-purpose software-based devices*~~ <u>*software*</u>*;*
[Nonretroactive as of January 1, 1968]
(Amended 2003)

(1) The serial number shall be prefaced by words, an abbreviation, or a symbol, that clearly identifies the number as the required serial number.
[Nonretroactive as of January 1, 1986]

(2) Abbreviations for the word "Serial" shall, as a minimum, begin with the letter "S," and abbreviations for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., S/N, SN, Ser. No., and S. No.).
[Nonretroactive as of January 1, 2001]

(d) the current software version or revision identifier for not-built-for-purpose software-based devices**; manufactured as of January 1, 2004, through December 31, 2015, and all software based devices or equipment manufactured as of January 1, 2016;**
[Nonretroactive as of January 1, 2004]
(Added 2003) **(Amended 20XX)**

(1) The version or revision identifier shall be:

    i.   *prefaced by words, an abbreviation, or a symbol, that clearly identifies the number as the required version or revision;*
[Nonretroactive as of January 1, 2007]
(Added 2006)

    ii.   ***directly linked to the software itself; and***
[Nonretroactive as of January 1, 2016]
(Added 20XX)

    iii.   ***continuously displayed* or be accessible via the display menus. Instructions for displaying the version or revision identifier shall be described in the CC. As an exception, permanently marking the version or revision identifier shall be acceptable providing the device does not have an integral interface to communicate the version or revision identifier.***
[Nonretroactive as of January 1, 2016]
(Added 20XX)

*The version or revision identifier shall be displayed continuously on software equipment with a digital display manufactured as of January 20XX and all software-based equipment with a digital display as of January 1, 20XX.

(2) Abbreviations for the word "Version" shall, as a minimum, begin with the letter "V" and may be followed by the word "Number." Abbreviations for the word "Revision" shall, as a minimum, begin with the letter "R" and may be followed by the world "Number." The abbreviation for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., No or No.).
[Nonretroactive as of January 1, 2007]
(Added 2006)

(e) an National Type Evaluation Program (NTEP) Certificate of Conformance (CC) *number or a corresponding CC Addendum Number for devices that have a CC.*

    (1)   *The CC Number or a corresponding CC Addendum Number shall be prefaced by the terms "NTEP CC," "CC," or "Approval." These terms may be followed by the word "Number" or an abbreviation of that word. The abbreviation for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., No or No.)*

[Nonretroactive as of January 1, 2003]

The required information shall be so located that it is readily observable without the necessity of the disassembly of a part requiring the use of any means separate from the device.
(Amended 1985, 1991, 1999, 2000, 2001, 2003, ~~and~~ 2006 **and 201X**)

G-S.1.1.   *Location of Marking Information for* ~~*Not-Built-For-Purpose*~~ **All** *Software-Based Devices.* – *For* ~~*not-built-for-purpose,*~~ *software-based devices, either:*

(a) The required information in G-S.1. Identification. (a), (b), ~~(d),~~ and (e) shall be permanently marked or continuously displayed on the device; or

(b) The CC Number shall be:

> *(1) permanently marked on the device;*

> *(2) continuously displayed; or*

> *(3) accessible through an easily recognized menu and, if necessary, a submenu. Examples of menu and submenu identification include, but are not limited to, "Help," "System Identification," "G-S.1. Identification," or "Weights and Measures Identification."*

> ***Note:*** *For (b), clear instructions for accessing the information required in G-S.1. (a), (b), and (d) shall be listed on the CC, including information necessary to identify that the software in the device is the same type that was evaluated.*

[Nonretroactive as of January 1, 2004]

(Added 2003) (Amended 2006 **and 20XX**)

No changes to subparagraph G-S.1.1. were proposed by OWM's LMDP since the SS had indicated earlier that it may be possible to eventually eliminate G-S.1.1. Thus, the proposed changes to subparagraph G-S.1.1. shown above in OWM's draft alternative changes are those originating from the SS's 2013 proposal.

In providing feedback to the SS, OWM's LMDP noted that the shaded portion of G-S.1.(d)(1).iii of their draft alternative changes was developed solely by OWM (i.e., does not reflect any of the goals communicated by the SS) and was being offered for consideration with the understanding that:

1. this change will make it easier in the future for inspectors to be able to identify software installed in equipment;

2. a reasonable amount of time for the changes to take effect can be specified; and

3. it is probable that improvements in technology over time will make it easier for equipment manufacturers to comply.

In addition to the alternative changes proposed by NIST, OWM's LMDP, a member of the SS submitted the following definition of "software-based devices" for discussion during the joint meeting of the WS and SS and possible future inclusion into Appendix D of NIST Handbook 44:

> **software-based devices:** devices used to compute and control processes using software, where software is a general term for the programs and data used to operate the computers and/or related electronic devices. Software-based device may also consist of just software (e.g., weigh in/weigh out software).

Discussion/Conclusion:
During the joint meeting of the WS and SS, the Chairman of the SS led a discussion on the identification of software; more specifically, the changes that have been proposed or that are needed to G-S.1. and G S.1.1. and the reasons why these changes are important. He reviewed the SS's 2013 draft proposal to amend G-S.1. and G-S.1.1., and the comments that had been received since its distribution. Very few constructive comments had been received except for some provided by NIST, OWM, which the Chairman reviewed one by one; requesting additional clarification from the NIST Technical advisor as needed.

Once the review of the Sector's draft proposal had been completed, it was then pointed out that NIST OWM's LMDG had developed some suggested alternative changes to the SS's proposal at the request of the SS. Members of both

sectors were asked to review and consider the alternative changes proposed by OWM's LMDP, which were provided in a handout to members of both sectors and displayed on screen.

The NIST Technical Advisor to the WS, also a member of OWM's LMDP, explained the reasons for NIST, OWM's proposed alternative changes to *G-S.1. Identification*. Initial discussions of the group regarding OWM's draft changes mostly concentrated on three main issues/concerns as follows:

1. Why is it necessary to retain the term "not-built-for-purpose software-based devices" and add enforcement dates to G-S.1.(d) when it is the Sector's intention to treat built-for-purpose and not-built-for-purpose devices the same with respect to identifying software?

2. Consideration of the text that OWM had developed and was proposing for addition to G-S.1.(d) iii.

3. What would be the effective dates of any changes agreed upon by the group?

The following is a brief summary of the discussions and actions taken by the two sectors relative to these three issues/concerns:

1. With regard to the changes proposed to G-S.1.(d), the NIST Technical Advisor to the WS indicated that it was OWM's view that a separation between built-for purpose and not-built-for-purpose software-based devices needed to be maintained within the paragraph because the current requirement (i.e., G-S.1.(d)) only applies to not-built-for-purpose software-based devices. Although the SS's intention is to expand the requirement to apply to all electronic devices, it would not be appropriate to require existing built-for-purpose-equipment, which is already in service, to comply with the proposed changes to G-S.1. since this equipment has not had to do so previously. Updating existing equipment, in order to make it comply with new requirements, could be costly to both manufacturers and device owners. Additionally, it may not be possible for some built-for-purpose devices to provide an indication of the current software version or revision identifier. Although marking of the version or revision identifier using a label affixed to the device might be an option, how would officials be able to tell if the version of software installed in the device actually matched the marking on the device? By adding effective dates, as proposed, the separation can be maintained and still provide a means of requiring all new electronic equipment to comply. The NIST Technical Advisor also acknowledged that it may be possible at some future date to remove the reference to "not built for-purpose" in the paragraph. Members of the two Sectors agreed, although it was decided that the words "through December 31, 2015," in the lead-in sentence of G-S.1.(d) should be deleted because the inclusion of this date is not necessary and its removal does not in any way change the proposal.

2. There were significant concerns raised by equipment manufacturers regarding OWM's suggested proposal to require the continuous display of the version or revision identifier on software-based equipment having a digital display. It was stated that some displays; specifically referenced were "seven-segment digital displays of simple design," do not have the capability of complying with the proposed note that had been developed by OWM. It was also stated that customer demand for these simple displays remains steady among the different scale manufacturers because of their low cost in relation to other digital displays that incorporate more current and complex technology. That is, some customers aren't willing to pay the extra money for a more complex display that can be made to comply with OWM's proposed note, such as one of the graphic types, when all that's needed is a simple basic display. Manufacturers did not see this situation changing and stated that sales of these displays are driven by their low cost. Another concern was the valuable "real estate" that the version or revision identifier would take up if it were continuously displayed.

3. In consideration of the fact that the proposed changes, if adopted, would require both built-for-purpose and not-built-for-purpose software-based equipment to continuously display the current software version or revision identifier, or that this information be accessible via the display menus, members of the two Sectors felt that the 2016 effective date proposed by OWM did not provide enough lead-in time for equipment manufacturers. Thus, the Sectors agreed to extend the date to 2020 by amending OWM's proposal to reflect this new date.

A fourth issue/concern, which was raised by an equipment manufacturer somewhat later in the discussions, is that some built-for-purpose equipment have limited capability of displaying letters of the alphabet, and, therefore, unable to comply with the prefacing requirements specified in G-S.1.(d)(1) and G-S.1.(d)(2). The example provided was a seven-segment display. It is not able to display a "V" or an "R," which are the current acceptable abbreviations for "version" and "revision," respectively. A "U" could be considered a symbol; however, it is not currently a symbol included in the list of acceptable abbreviations found in some NCWM Publication 14 device checklists. Alternatively, a lowercase "r" could be displayed on such an indicator. In consideration of this concern, it was suggested that a "note" be added to G-S.1.(d) permitting the NTEP evaluators to specify a different method of indication if the device is incapable of prefacing the software version/revision with a "V" or "R." The Sectors agreed to propose a "note" be added and let the S&T Committee decide whether the "note" is necessary or appropriate. An additional change agreed upon by the Sectors relating to this issue/concern was to add the last sentence of G-S.1.(b) to the end of G-S.1.(d)(2). In discussing this issue/concern, it was also stated that some built-for-purpose devices only indicate the software version or revision identification during power up. That is, in order to view the software identification, it is necessary to shut off and then return power to the device. It was noted that some officials have been instructed not to power down equipment they are inspecting for liability reasons. There were no solutions to this (power down/power up) concern offered by members of either Sector.

Although the SS had earlier proposed changes to G-S.1.1., it was decided during the meeting that no changes to GS.1.1. were necessary since the Sectors had agreed to retain the term "not-built-for-purpose software-based devices" in G-S.1.(d). Thus, no changes are proposed to paragraph G-S.1.1. The following reflects all of the changes to paragraph G-S.1. that were agreed upon by the two Sectors during the joint meeting:

Amend NIST Handbook 44:   G-S.1. Identification as follows:

G-S.1. Identification. – All equipment, except weights and separate parts necessary to the measurement process but not having any metrological effect**,** shall be clearly and permanently marked for the purposes of identification with the following information:

(a) the name, initials, or trademark of the manufacturer or distributor;

(b) a model identifier that positively identifies the pattern or design of the device;

(1) The model identifier shall be prefaced by the word "Model," "Type," or "Pattern." These terms may be followed by the word "Number" or an abbreviation of that word. The abbreviation for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., No or No.). The abbreviation for the word "Model" shall be "Mod" or "Mod." Prefix lettering may be initial capitals, all capitals, or all lowercase.
[Nonretroactive as of January 1, 2003]

(Added 2000) (Amended 2001)

(c) *a nonrepetitive serial number, except for equipment with no moving or electronic component parts and* ~~*not-built-for-purpose software-based software devices*~~ *software:*
[Nonretroactive as of January 1, 1968]

(Amended 2003)

(1) The serial number shall be prefaced by words, an abbreviation, or a symbol, that clearly identifies the number as the required serial number.
[Nonretroactive as of January 1, 1986]

(2) Abbreviations for the word "Serial" shall, as a minimum, begin with the letter "S," and abbreviations for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., S/N, SN, Ser. No., and S. No.).
[Nonretroactive as of January 1, 2001]

(d) the current software version or revision identifier for not-built-for-purpose software-based devices**; manufactured as of January 1, 2004, and all software-based devices or equipment manufactured as of January 1, 2020;**
[Nonretroactive as of January 1, 2004]
(Added 2003) **(Amended 20XX)**

(1) The version or revision identifier shall be:

    i. *prefaced by words, an abbreviation, or a symbol, that clearly identifies the number as the required version or revision;*
[Nonretroactive as of January 1, 2007]
(Added 2006)

    Note: If the equipment is capable of displaying the version or revision identifier but is unable to meet the formatting requirement, through the NTEP type evaluation process, other options may be deemed acceptable and described in the CC.
(Added 20XX)

    ii. **directly linked to the software itself; and**
[Nonretroactive as of January 1, 2020]
(Added 20XX)

    iii. **continuously displayed or be accessible via the display. Instructions for displaying the version or revision identifier shall be described in the CC. As an exception, permanently marking the version or revision identifier shall be acceptable providing the device does not have an integral interface to communicate the version or revision identifier.**
[Nonretroactive as of January 1, 2020]
(Added 20XX)

(2) Abbreviations for the word "Version" shall, as a minimum, begin with the letter "V" and may be followed by the word "Number." Abbreviations for the word "Revision" shall, as a minimum, begin with the letter "R" and may be followed by the word "Number." The abbreviation for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., No or No.). **Prefix lettering may be initial capitals, or all lowercase.**
[Nonretroactive as of January 1, 2007]
(Added 2006)

(e) *a National Type Evaluation Program (NTEP) Certificate of Conformance (CC) number or a corresponding CC Addendum Number for devices that have a CC.*

    (1) *The CC Number or a corresponding CC Addendum Number shall be prefaced by the terms "NTEP CC," "CC," or "Approval." These terms may be followed by the word "Number" or an abbreviation of that word. The abbreviation for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., No or No.)*
[Nonretroactive as of January 1, 2003]

The required information shall be so located that it is readily observable without the necessity of the disassembly of a part requiring the use of any means separate from the device.
(Amended 1985, 1991, 1999, 2000, 2001, 2003, ~~and~~ 2006 **and 201X**)

An additional issue that was discussed during the joint meeting is whether or not the updating of metrological software should be considered a sealable event or sealable parameter. It was agreed that an update to metrological

software is a sealable event and needs to be protected using an approved means of security. The Sectors then considered whether it would be appropriate to include the updating of metrological software in the list of sealable parameters in NCWM Publication 14 or to provide for its security by proposing a new General Code requirement be added to NIST Handbook 44. The Sectors decided that the updating of metrological software can affect multiple sealable parameters, and, therefore, it is appropriate to address its security in the General Code of NIST Handbook 44. Consequently, the Sectors decided to complete and submit an NCWM Form 15 proposing there be a new General Code requirement added to the handbook to address the security of software updates.

The two Sectors agreed that much progress had been made during the joint meeting, but that paragraph G-S.1., as revised during the meeting, is not likely to be considered for Vote by the NCWM. In consideration of the progress that was made, the Sectors agreed to recommend that the "Developing" status of the item be changed to "Informational" and forward the revised draft of G-S.1. to the different regional associations for their consideration at their next meeting.

Based on the feedback received by the S&T Committee regarding agenda Item 1, we are of the opinion that it may no longer be possible to avoid providing a definition for "software-based electronic devices." A discussion on possible definitions commenced. Members of the two Sectors reviewed a draft definition of "software-based devices" that had been developed by a member of the Sector in consideration of a comment that had been received by the S&T Committee during one of the 2014 NCWM Conferences. The Sectors decided that a simpler definition may be more palatable, that is:

> *Software Based Device – Any device with metrologically significant software.*

If they feel it is imperative to have a definition for this term (which many in the Sector feel is self-defining), the S&T Committee can point us in the direction of one or the other of the proposed definitions.

2. Identification of Certified Software

Source:
NTEP Software Sector

Background/Discussion:
This item originated as an attempt to answer the question, "How does the field inspector know that the software running in the device is the same software evaluated and approved by the lab?" In previous meetings, it was shown that the international community has addressed this issue (both WELMEC and OIML).

From WELMEC 7.2:

> **Required Documentation:**
> The documentation shall list the software identifications and describe how the software identification is created, how it is inextricably linked to the software itself, how it may be accessed for viewing, and how it is structured in order to differentiate between version changes with and without requiring a type approval**.**

From OIML D-31:

> The executable file "**tt100_12.exe**" is protected against modification by a checksum. The value of checksum as determined by algorithm **XYZ** is **1A2B3C**.

Previous discussions have included a listing of some additional examples of possible valid methods (not limiting):

- CRC (cyclical redundancy check)
- Checksum

- Inextricably Linked version no.

- Encryption

- Digital Signature

Is there some method to give the weights and measures inspector information that something has changed?
Yes, the Category III Audit Trail or other means of sealing.

How can the weights and measures inspector identify an NTEP Certified version?
They can't, without adding additional requirements like what is described here, in conjunction with including the identifier on the CC).

The Sector believes that we should work towards language that would include a requirement similar to the International Organization of Legal Metrology (OIML) requirement in NIST Handbook 44. It is also the opinion of the Sector that a specific method should not be defined; rather the manufacturer should utilize a method and demonstrate the selected identification mechanism is suitable for the purpose. It is not clear from the discussion where such proposed language might belong.

NTEP strongly recommends that metrological software be separated from non-metrological software for ease of identification and evaluation.

From OIML:

Separation of software parts. – All software modules (programmes, subroutines, objects etc.) that perform metrologically significant functions or that contain metrologically significant data domains form the metrologically significant software part of a measuring instrument (device or sub-assembly). The conformity requirement applies to all parts and parts shall be marked according to Section G-S-X.X.

If the separation of the software is not possible or needed, then the software is metrologically significant as a whole.

(Segregation of parameters is currently allowed - see table of sealable parameters)

Initial draft proposed language: (G-S.1.1?)

NIST Handbook 44 (This has been written into G-S.1.(d)(3): Identification of Certified Software):

Software-based electronic devices shall be designed such that the metrologically significant software is clearly identified by the version or revision number. ~~The identification, and this identification of the software~~ shall be ~~inextricably~~ directly and inseparably linked to the software itself. The version or revision number may consist of more than one part, but at least one part shall be dedicated to the metrologically significant software.

From NCWM Publication 14:

Identification of Certified Software:

Note: Manufacturers may choose to separate metrologically significant software from non-metrologically significant software. Separation would allow the revision of the non-metrological portion without the need for further evaluation. In addition, non-metrologically significant software may be updated on devices without breaking a seal, if so designed. Separation of software requires that all software modules (programs, subroutines, objects etc.) that perform metrologically significant functions or that contain metrologically significant data ~~domains~~ form the metrologically significant software part of a measuring instrument (device or sub-assembly). If the separation of the software is not possible or needed, then the software is metrologically significant as a

whole. ~~The conformity requirement applies to all parts and parts shall be marked according to Section G-S-X.X.~~

The manufacturer must describe and possibly demonstrate how the version or revision identifier is directly and inseparably linked to the metrologically significant software. Where the version revision identifier is comprised of more than one part, the manufacturer shall describe which portion represents the metrological significant software and which does not.

From OIML D-31:

Legally relevant software of a measuring instrument/electronic device/sub-assembly shall be clearly identified with the software version or another token. The identification may consist of more than one part but at least one part shall be dedicated to the legal purpose.

The identification shall be inextricably linked to the software itself and shall be presented or printed on command or displayed during operation or at start up for a measuring instrument that can be turned off and on again. If a sub-assembly/an electronic device has neither display nor printer, the identification shall be sent via a communication interface in order to be displayed/printed on another sub-assembly/electronic device.

The first sentence of the first paragraph above is already addressed in NIST Handbook 44's marking requirements.

In 2010, the Sector recommended the following change to NIST Handbook 44, General Code: G-S.1.(d) to add a new subsection (3):

(d) *the current software version or revision identifier for* ~~*not-built-for-purpose*~~ ***software-based electronic*** *devices;*
[Nonretroactive as of January 1, 2004]
(Added 2003) **(Amended 20XX)**

(1) *The version or revision identifier shall be prefaced by words, an abbreviation, or a symbol, that clearly identifies the number as the required version or revision.*
[Nonretroactive as of January 1, 2007]
(Added 2006)

(2) *Abbreviations for the word "Version" shall, as a minimum, begin with the letter "V" and may be followed by the word "Number." Abbreviations for the word "Revision" shall, as a minimum, begin with the letter "R" and may be followed by the word "Number." The abbreviation for the word "Number" shall, as a minimum, begin with the letter "N" (e.g., No or No.).*
[Nonretroactive as of January 1, 2007]
(Added 2006)

(3) **The version or revision identifier shall be directly and inseparably linked to the software itself. The version or revision identifier may consist of more than one part, but at least one part shall be dedicated to the metrologically significant software.**
[Nonretroactive as of January 1, 20XX]
(Added 20XX)

Also the Sector recommends the following information be added to NCWM Publication 14 as explanation/examples:

• Unique identifier must be displayable/printable on command or during operation, etc.

• At a minimum, a version/revision indication (1.02.09, rev 3.0 a, etc.). Could also consist of/contain checksum, etc. (crc32, for example).

There was some additional discussion on this item regarding where this new requirement was best located. It was suggested that the first sentence of G-S.1.(d)(3) could be added as a clause to the base paragraph GS.1.(d) text (e.g., "*the current software version or revision identifier for ~~not-built-for-purpose~~ <u>software-based</u> devices, which shall be directly and inseparably linked to the software itself").*

It also was suggested that the second sentence in G-S.1.(d)(3) might be more suitable for NCWM Publication 14, as it describes more "how" than "what" the requirement entails.

In addition, the Sector considered the following information to be added to NCWM Publication 14 as explanation/examples:

- The current software identifier must be displayable/printable on command during operation (or made evident by other means deemed acceptable by G-S.1.).

- At a minimum, the software identifier must include a version/revision indication (1.02.09, rev 3.0 a, etc.). It could also consist of/contain checksum, etc. (crc32, for example).

- The version or revision identifier may consist of more than one part, but at least one part shall be dedicated to the metrologically significant software.

Other questions that are still outstanding:

- If we allow hard-marking of the software identifier (the Sector has wavered on this in the past), does the above wording then imply that some mechanical means is required (i.e., physical seal) to "inseparably link" the identifier to the software?

- If a device is capable of doing so, does it still have to be able to display, print or communicate the identifier somehow, even if it is hard-marked?

At the 2012 NTEP Software Sector Meeting, there was some discussion as to where the terminology regarding inextricably linking the software version or revision to the software itself belonged. At the moment, it is not incorporated in the proposed text for G-S.1. NCWM Publication 14 may be a better option for the time being. This would be another item that would benefit from further explanation in a supplementary document.

One suggestion was this revision to G-S.1.(d):

> (d) ~~when metrologically significant software is employed,~~ the current software version or revision identifier<u>, which shall be directly and inseparably linked to the software itself;</u>~~, for not-built-for-purpose software-based electronic devices;~~

Alternatively, if the previously proposed new subsection G-S.1.(d)(3) from Item 1 is adopted, this concept could be inserted thus:

> *(3)* *The version or revision identifier shall be* <u>directly and inseparably linked to the software itself and accessible via the display. Instructions for displaying the version or revision identifier shall be described in the CC. As an exception, permanently marking the version or revision identifier shall be acceptable under the following conditions:</u>

Several Sector members were of the opinion that attempting to make this change at the same time as the earlier changes might be a difficult sell. Mr. Truex, NTEP Administrator, reiterated the necessity of baby steps.

The Sector recommended adding the following to NCWM Publication 14 and forward to NTEP Weighing, Measuring, and Grain Analyzer Sectors for feedback:

Identification of Certified Software:

Note: Manufacturers may choose to separate metrologically significant software from non-metrologically significant software. Separation would allow the revision of the non-metrological portion without the need for further evaluation. In addition, non-metrologically significant software may be updated on devices without breaking a seal, if so designed. Separation of software requires that all software modules (programs, subroutines, objects etc.) that perform metrologically significant functions or that contain metrologically significant data domains form the metrologically significant software part of a measuring instrument (device or sub-assembly). If the separation of the software is not possible or needed, then the software is metrologically significant as a whole. The conformity requirement applies to all parts and parts shall be marked according to Section G-S.X.X.

The manufacturer must describe and possibly demonstrate how the version or revision identifier is directly and inseparably linked to the metrologically significant software. Where the version revision identifier is comprised of more than one part, the manufacturer shall describe which portion represents the metrological significant software and which does not.

Also, it was decided to forward the two alternate options for adding requirements for uniquely identifying software to the individual sectors:

One suggestion was this revision to G-S.1.(d):

> (d) ~~when metrologically significant software is employed,~~ the current software version or revision identifier_,_ **which shall be directly and inseparably linked to the software itself;**~~, for not-built-for-purpose software-based electronic devices;~~

Alternatively, if the previously proposed new subsection G-S.1.(d)(3) from Item 1 is adopted, this concept could be inserted thus:

> *(3)* ***The version or revision identifier shall be directly and inseparably linked to the software itself and accessible via the display. Instructions for displaying the version or revision identifier shall be described in the CC. As an exception, permanently marking the version or revision identifier shall be acceptable under the following conditions:***

The Measuring Sector reviewed this item and had no feedback other than a statement that they support the continuing/ongoing efforts of this sector. The Weighing Sector summary mentioned that no one opted to provide comment. They agreed to take no further action on this item, pending further action from the Software Sector. This was specifically in reference to the accepted symbols.

For the time being, Mr. Jim Truex recommended that we not attempt to provide a definition for "software-based device." We discussed the possibility of combining this change with the first agenda item, which had been attempted in previous years. Alternatively, if the NIST Handbook 44 changes from agenda Item 1 are made, this agenda item could be addressed in NCWM Publication 14.

After further discussion, the proposed wording in G-S.1.d under agenda item 1 was changed. Agenda Item 2 will remain; however, it will address potential changes to NCWM Publication 14 and contain no suggested modifications to NIST Handbook 44. (See changes and conclusion under agenda item 1 for further details.)

The Sector chair volunteered to review the existing slide presentation detailing the purpose of these changes, to ensure that it accurately reflects this information. This was done by the Technical Advisor and the most recent version reflects our current point of consensus (see Appendix B).

The list of acceptable menu text and symbols in Appendix A are intended to assist the labs in finding the certification number. The Sector noticed no action by the sectors had been taken when this list was circulated for comment. We would like to remind them that we would like to have it reviewed. We feel that this belongs in, for example, the Weighing Device NCWM Publication 14, page DES-22, Section 3; the Belt- Conveyor Scales, page BCS-10,

Section 8.7; the Measuring Devices, page LMD-21, Section 1.6; the Grain Moisture Meter, page GMM-14, Section 1 (G.S.1); and Near Infrared Grain Analyzers, page NIR-8, Section 1 (G.S.1).

Conclusion:
Some of the Sectors (Weighing, Measuring) have already agreed to put the two paragraphs of text appearing at the top of page NTEP-3 in NCWM Publication 14. (The sentence that has been struck out in the first paragraph was not included because NIST Handbook 44 hasn't been altered to make it a requirement.)

This agenda item will likely require less time during future meetings as it seems to be nearly finalized. Outstanding work remaining is to secure buy-in from the remaining Sectors that have yet to adopt this recommendation to include in NCWM Publication 14. Once those Sectors reach a decision, this item can be considered complete and removed from future agendas.

3. Software Protection/Security

Source:
NTEP Software Sector

Background:
The Sector agreed that NIST Handbook 44 already has audit trail and physical seal, but these may need to be enhanced.

From the WELMEC Document:

Protection against accidental or unintentional changes:
Metrologically significant software and measurement data shall be protected against accidental or unintentional changes.

Specifying Notes:
Possible reasons for accidental changes and faults are: unpredictable physical influences, effects caused by user functions and residual defects of the software even though state of the art of development techniques have been applied.

This requirement includes consideration of:

a) Physical influences: Stored measurement data shall be protected against corruption or deletion when a fault occurs or, alternatively, the fault shall be detectable.

b) User functions: Confirmation shall be demanded before deleting or changing data.

c) Software defects: Appropriate measures shall be taken to protect data from unintentional changes that could occur through incorrect program design or programming errors, (e.g., plausibility checks).

Required Documentation:
The documentation should show the measures that have been taken to protect the software and data against unintentional changes.

Example of an Acceptable Solution:
- The accidental modification of software and measurement data may be checked by calculating a checksum over the relevant parts, comparing it with the nominal value and stopping if anything has been modified.

- Measurement data are not deleted without prior authorization (e.g., a dialogue statement or window asking for confirmation of deletion).

- For fault detection see also Extension I.

The Sector continued to develop a proposed checklist for NCWM Publication 14. The numbering will still need to be added. This is based roughly on R 76-2 checklist and discussions beginning as early as the October 2007 NTEP Software Sector Meeting. 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 California, Maryland, and Ohio laboratories agreed to use this checklist on one of the next devices they have in the lab and report back to the Sector on what the problems may be. In February 2011, the North Carolina laboratory was also given a copy of the check list to try.

The Maryland laboratory had particular questions regarding 3.1 and 5.1. The information for 3.1 could be acquired from an operator's manual, a training video, or in-person training. The items in 5.1 were confusing to the evaluators. The terminology is familiar to software developers, but not necessarily others. It was indicated that manufacturers were typically quick to return the filled out questionnaire, but he didn't know how his laboratory was supposed to verify that it was true. Generally, the laboratories wouldn't be expected to verify things to that level. For example, if the manufacturer states that a checksum is used to ensure integrity, the laboratories wouldn't be expected to evaluate the algorithm used.

The intent was to see whether the manufacturer had at least considered these issues, not for evaluators to become software engineers. Perhaps a glossary or descriptive paragraphs might be added to assist the evaluators for if the manufacturer has questions for the evaluators.

OIML makes use of supplementary documents to explain the checklist they use. Below are links:
http://www.oiml.org/publications/D/D031-e08.pdf
http://www.welmec.org/latest/guides/72.html
http://www.welmec.org/fileadmin/user_files/publications/2-3.pdf

WELMEC document 2.3 is the original source for our checklist, but it's been significantly revised and simplified. Mr. Payne, Maryland Department of Agriculture, is going to review the other documents and come up with some suggestions for the checklist. Mr. Roach, California Division of Measurement Standards, is going to begin using the checklist. The international viewpoint is that any device running an operating system is considered to be Type U. Mr. Roach mentioned that they're having lots of problems with "skimmers" stealing PIN's. Is there some way they can detect this?

Mr. Lewis, Rice Lake Weighing Systems, Inc., mentioned that he liked Measurement Canada's website. When answering similar questions, different pages would appear, based on answers to those questions:
http://www.ic.gc.ca/eic/site/mc-mc.nsf/eng/lm00573.html.

At the 2011 NTEP Software Sector Meeting, the laboratories were polled to obtain any feedback on the use of the checklist. Maryland attempted to use this checklist a few times. They had some difficulty obtaining answers from the manufacturers because the individual(s) interacting with the Maryland evaluator didn't always have the required information on hand. More experience in using the checklist will help determine what needs to be revised.

It was suggested that the checklist could be sent to manufacturers for their feedback as well, with the stipulation that it a completely voluntary exercise and purely informational at this point. The laboratories will coordinate with willing manufacturers to obtain feedback.

At the 2013 meeting, it was reported by the labs that attempts to use the current checklist did not meet with many difficulties. The checklists were given to the manufacturers to fill out, and that seemed to work rather well. Minor modifications were made to clarify certain confusing areas or eliminate redundancy. (**Note:** The text above includes the updates made in 2013).

Discussion:
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 this Summary shall be used henceforth.

During the discussion, Mr. Ed Payne (NTEP lab, Maryland) said that his impression is that this is at least making some of the manufacturers think about security, which they hadn't necessarily done in the past.

It was indicated that some more or better examples may be helpful to manufacturers, and that more guidance is needed. Clearer instructions could be part of the checklist, or it could be a separate document. The Sector would like additional feedback specifically regarding what portions of it are causing confusion.

Due to proprietary issues, the labs can't simply give us direct feedback from the companies with which they interact. Mr. Darrell Flocken volunteered to obtain information from the labs, aggregate it, and remove any potential proprietary information issues.

The checklist as updated during the 2014 meeting:

1. Devices with Software

1.1. Declaration of the manufacturer that the software is used in a fixed hardware and software environment. **The manufacturer should indicate whether it's solely software or includes hardware in the system. Can the software be changed after the system has been shipped without breaking a seal? AND**   ☐ Yes ☐ No ☐ N/A

1.2. Cannot be modified or uploaded by any means after securing/verification. **With the seal intact, can you change the software?**   ☐ Yes ☐ No ☐ N/A

It is acceptable to break the "seal" and load new software, audit trail is also a sufficient seal.

1.3. The software documentation contains:

1.3.1. Description of all functions, designating those that are considered metrologically significant.   ☐ Yes ☐ No ☐ N/A

1.3.2. Description of the securing means (evidence of an intervention).   ☐ Yes ☐ No ☐ N/A

1.3.3. Software Identification, including version/revision. **It may also include things like name, part number, CRC, etc.**   ☐ Yes ☐ No ☐ N/A

1.3.4. Description how to check the actual software identification.   ☐ Yes ☐ No ☐ N/A

1.4. The software identification is:

1.4.1. Clearly assigned to the metrologically significant software and functions.   ☐ Yes ☐ No ☐ N/A

1.4.2. Provided by the device as documented.   ☐ Yes ☐ No ☐ N/A

1.4.3. Directly linked to the software itself. **This means that you can't easily change the software without changing the software identifier. For example, the version identifier can't be in a text file that's easily editable, or in a variable that the user can edit.**   ☐ Yes ☐ No ☐ N/A

2. Programmable or Loadable Metrologically Significant Software

2.1. The metrologically significant software is:

2.1.1. Documented with all relevant (see below for list of documents) information. *The list of docs referred to exists in agenda Item 5.*   ☐ Yes ☐ No ☐ N/A

2.1.2. Protected against accidental or intentional changes.   ☐ Yes ☐ No ☐ N/A

2.2. Evidence of intervention (such as, changes, uploads, circumvention) is available until the next verification/inspection (e.g., physical seal, Checksum, Cyclical Redundancy Check (CRC), audit trail, etc. means of security). ☐ Yes ☐ No ☐ N/A

3. Software with no access to the operating system and/or programs possible for the user. <u>This section and Section 4 are intended to be mutually exclusive. Complete this section only if you replied Yes to 1.1.</u>

3.1. Check whether there is a complete set of commands (e.g., function keys or commands via external interfaces) supplied and accompanied by short descriptions. ☐ Yes ☐ No ☐ N/A

3.2. Check whether the manufacturer has submitted a written declaration of the completeness of the set of commands. ☐ Yes ☐ No ☐ N/A

4. Operating System and/or Program(s) Accessible for the User. <u>Complete this section only if you replied No to 1.1.</u>

4.1. Check whether a checksum or equivalent signature is generated over the machine code of the metrologically significant software (program module(s) subject to legal control Weights and Measures jurisdiction and type-specific parameters). **<u>This is a declaration or explanation by the manufacturer.</u>** ☐ Yes ☐ No ☐ N/A

4.2. Check whether the metrologically significant software will detect and act upon any unauthorized alteration of the metrologically significant software using simple software tools (e.g., text editor). **<u>This is a declaration or explanation by the manufacturer.</u>** ☐ Yes ☐ No ☐ N/A

5. Software Interface(s)

5.1. Verify the manufacturer has documented:

5.1.1. **<u>If software separation is employed, t</u>**he program modules of the metrologically significant software are defined and separated. ☐ Yes ☐ No ☐ N/A

5.1.2. **<u>For software that can access the operating system or if the program is accessible to the user, t</u>**he protective software interface itself is part of the metrologically significant software. ☐ Yes ☐ No ☐ N/A

5.1.3. The functions of the metrologically significant software that can be accessed ~~via the protective software interface~~. ☐ Yes ☐ No ☐ N/A

5.1.4. The **<u>metrologically significant</u>** parameters that may be exchanged ~~via the protective software interface~~ are defined. ☐ Yes ☐ No ☐ N/A

5.1.5. The description of the functions and parameters are conclusive and complete. ☐ Yes ☐ No ☐ N/A

5.1.6. There are software interface instructions for the third party (external) application programmer. ☐ Yes ☐ No ☐ N/A

Conclusion:
The Sector discussed examples, such as the upgrade of application programs and how these changes would affect audit trails and version numbers. It should be clear that if the upgraded software doesn't affect anything metrologically significant, then it's irrelevant for the purposes of this checklist. On the other hand, if it does affect metrologically significant functions or parameters, it should be tracked and/or identified somehow.

The revised checklist will be reviewed and further edited as required, and the updated version can be sent to the labs.

4. Software Maintenance and Reconfiguration

Source:
NTEP Software Sector

Background:
After the software is completed, what do the manufacturers use to secure their software? The following items were reviewed by the Sector. *Note that agenda Item 3 also contains information on Verified and Traced updates and Software Log.*

1. Verify that the update process is documented. (OK)

2. For traced updates, installed Software is authenticated and checked for integrity

    Technical means shall be employed to guarantee the authenticity of the loaded software (i.e., it originates from the owner of the type approval certificate). This can be accomplished (e.g., by cryptographic means like signing). The signature is checked during loading. If the loaded software fails this test, the instrument shall discard it and either use the previous version of the software **or become inoperative**.

    Technical means shall be employed to guarantee the integrity of the loaded software i.e. that it has not been inadmissibly changed before loading. This can be accomplished (e.g., by adding a checksum or hash code of the loaded software and verifying it during the loading procedure). If the loaded software fails this test, the instrument shall discard it and either use the previous version of the software **or become inoperative**.

    Examples are not limiting or exclusive.

3. Verify that the sealing requirements are met,

    The Sector asked, "What sealing requirements are we talking about"?

    This item is **only** addressing the **software update**; it can be either verified or traced. It is possible that there are two different security means, one for protecting software updates (software log) and one for protecting the other metrological parameters (Category I II or III method of sealing). Some examples provided by the Sector members include but are not limited to:

    - Physical Seal, software log; and
    - Category III method of sealing can contain both means of security.

4. Verify if the upgrade process fails, the device is inoperable or the original software is restored,

    The question before the group is, "Can this be made mandatory"?

    The manufacturer shall ensure by appropriate technical means (e.g., an audit trail) that traced updates of metrologically significant software are adequately traceable within the instrument for subsequent verification and surveillance or inspection. This requirement enables inspection authorities, which are responsible for the metrological surveillance of legally controlled instruments, to back-trace traced updates of metrologically significant software over an adequate period of time (that depends on national legislation). The statement in *italics* will need to be reworded to comply with U.S. weights and measures requirements.

The Sector **agreed** that the two definitions below for Verified update and Traced update were acceptable.

Verified Update
A verified update is the process of installing new software where the security is broken and the device must be re-verified. Checking for authenticity and integrity is the responsibility of the owner/user.

Traced Update
A traced update is the process of installing new software where the software is automatically checked for authenticity and integrity, and the update is recorded in a software update log or audit trail.

Note: It's possible that the Philosophy of Sealing section of NCWM Publication 14 may already address the above IF the definitions of Verified and Traced Updates (and the statement below) were to be added. The contrary argument was that it may be better to be explicit.

Use of a Category 3 audit trail is required for a Traced Update. A log entry representing a traced software update shall include the software identification of the newly installed version.

The Sector recommended consolidating the definitions with the above statement thus:

Verified Update
A verified update is the process of installing new software where the security is broken and the device must be re-verified. Checking for authenticity and integrity is the responsibility of the owner/user.

Traced Update
A traced update is the process of installing new software where the software is automatically checked for authenticity and integrity, and the update is recorded in a ~~software update log or~~ Category 3 audit trail. The audit trail entry shall include the software identification of the newly installed version.

The Sector recommended that as a first step, the following be added to NCWM Publication 14:

The updating of metrologically significant software, including software that checks the authenticity and integrity of the updates, shall be considered a sealable event.

Mr. Truex, NTEP Administrator, believes the above sentence is unnecessary since it's self-evident. It was agreed to ask the other Sectors for feedback on the value of this addition.

Though the Sector is currently recommending only the single sentence be incorporated into NCWM Publication 14 for the time being, ultimately, the sector may wish to advance the remaining language of the original item submission.

At the 2013 meeting, the Sector had no information indicating that the other Sectors had yet been approached for feedback on the value of the addition of the proposed sentence. This Sector would still like the other Sectors to evaluate this for inclusion in NCWM Publication 14. We'd also like to include some description indicating that an existing audit trail should be protected during a software update, though that may already be a requirement. This does appear to be addressed in the Requirements for Metrological Audit Trails Appendices in NCWM Publication 14.

Discussion:
In 2010 the Software Sector had considered the following:

G-S.9.   Metrologically Significant Software Updates – The updating of metrologically significant software shall be considered a sealable event. Metrologically significant software that does not conform to the approved type is not allowed for use.

Mr. Ambler Thompson suggested that the notes under G-S.8. could be amended to include software updates as a new example. Mr. Rick Harshman recommended having it as a stand-alone item, such as discussed in 2010.

This could possibly be tied back to G-S.2.

What is the sealable parameter? Is it the software version/revision? Currently all of the parameters are user-selectable, which would make this unique.

If the general code in NIST Handbook 44 is amended to include this in some form, it applies to everything. The various Sectors don't need to add to their specific sections of NIST Handbook 44.

Mr. Darrell Flocken suggested that we try to come up with a declaration of intent and see how the Sectors respond. Mr. Doug Bliss will add it to the existing presentation. Mr. Jim Truex thought it might be valuable to obtain the opinion of the S&T Committee. The Legal Metrology group should be asked, "Is a software change that updates metrologically significant software a sealable event"? Rick Harshman can obtain an answer from them.

Mr. Thompson raised a concern about the fact that at this point none of the suggested wording requires the software identifier be unique (i.e., a change to the metrologically significant software should require a change to the software identifier). You could perhaps infer it from the requirement that it be inextricably linked to the software, but that isn't clear. Mr. thinks this will eventually need to be addressed, but not right now.

We reviewed the presentation that Mr. Doug Bliss had revised and tweaked it a bit. This sparked more discussion about the difficulty of convincing NIST. There seems to be a fundamental difference in how they understand changes of parameters and/or software. People don't seem to understand the difference between software and data. Adding a slide that explains the difference may help.

Last year's Weighing Sector feedback (Mr. Truex will provide their wording.) – they were opposed because:

1. It would change the methods of sealing (category 1, 2, and 3 audit trails) and require a change to NIST Handbook 44.

2. It's not clear that the requirement for authenticity and integrity of the updates is limited to metrologically significant software.

The other Sectors were concerned about this as well.

Legacy equipment that's still being manufactured might need to be changed to meet this obligation since their audit trails wouldn't necessarily indicate that the software has been updated.

Reference G-S.8., which is rather loose. NCWM Publication 14 goes into much more detail about what is metrologically significant.

Mr. Flocken referred to NIST Handbook 44, Scales code – the event logger category 3 – the software is not a parameter. It's not so much that the software would be tracked, as the fact that it has not been in the list of sealable parameters is the concern. It sounds like this may be a procedural issue – sections of NIST Handbook 44 may need to be altered before the Sectors can add this suggestion to NCWM Publication 14.

Conclusion:
After the discussion during the 2014 joint meeting, we revised the wording of the proposed G-S.9. to reflect some of the concerns heard from the other Sectors and interested parties:

G-S.9.   Metrologically Significant Software Updates – A software update that changes the metrologically significant software shall be considered a sealable event.

The Sector still feels that explicitly requiring the metrologically significant software to be given at least the same level of protection as metrologically significant parameters is the best approach. We look forward to feedback from the S&T Committee and other Sectors on this proposed change. The Software Sector still would like to consider the issue of audit trail protection; there is some doubt as to whether the existing language is sufficient as it does not address the integrity of the audit trail during a software update, etc.

5.   NTEP Application for Software and Software-based Devices

Source:
NTEP Software Sector

Background:
The purpose of initiating this item was to identify issues, requirements and processes for type approving Type U device applications. It was suggested that it may be useful to the labs to devise a separate submission form for software for Type U devices. 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.

Mr. Roach, California Division of Measurement Standards, stated that if the software package being evaluated supports platforms/subsystems from multiple manufacturers, testing should be done using at least two platforms/subsystems. Scale laboratories and scale manufacturers indicated that this is not usually done for scale evaluations.

Since the NTEP Committee passed the related item at NCWM Annual Meeting we will continue to work on this. Mr. Truex, NTEP Administrator, indicated that we can move in this direction, but felt that it was somewhat premature to develop this thoroughly now. At the point where the Sector has developed checklist requirements, then we could move to perhaps add a subsection to current NTEP applications for applicable software. Refer to D-31.6.1. It was also agreed that there seems to be no reason for limiting the scope of this item to software-only applications, and hence all software/software-based devices could benefit from an enhanced application process. Hence, the description of this agenda item was modified as shown in the marked up heading.

Comments given at the meeting indicate that current practice does not require anything different for software/software based devices compared to any other type approval. It was also noted that for international applications, OIML D-31.6.5 states, "The approval applicant is responsible for the provision of all the required equipment and components." This would likely also be the policy of NTEP.

Discussion:
Since the checklist is still being tried out by some of the laboratories, the Sector is not quite ready to develop this fully. Some documentation that eventually might be required by applicants could include (from WELMEC doc. 7-2 Issue 4): This is the list of documents referred to in the checklist.

- A description of the software functions that are metrologically significant, meaning of the data, etc. (e.g., an architecture diagram or flowchart).

- ~~A description of the accuracy of the measuring algorithms (e.g., price calculation and rounding algorithms).~~

- ~~A description of the user interface, communication interface, menus, and dialogs.~~

- The software identification (version, revision, etc.) and how to view it.

- ~~An overview of the system hardware, e.g., topology block diagram, type of computer(s), type of network, etc., if not described in the operating manual.~~

- An overview of the security aspects of the operating system (e.g., protection, user accounts, privileges, etc.)

- ~~The operating manual.~~

Mr. Flocken and Mr. Truex quickly reviewed existing requirements for documentation to be submitted for obtaining certification in Pub. 14, Administrative Policy, and on the application form itself. Administrative policy 9.1.7 was where this was found:

- Engineering specification; and

- Operating descriptions that characterize the type.

NTEP evaluators already have the authority to request whatever documentation they need. We can provide them with a list of documents that we think would assist the evaluator in his job and also give the manufacturer a good idea of what they should be capable of providing.

Mr. Flocken suggested that these additional items on our list could be added to administrative policy 9.1.7 in NCWM Publication 14. Mr. Truex suggested it could also be added to the application.

We struck the second bullet point because the labs probably won't care about this particular issue since they already have tests that they'll be running to address the accuracy of the measuring algorithms.

Mr. Russ Vires suggested removing some of the other bullet points, reducing the list to only new things to be added to the Administrative Policy. The list was originally designed to replace the current required documentation, so this would change its purpose. The original list was also never intended to be all-inclusive.

Conclusion:
If we combine the two lists, it might appear as something like this:

- A description of the software functions that are metrologically significant, meaning of the data, etc. (e.g., an architecture diagram or flowchart).

- A description of the user interface, communication interface, menus, and dialogs.

- The software identification (version, revision, etc.), and how to view it.

- An overview of the system hardware (e.g., topology block diagram, type of computer(s), type of network, etc.), if not described in the operating manual.

- An overview of the security aspects of the operating system (e.g., protection, user accounts, privileges, etc.

- The operating manual.

- Engineering specification.

- Operating descriptions that characterize the type.

A statement could be made along the lines of, "If not included in the operating manual, provide the following, as applicable."

After the last sentence in 9.1.7, this could be added:

As part of the type evaluation submission, the following information should be provided for software-based devices:

- **A description of the software functions that are metrologically significant, meaning of the data, etc., (e.g., an architecture diagram or flowchart).**

- **The software identification (version, revision, etc.) and how to view it.**

- **An overview of the security aspects of the operating system (e.g., protection, user accounts, privileges, etc.).**

These documentation requirements will be considered as input for requirements that will eventually appear in NCWM Publication 14 and the application paperwork. Further work by the Sector to develop the NCWM Publication 14 requirements is needed, after more input from the labs is gathered. The Sector recommends including the above bulleted list as an introduction to the checklist as part of our recommendation to include the checklist from agenda Item 3 in NCWM Publication 14. As a description of the accuracy of the measuring algorithms, simply declaring the type and class being aimed for may be sufficient. This list should reflect the needs of the labs for an evaluation. The bulleted list and the paragraph before it should be brought to the labs for an initial review and their input.

The Sector needs to discuss any input from the labs and finalize this list, prior to submitting the list to the other Sectors for incorporation into NCWM Publication 14.

6.   Training of Field Inspectors

Source:
NTEP Software Sector

Background:
During discussions at the 2009 NTEP Software Sector Meeting, the Sector concluded that a new agenda item should be initiated specific to the training of field inspectors in relation to evaluating/validating software-based devices.

California has an Examination Procedure Outline (EPO) that begins to address this. Use "California Handbook 112" as a pattern template for how it could read.

Items to be addressed:

- Certificate of Conformance

- Terminology (as related to software) beyond what is in NIST Handbook 44.

- Reference materials / information sources

System Verification Tests:
NOTE: Item numbers 1 through 5 apply to both weighing and measuring devices. Numbers 6 and 7 are specific to weighing devices; while numbers 9 and 10 apply to measuring devices.

1. **Identification.** – The identification (ID) tag may be on the back room computer server and could be viewed on an identification screen on the computer monitor. The ID information may be displayed on a menu or identification screen. Though currently discouraged, some systems may be designed so the system must be shut down and reset to view the ID information. G-S.1. [1.10]

    1.1.   Manufacturer.

    1.2.   Model designation.

2. Provisions for sealing. G-S.8. [1.10]; S.1.11. [2.20]; S.2.2. [3.30]

    2.1.   Verify sealing category of device (refer to Certificate of Approval for that system).

    2.2.   Verify compliance with certificate.

3. Units of measure.

    3.1.   A computer and printer interfaced to a digital indicator shall print all metrological values, intended to be the same, identically. G-S.5.2.2.(a); G-S.5.1. [1.10]

3.2.   The unit of measure, such as lb, kg, oz, gal, qt, liters, or whatever is used, must agree.

4.   Operational controls, indications and features (buttons and switches). Verify that application criteria and performance criteria are met (refer to Certificate of Approval).

4.1.   Any indication, operation, function or condition must not be represented in a manner that interferes with the interpretation of the indicated or printed values.

5.   Indications and displays.

5.1.   Attempt to print a ticket. The recorded information must be accurate or the software must not process and print a ticket with erroneous data interpreted as a measured amount.

Weighing Devices:
6.   Motion detection.

6.1.   For railway track, livestock, and vehicle scales apply or remove a test load of at least 15d while simultaneously operating a print button, push-button tare or push-button zero. A good way to do this is to try to print a ticket while pulling the weight truck or another vehicle onto the scale. Recorded values shall not differ from the static display by more than 3d. Perform the test at 10 %, 50 % and 100 % of the maximum applied test load. S.2.5.1.(a) [2.20]; EPO NO. 2-3, 2.4

6.2.   For all other scales, apply or remove at least 5d. Printed weight values must agree with the static weight within 1d and must exactly agree with other indications. S.2.5.4.(b) [2.20]; EPO NO. 2-3, 2.4

7.   Behind zero indication.

7.1   Apply a load in excess of the automatic zero setting mechanism (AZSM) and zero the scale. S.2.1.3. [2.20]; EPO NO. 2-3, 2.4, 2.5.2

Example: On a vehicle scale, have someone stand on the scale, then zero them off (AZSM is 3d). Remove the weight (person) and note the behind zero display (usually a minus weight value) or error condition.

7.2.   Attempt to print a ticket. With a behind zero condition, (manually or mechanically operated) a negative number must not be printed as a positive value.

8.   Over capacity.

8.1.   Manually enter a gross weight if permissible or apply a test load in excess of 105 % of the scale's capacity. S.1.7. [2.20.]; S.1.12., UR.3.9. [2.20.]

8.2.   Attempt to print a weight ticket. A system must not print a ticket if the manually entered weight or load exceeds 105 % of the scale capacity.

Measuring Devices
9.   Motion detection.

9.1.   Initiate flow through the measuring element. Attempt to print a ticket while the product is flowing through the measuring chamber. The device must not print while the indication is not stable. S.2.4.1. (3.30.)

10.   Over capacity.

10.1.   Attempt to print a ticket in excess of the indicated capacity. A system must not print a ticket if the device is manually or mechanically operated in excess of the indicated value.

NOTE: Be aware of error codes on the indicator which may be interrupted as measured values.

The PDC is focused on training sessions at the moment, so it's unsure how much time they'd have to review this currently.

Discussion:
California has some direction for inspectors regarding third party software. Mr. Mike Wedman is currently tasked with revising and expanding some of California's documentation on the subject, and we asked him to share it with us when it is complete.

Is it California's Handbook 112? Mr. Wedman said they don't have such a handbook; it's in their device enforcement documentation.

NIST Handbook 112 doesn't have anything specific to software, and Mr. Truex says that this handbook has actually been out of production for years. Its last edition was in 2002. There's an online copy of it that was searched to verify if there was anything software-specific in it, and nothing was found.

Mr. Jim Pettinato proposed that we put together a group to begin writing something ourselves, and Mr. Truex stressed that it needed to be written at a level that the field inspectors would find useful.

Conclusion:
We'll wait until Mr. Wedman has completed his work on the California EPO. Mr. Pettinato, Mr. Teri Gulke, and Mr. Wedman volunteered to work on this offline.

The Sector would like to continue exploring means by which it can be of assistance in training of field inspectors as software and electronic systems become more and more prevalent in their daily tasks.

It was also suggested we contact Mr. Ross Anderson, a paid consultant working with the PDC Committee, to ask his opinion on how the Software Sector could best proceed to assist in the training of field inspectors. The Sector chair, Mr. Pettinato, will act as primary point of contact for this communication.

NEW ITEMS

7.   Next Meeting

Background/Discussion:
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 would likely be the Measuring Sector next October?

Conclusion:
The Measuring Sector normally meets the afternoon of Friday and all day Saturday, leading into Southern's meeting starting on Sunday. The labs meeting is Friday morning. Mr. Jim Truex recommended against us beginning Thursday and continuing into Friday as we will probably need an entire day overlapping with their schedule. Overlapping with them for the entire day of Saturday might be our best option, and then have a day to ourselves on Sunday.

We can't determine our precise schedule right now. We will have a one-day meeting in conjunction with the Measuring Sector (in addition to a one-day meeting of just the Software Sector), and it will be in the fall of 2015. Mr. Truex is going to try to determine what's possible.

8.   2014 NCWM Interim Meeting Report

There was one item on the NCWM S&T Committee agenda for the 2013 NCWM Interim Meeting related to work done by the NTEP Software Sector. 2013 Publication 15, S&T Item 360-2 relates to the 2013 NTEP Software Sector Agenda Item 1: Marking Requirements.

From Jim Truex – the S&T Committee reported that it is considering withdrawing the item from their agenda if the Software Sector doesn't show some progress this year. By the end of August 28, 2014, this didn't seem like a likely result as we'd made significant progress on the item.

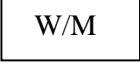**9.   2013 International Report**

Dr. Ambler Thompson, NIST, Office of Weights and Measures (OWM), will provide a synopsis of international activity that relates to the work of the Sector. Software Sector Co-Chair, Mr. Jim Pettinato will summarize the discussions that took place at the European Cooperation in Legal Metrology (WELMEC) WG7 meeting in December 2013.

Highlights of interest to the NTEP Software Sector:

- New WELMEC 7.2 draft document circulated for comment by WG7; and

- R-117 working group.

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Sub-Appendix A
Acceptable Menu Text/Icons for Weights Measures information

Permitted Menu Text examples	*Permitted Icon shape examples*	*Essential characteristics*
Information Info		Top level menu text or icon: • Icon text is a lower case "i" with block serifs. • Text color may be light or dark but must contrast with the background color. • Icon may have a circular border. • Activation of this menu text/icon may invoke a second level menu text/icon that recalls metrology information.
Help ?		Top level menu text or icon: • Icon text is a question mark. • Text color may be light or dark but must contrast with the background color. • Icon may have a circular 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 may be light or dark but must contrast with the background color. • Icon may have a circular, rectangular, or rounded rectangle border. • If present, the activation of this menu text/icon must recall at a minimum the NTEP CC number.
NTEP Data N.T.E.P. Certificate		This one is debatable – what if the certificate is revoked? Does NTEP grant holders of CCs the right to display the logo on the device, or just in documentation?
Weights & Measures Info		

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Sub-Appendix B
Software Sector 2014 Goals Presentation

SOFTWARE SECTOR 2014

Software Identification Goals (1/2)

- Each piece of physical equipment is unique and needs a serial number

- Software by itself is non-unique; it does **not** need a serial number

- All metrologically significant software, embedded or PC-based, needs version/revision identification

- Identification is best provided by the software itself; there is no guarantee that a hard-marked version/revision matches what is running

NTEP SOFTWARE SECTOR ACTIVITY 2013

Software Identification Goals (2/2)

- Metrologically significant software and its version/revision identification must be linked together; it must not be possible to modify the software without a change to its identification and vice versa.

- Changes to metrologically significant software made after placement in service must be evident

NTEP SOFTWARE SECTOR ACTIVITY 2013

Effecting Desired Changes

- Handbook 44: Current marking requirements for software in GS-1 are different for built-for-purpose and not-built-for-purpose

- HB44 has wide reaching impact and changes are understandably scrutinized by all, difficult to modify

- New goal is to implement the consensus items with minimal impact on existing HB 44 language

- Propose to add explanations and clarifications of intent to Publication 14

NTEP SOFTWARE SECTOR ACTIVITY 2013

Software Identification

- Software must be identified, preferably self

- Handbook 44 proposed change:

  - Software identification must be displayable or printable, unless impossible (applies to all metrologically significant software)

- Publication 14 proposed additions:

  - Define software separation and explain options to submit software either as a monolithic entity that includes metrologically significant software or as a separated piece of metrologically significant software

  - Explain that metrologically significant software and its version/revision identifier must be linked together

NTEP SOFTWARE SECTOR ACTIVITY 2013

Recommended Additions to Publication 14

"Identification of Certified Software:

Note: Manufacturers may choose to separate metrologically significant software from non-metrologically significant software. Separation would allow the revision of the non-metrological portion without the need for further evaluation. In addition, non-metrologically significant software may be updated on devices without breaking a seal, if so designed. Separation of software requires that all software modules (programs, subroutines, objects etc.) that perform metrologically significant functions or that contain metrologically significant data domains form the metrologically significant software part of a measuring instrument (device or sub-assembly). If the separation of the software is not possible or needed, then the software is metrologically significant as a whole. The conformity requirement applies to all parts and parts shall be marked according to Section G-S-X.X.

The manufacturer must describe and possibly demonstrate how the version or revision identifier is directly and inseparably linked to the metrologically significant software. Where the version revision identifier is comprised of more than one part, the manufacturer shall describe which portion represents the metrologically significant software and which does not."

NTEP SOFTWARE SECTOR ACTIVITY 2013

Software Protection

- Update of metrologically significant software must be protected
  - **Physical seal can protect software update but current event counters/audit trails may not**
  - **No clear requirement for counters/event log to either take note of, or survive a software update intact**
- Publication 14 proposed addition:
  - **Update of metrologically significant software becomes a sealable event**

NTEP SOFTWARE SECTOR ACTIVITY 2013

Recommended Additions to Publication 14

" The updating of metrologically significant software, including software that checks the authenticity and integrity of the updates, shall be considered a sealable event."

NTEP SOFTWARE SECTOR ACTIVITY 2013

Software Update

- Metrologically significant software contains algorithms, methods and procedures that operate on data, which includes both sealable and non-sealable parameters.

- Today, type approval evaluation considers protecting the modification of sealable parameters but ignores protecting the software that manipulates those sealable parameters.

NTEP SOFTWARE SECTOR ACTIVITY 201

Software Update (cont.)

- Equipment protected by a physical seal may prevent the update of software unless a seal is broken and provides evidence of software update.

- Event Counter & Event Logger sealing methods lack any requirement for such protection today.

- Software Sector believes that the field update of metrologically significant software is at least as important as the field change of a metrologically significant parameter – either can adversely impact a future measurement result.

- Metrologically significant software update should be a sealable event.

NTEP SOFTWARE SECTOR ACTIVITY 201

Future Vision

- Make Software Sector more visible/transparent

  - **Educate & better explain Software Sector objectives**

- Improve communication with other Sectors

  - **Propose to overlap Software Sector meetings with other Sector meetings to better align Publication 14 changes and speed up the consensus process**

- Finalize definition of 'easily recognizable' menu selections/icons to display software identification

- Provide checklists for software evaluations

- Assist in software-specific field training curriculum

NTEP SOFTWARE SECTOR ACTIVITY 2013

Sub-Appendix C

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*Note: The first day of the Software Sector meeting
was held in conjunction with the NTEP Weighing
Sector whose attendees were also present.*