Greetings to all our readers! I hope your year is off to a good start.

The events of last year concluded with the fall NCSLI Board of Directors meeting, which was held in conjunction with the NCSLI Canadian Region Conference in beautiful Vancouver, British Columbia, Canada, from November 6-8, 2013. The agenda for the conference included informative presentations, an exhibition hall filled with the latest measurement equipment and a trip to Everett, Washington to visit the Fluke and Boeing facilities. After a full schedule of presentations, the participants enjoyed the Deeley Motorcycle Exhibition at the Deeley Harley-Davidson Dealership in Vancouver. The event was a huge success! You can read more about the Canadian Conference in a Region report by Ingrid Ulrich in this issue.

Next on the agenda is our annual NCSLI Workshop & Symposium, which will be held July 28-31, in Orlando, Florida at the Walt Disney World Swan and Dolphin Hotel. The theme for this year’s conference is Measurement Science and the Environment. We will be welcoming professionals from all areas of the measurement science community and hope you will join us.

Among conference highlights will be our keynote speaker, Dr. Martin Milton, Director of the International Bureau of Weights and Measures (BIPM). Dr. Milton has worked in the applications of standard gas measurements to environmental measurements, as well as in the assessment of global methane emissions. It is an honor to have him as our keynote speaker!

The tutorial program will be held from July 25-27. This program offers 25 hands-on tutorials covering many current topics, which contribute to continuing education in our field.

Our technical program will be offering a brand new track this year: Pressing Problems - Real Research. Experts from NIST and NRC will present papers on pressing societal issues and the importance of measurements in addressing them. In addition, on Wednesday, July 30 we will feature sessions centered on Energy topics. The sessions will focus on measurements associated with smart energy, infrastructure and power systems. You will not want to miss this day. I look forward to attending these sessions.

Spending time in the exhibit hall is a must... over 120 vendors will be displaying their products and services; also included will be 50 poster presentations for viewing and discussion.

At the end of each day we will enjoy evening gatherings and further networking opportunities.

To conclude, in October 2013, we were saddened to report the loss of our colleague, Del Caldwell, who passed away in September. Please see the feature article in this issue, which details his many contributions and how he touched so many lives.

Lonnie Spires
FROM THE PRESIDENT

lspires@trescal.us
The fall NCSLI Board of Directors meeting was held a few weeks later this year to allow the meeting to coincide with the NCSLI Canadian Region Conference held in Vancouver, British Columbia, Canada on November 6-8, 2013. President Lonnie Spires hosted 17 board members and two guests for a short two-day meeting.

Due to the compressed schedule, the focus of this meeting was to discuss and wrap-up open action items from previous meetings. Board members submitted written reports in advance of the meeting to update the board on third quarter activities and the meeting discussion time was spent focusing on those individual action items. Reports included updates on attendance at other conferences and meetings where NCSLI board members represented the NCSLI organization. These included attendance at the; 16 International Congress of Metrology in Paris France sponsored by Collège Français de Metrologie (CFM) from October 7-10, 2013 and the Sistema Interamericano de Metrologia (SIM) General Assembly meetings sponsored by the Centro Nacional de Metrologia (CENAM) in Santiago de Queretaro, Mexico from October 6-12, 2013.

The outcome from the annual elections was also reported at the meeting. Of the current NCSLI membership, about 12.5% of you participated in the election process. The ballot tallies support the elections of Roger Burton, Sandia National Laboratories, Executive Vice President; and Vice Presidents; Vernon Alt, Northrop Grumman Corporation; Jim Kaylor, Agilent Technologies; Tim Osborne, Trescal, Inc.; Paul Packebush, National Instruments Corporation.; Robert Sawyer, Consumers Energy Laboratory Services; and Ingrid Ulrich, Ulrich Metrology, Inc.

The 2014 schedule of meetings is currently being finalized. Our winter meeting is scheduled and is again set to coincide with the NCSLI Technical Exchange being held in Raleigh, North Carolina from February 5-7, 2014. NCSLI board meetings are open to everyone and we would welcome your attendance.

dana.leaman@nist.gov
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Minnetonka, MN 55343
Contact: Tanna Hilgendorf
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Contact: Robert Mooney
978-670-2361, beaumooney@americancal.com

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Columbus, MS 39710
Contact: Michael Meggs, Michael.meggs@yahoo.com

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Ireland
Contact: Noel Heary, 056-770-0800
noel@irishpowerandprocess.com

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Contact: Gregg Shuman
972-270-0809, gregg.shuman@dallascalibrationservices.com

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Contact: Aras Piecaitis, 514-832-2838, aras_piecaitis@agilent.com

For information regarding NCSLI membership opportunities, please visit ncsli.org, or call 303-440-3339.
For complete meeting information visit: the NCSLI Metrology and Calibration events calendar at www.ncsli.org.

**NCSLI WORKSHOP & SYMPOSIUM 2014**

**July 28-31, 2014**  
Measurement Science and the Environment  
Walt Disney World Swan & Dolphin  
Orlando, Florida

**NCSLI BOARD MEETINGS**

**February 3-6, 2014**  
Raleigh, NC  
Raleigh Marriott Crabtree Valley

**May 4-7, 2014**  
Puerto Rico  
Embassy Suites Dorado Del Mar Beach

**July 26-27, 2014**  
Orlando, FL  
Swan & Dolphin

**October 19-22, 2014**  
Queretaro, Mexico  
Gran Hotel, Queretaro

**NCSLI TRAINING EVENTS**

**April 9, 2014**  
Mid-Atlantic Training Event  
rknake@a2la.org

**May 12, 2014**  
Albuquerque Regional Training Event  
Seminar on Surface Metrology for the Americas  
hdtran@sandia.gov

**INTERNATIONAL EVENTS**

**February 3-5, 2014**  
IMEKO, Cape Town, South Africa

**August 24-29, 2014**  
CPEM 2014  
Rio de Janeiro, Brazil

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info@wptraining.com
Join Us for the

WORKSHOP & SYMPOSIUM

MEASUREMENT SCIENCE AND THE ENVIRONMENT

Don’t Miss This Event!

- Keynote Speaker: Dr. Martin Milton, Director of the BIPM
- 110 Newly Authored Technical Papers
- A New Track Entitled “Pressing Problems – Real Research” Presented by NIST and NRC on Leading Edge Topics
- 25 Tutorials – Register Today!
- A Day of “Energy” Technical Papers
- 120+ Product & Service Vendors
- NCSLI Committee Meetings
- Great Food, Lodging and Networking with Colleagues
PRESSING PROBLEMS — REAL RESEARCH

World experts in exciting technical areas will come together to present on pressing societal issues and the importance of measurements in addressing them. These presentations will focus on clearly explaining the science of these issues while also investigating the relevant measurement challenges and solutions. This combination of fascinating science with a measurement perspective should make this an unforgettable series of talks. Topics include a range of vital scientific issues ranging from global climate change to alternate energy to advanced manufacturing to the U.S. metric program.

A FOCUS ON ENERGY

Measurement Science plays multiple roles in all aspects of the energy industry. The energy focused sessions will center on measurements associated with smart energy, infrastructure, and measurements associated with power systems. Do not miss this day of energy if you work in utility management, or as a planner, engineer, or technician working in measurement science relating to distribution, transmission, generation, reliability, power quality and smart energy, or are an associated supplier supporting the energy industry.

TUTORIAL PROGRAM

What are we offering for the 2014 Tutorial Program? Plenty.

Just a few to whet the appetite:
- NEW! Geometric Dimensioning & Tolerancing Basics Workshop!
- LabView Automation software training
- ASTM E617:2013 Standard Training on Weights and Precision Mass Standards
- ISO/IEC 17025 Laboratory Accreditation and Management Quality Track
- Metrology Parameters Training: Temperature, Force, Torque, Humidity

THE POSTER SESSIONS

Join us in the Exhibit Hall on Monday, Tuesday and Wednesday to view our poster presentations, and talk with their authors! NCSLI will feature 50 different presentations.

Please Welcome
KEYNOTE SPEAKER
DR. MARTIN MILTON

Dr. Martin Milton took over as Director of the International Bureau of Weights and Measures (BIPM) in 2013 after a long career at the UK’s National Physical Laboratory.

His time at the NPL began in 1981, shortly after he earned a BA in physics from the University of Oxford. Over the next 31 years, he earned both a PhD from the University of Southampton and an MBA from London Business School and rose to become an NPL Fellow.

Dr. Milton led NPL’s work in gas metrology and also conducted research into isotope dilution mass spectrometry and raman spectroscopy. He was one of the founding members of the Consultative Committee for Amount of Substance (CCQM) and published early work on the nature of primary methods in chemistry. He has always had a special interest in the applications of standard gas measurements to environmental measurements, and was involved in the assessment of global emissions of methane for the Inter-governmental Panel on Climate Change (IPCC).

In 2013 he was awarded an honorary professorship in chemistry by the University of York.
TUTORIAL PROGRAM

T1  Train the Trainer: Making Adult Learning Come to Life
T2  An Introduction to Instrument Control and Calibration Automation in LabVIEW
T4  Fundamentals of Calibration in Dimensional Metrology
T5  Understanding ISO/IEC 17025 Requirements
T6  Fundamentals of Gas Flow Measurement
T7  Pressure Metrology
T8  Running the Effective Laboratory Better – Data Driven Improvements that Matter
T9  Control Charts and Stability Analysis for Calibration Laboratory Reference Standards
T10 Geometric Dimensioning & Tolerancing Basics Workshop
T11 Pipette Calibration, Use, and Uncertainty for the Metrologist, Assessor and Laboratory User
T12 Root Cause Analysis
T13 Applying LEAN techniques in a Calibration Laboratory Environment
T14 Auditing, Traceability, and Auditing Traceability
T15 Measurement Uncertainty
T16 Fundamentals of Torque Calibration
T17 Intermediate Dimensional Metrology
T18 Measurement Decision Risk
T19 Force Calibration
T20 Fundamentals of Radiation Thermometry Calibration
T21 Fundamentals of Temperature Calibration
T22 A Comprehensive Training Program for Bio-Pharma Laboratories
T23 Train the Trainer: Evaluating Performance, Learning Objectives and Training Effectiveness for Managers
T24 Humidity Calibration Tutorial
T25 Microwave Measurement Basics Cable Maintenance

TECHNICAL PROGRAM HIGHLIGHTS

Pressing Problems – Real Research
How International Metrology Really Works - A Little Lady's Foray into an Old-Boys' Club
Dr. Georgette Macdonald, NRC Program Leader
Boltzmann and Avogadro and Planck, Oh My... (and your little charge too...)
Dr. Alan Steele, Chief Metrologist for Canada
Greenhouse Gas and Climate Science Measurements Research at NIST
Dr. James Whetstone, Special Assistant to the NIST Director for Greenhouse Gas Measurements
Metric System in the U.S.: Current Efforts & Future Opportunities
Elizabeth Gentry, U.S. Metric Program Manager
NIST’s Net-Zero Energy Residential Test Facility
Dr. Hunter Fanney, Chief of the NIST Energy and Environment Division
Airborne Particulate Matter: Metrology Challenges
Dr. Greg Smallwood, NRC Program Leader, Measurement Science for Emerging Technologies
Measurement Challenges in Advanced Communications
Dr. Michael Janezic, Acting Leader of the NIST Radio Frequency Field Group
Who Needs Calibrations Anyway?
Dr. Gregory Strouse, Leader of NIST Thermodynamic Metrology Group
Measurements for Nanomanufacturing
Dr. David Seiler, Chief of the NIST Semiconductor and Dimensional Metrology Division
Embedded Standards: Future Opportunities for Measurement Services
Dr. Thomas O’Brien, Chief of NIST Time and Frequency Division

Energy
Metering Technology Center Values Laboratory Services
Edward Hass, Consumers Energy Company
An Advanced Intelligent Electronic Device Platform
Roberto Piacentini, National Instruments Corporation
Fleet Wide Monitoring: Sensors to Prognostics
Preston Johnson, National Instruments Corporation
High Precision Battery Testing for Automotive and Grid Applications
Harold Parks, Sandia National Laboratories
Unique Type of High Shock Calibration System Using Electromagnetic Exciter
Jiun-kia Che, Industrial Technology Research Institute (ITRI), Taiwan
Application of GUM-S1 to Results in Testing of Losses in Power Transformers
Marcelo Luiz Lourenco, Universidade Federal de Goias, Brazil
Ensuring Accurate and Safe Calibration of Electrical Safety Equipment
Michael Bailey, Transmille, Ltd
Instrumentation and Measurement Society IEEE TC 39: Measurements in Power Systems
Lorenzo Peretto, University of Bologna, Italy

VISIT NCSLI.ORG FOR THE COMPLETE WORKSHOP & SYMPOSIUM PROGRAM
BANQUET NIGHT

Enjoy entertainment by The Smokin’ Torpedoes at Banquet Night.

*The Smokin’ Torpedoes* consist of experienced musicians committed to providing an entertaining, live performance based on a variety of blues influences. Each member brings their own unique style to the band, providing every listener with genuine blues rhythms, melodies and the charisma associated with bands paying tribute to the music we all love… the BLUES.

2014 NCSL INTERNATIONAL WORKSHOP & SYMPOSIUM RATES

FULL CONFERENCE

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<thead>
<tr>
<th></th>
<th>Regular Rate</th>
<th>Late Rate</th>
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<tr>
<td></td>
<td>Ends May 31</td>
<td>Begins June 1</td>
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<tr>
<td>Member / Non-Member</td>
<td>$995 / $1,150</td>
<td>$1,155 / $1,275</td>
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<tr>
<td>One Day Registration</td>
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<td>$550</td>
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<tr>
<td>Extra Luncheon Tickets</td>
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<td>Banquet Ticket</td>
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TUTORIAL PROGRAM

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<th>Regular Rate</th>
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<td></td>
<td>Ends May 31</td>
<td>Begins June 1</td>
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<tr>
<td>2 Day Tutorial Member / Non-Member</td>
<td>$700 / $800</td>
<td>$750 / $850</td>
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<tr>
<td>1 Day Tutorial Member / Non-Member</td>
<td>$450 / $550</td>
<td>$475 / $575</td>
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<tr>
<td>1/2 Day Tutorial Member / Non-Member</td>
<td>$275 / $375</td>
<td>$300 / $400</td>
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HOTEL RATES

Walt Disney World Swan & Dolphin Hotel
1500 Epcot Resorts Blvd | Lake Buena Vista, Florida | 1-888-828-8850

Group Rate

NCSLI Group Rate $178 + tax

Resort Service Package including In-Room High-Speed Internet Access is available at an additional charge.

EXHIBITORS

- A.K.O. Inc, Torque Specialties Division
- A2LA - American Association for Laboratory Accreditation
- ABTech Inc.
- AccuMac Corporation
- Additel Corporation
- Agilent Technologies
- Ametek Test & Calibration Instruments
- Andeen-Hagerling, Inc.
- ANSI-ASQ National Accreditation Board/ACLSAS
- ASQ-MQD
- AssetSmart
- ATS Metrology
- Bionetics Corporation; Newark Metrology Ops
- Bruel & Kjaer North America Inc.
- Cal Lab Solutions
- Calibrate, Inc.
- Consumers Energy Laboratory Services
- Dallas CVD
- Data Proof
- E + E Elektronik
- Esco Calibration Laboratory
- Exelon Powerlabs
- Flexium Americas Corporation
- Fluke Calibration

Exhibition Hall July 27 — July 30

- Fowler Precision Tools
- GE Measurement and Control Solutions
- Guildline Instruments Limited
- Heusser Neweigh
- IEEE I&M
- Interface, Inc.
- International Accreditation Service (IAS)
- Isotech
- JM Test Systems
- King Nutronics Corporation
- Lockheed Martin MST
- Lockheed Martin Technical Operations
- Mahr Federal
- Measurement Science Conference
- Measurements International
- Meatstat, s.r.o.
- Mentor Corporation
- Mettler Toledo
- Mitutoyo America Corporation
- Morehouse Instrument Company
- National Metrology Institute of Japan, AIST (NML/AIST)
- National Research Council Canada
- National Voluntary Laboratory Accreditation Program (NVLAP)
- NCSL International
- NIST - Physical Measurement Laboratory
- Northrop Grumman Corporation
- NRD Advanced Static Control
- OHM-Labs, Inc.
- Pond Engineering Laboratories
- Pratt & Whitney Measurement Systems, Inc.
- Precision Environments Quality Digest
- Quality Magazine
- Radian Research
- Ralston Instruments
- RH Systems
- Rice Lake Weighing /Condec
- Sartorius
- SIMCO Electronics
- Tektronix
- The Boeing Company
- The Modal Shop
- Thunder Scientific Corporation
- Tovey Engineering
- Transcat, Inc.
- Transmille Calibration
- Trescal
- Vaisala Inc.
- Vibration Research Corporation
- Western Environmental Corporation
- WorkPlace Training

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Enjoy entertainment by The Smokin’ Torpedoes at Banquet Night.
Del’s legacy will live on as it will continue to influence organizations and individuals across the metrology community worldwide.

DEl CALDWELL
1937-2013
It is with deep sadness to inform you that we have lost a brother, father figure, mentor, and a great colleague in the metrology community, Mr. Del Caldwell. Del passed away on September 25, 2013. Del meant so much, to so many of us.

Del was born on December 5, 1937 in Caldwell, Idaho. His father was Harold B. Caldwell and his mother was Violet Shaver Caldwell. Del lived in Idaho and California. Growing up, he helped care for his family doing a variety of jobs, from picking beans in the fields to working in his father’s real estate office. He graduated from high school in Chula Vista and remained thereafter in California.

Del learned how to play the guitar from his uncle Gene Shaver and often played together at family gatherings. This love for music led him to play in a jazz band called “The Blue Notes.” He also had a love of photography, which his uncle Elwood Shaver helped develop. Del met his wife Beverly by a mutual friend. Two months later, on October 17, 1958, they were married. Del and Beverly moved from Chula Vista to Claremont, California in the early 1960s where they raised their two daughters, Alane and Christine. Del remained in the family home even after losing his wife Beverly in 2007.

In the 1970s Del taught pottery and built his own studio and kiln in the backyard. He produced the dinnerware the family used

One of Del’s passions was volunteering and serving as an NCSLI Board member and then as NCSLI President in 1989.

Contributions by Jerry Hayes, Ryan Fischer and many others
Del "pallet painted" and his artwork is still hanging in his daughter’s home. Del has passed on his love of nature, art, photography and music, as well as his love for detail to his children, grandchildren and friends. Del was a meticulous and detailed man in all parts of his life, characteristics that both served him well in his distinguished career. He meant a lot to so many people, both in his personal life and in his work for the Navy.

Del started his career as a bench technician at the Naval Aircraft Rework Station, Coronado, California, with aircraft system measuring and test equipment. After a brief stint with Metron Corporation as an instructor in electronic fundamentals and calibration techniques for Navy technicians, he joined the Navy’s Metrology Engineering Center (MEC), Pomona, California, as an engineer developing microwave primary and secondary standards and creating unique calibration methods. He became MEC’s research and development leader working extensively with engineers and scientists at the National Bureau of Standards in Boulder, Colorado and Gaithersburg, Maryland.

Finally, Jerry Hayes was able to convince Del to become a manager in the Navy Metrology Engineering Center (MEC), developing calibration procedures and calibration intervals, and acting as a liaison with various Navy and Marine Corps customers, including procurement over his career numerous papers were authored providing significant insight to dealing with complex technical and program management issues.
and engineering of calibration systems. Jerry Hayes, Stan Crandon, Del and many other dedicated MEC engineers and staff were responsible for the Navy Calibration Program which was created in the late 1950s. It encompassed all elements of the Navy, including the Marine Corps.

During this time of increasing technology complexity, precision and computerization, MEC was understaffed and had their hands full, especially when the nation responded to the Soviet Union’s Sputnik launch. That required support of increasingly difficult measurements of all known phenomenon being required by the Navy and its contractors. As it became obvious that Del was very competent and creative, Del proved to be of great value to a broader segment of the Navy calibration program and became involved in management, national requirement standards and policy development.

One of Del’s passions was volunteering, and he served as an NCSLI Board member and then as NCSLI President in 1989. He was instrumental in developing and publishing our organization’s first long-range plan, which provided a model for all future plans. During his term of office, several innovative products were produced for the benefit of NCSLI members, a focus of his “administration.”

After Del retired he became a consultant, working on many technical projects with Jerry Hayes. Together they helped develop new concepts for the Navy’s Measurement

“I have enjoyed knowing Del since the 1970s, not only through his NCSLI efforts, but also during my 28 years working within the U. S. Navy Calibration Program where Del was one of the top level managers. God rest your soul, Del.”

- Mike Suraci
Science Department at Corona, California, which was MEC’s successor organization. Del was an invaluable mentor to upper management and working engineers. Del developed several engineering documents, policy papers and requirement standards that would revolutionize the operation of calibration facilities, Navy, NASA, DoD, and hundreds of companies and contractors. Upon retirement, Del was honored with the “Navy Distinguished Civilian Service Award,” one of the Navy’s highest awards given to civilian employees. He retired as an electronic engineer with the Navy at the Naval Surface Weapons Station, Corona where he served with great distinction in critical positions.

During his career, numerous papers were authored, providing significant insight to dealing with complex technical and program management issues. Several of these papers were presented at annual NCSLI Conferences and Measurement Science Conference (MSC) meetings. During the past 25 years. In his humble and respectful way, Del became recognized by hundreds of colleagues for his brilliance in developing guidance documents and national requirement standards in the field of metrology.

Documentary standards were a passion for Del as he served in the development of ANSI/NCSL Z540.1 “Calibration Laboratories and Measuring and Test Equipment General Requirements,” coauthoring the effort with NCSLI President, Gary Davidson. Del was active in furthering the efforts to harmonize ANSI/NCSL Z540.1 with ISO/IEC 17025 and ISO 10012, working on the fine details to properly analyze the documents, providing documentation to aid in the interpretation of the two ISO documents and their relation to ANSI/NCSL Z540.1. He continued to participate in NCSLI committee efforts to develop draft standard ISO/IEC 17025 (1997–1999) and with the working group to rewrite ISO 10012 (1999-2003).

As chair of the Z540 working group, Del was the principal author who coordinated a committee and developed the ANSI/NCSL Z540.3 standard (released in 2006) to replace the ANSI/NCSL Z540.1 (part II) standard, following up by serving as the facilitator of an NCSLI Recommended Practice (RP) guide dealing with the performance of

“Del remained an active contributor to the metrology community. As recently as September 2013, he provided six pages of valuable comments for the recently drafted NCSLI RP-18 on measurement decision risk. Though Del sought technical and editorial accuracy, his feedback livened things up with bits like “Come on Howard . . .” “Sorry, I just can’t see how . . .” and “Those were such cool and fun times.” We will miss him.

- Mark Kuster
assessments involving both ISO/IEC 17025 and ANSI/NCSL Z540.3. Upon completion of the ANSI/NCSL Z540.3 standard, he led the extensive effort to develop the ANSI/NCSL Z540.3 “Handbook.” Del was also instrumental in assisting in the writing of RP-21, “Assessment for the Requirements of ANSI/NCSL Z540.3 sub-clause 5.3.”

To conclude, Del contributed greatly to the science of measurement and made a difference in the lives of many people. He will be profoundly missed.

“Del has become recognized by more than a hundred individuals and companies that respect his brilliance in developing and leading in a respectful and humble way the preparation and release of numerous guidance documents and national requirements standards in the field of metrology. To say he will be missed is a gross understatement. His legacy will live on as it will continue to influence organizations and individuals across this nation as well as other countries. We have been so very fortunate to have had him with us as a friend, colleague, and loved one. He was a humble, patient, devoted servant to us all. Farewell friend... thanks for everything... until we meet again.”

- Jerry Hayes
Greetings again, friends and colleagues. We hope you track our thoughts on the Measurement Information Infrastructure. The last installment began sketching a high-level data model for instrument specifications, based on the idea that we would like our software to know every important thing about candidate instruments in order to help us select the most appropriate one, calibrate it, and use it. We started at the measuring system level and worked our way down through measuring instruments and measuring functions to measurement ranges. Our loose data model has holes to patch throughout, but for now let’s home in on the measurement range where the most interesting things happen.

Bones to Pick
We left off last time with the skeleton range model

Measuring Range
- Range Identifier
- Nominal Indication Interval
- Indication Interval
- Measuring Interval
- Other Range Properties

Recall that the VIM\(^1\), which we reference to build our model, uses “interval” to mean a range between two values. For one particular instrument, the actual data in text form might look like

- Range ID XXXXXXXX
- ± (0 mV to 200 mV)
- ± (0.0 mV to 199.9 mV)
- ± (10.0 mV to 199.9 mV)
- More data...

We often describe the range by its nominal indication interval, but it also has an actual indication interval that more exactly delineates the indications it may produce and a measuring interval that further refines the indications to which the specifications apply. The indication interval would interest us in a purchase decision, whereas the measuring interval would dominate the instrument’s use as test equipment or a measurement standard.

Many instruments have multidimensional ranges. For instance, an impedance meter’s inductance measurement function might have a 0 mH to 100 mH primary nominal range, with additional qualifying ranges such as test signal frequency, impedance magnitude, quality factor, test cable length, ambient temperature, etc. Each qualifying range would include nominal, indication, and measuring intervals. The specifications apply when all influence and input quantities lie within their measuring intervals.

For single-valued artifacts (VIM: material measures), the intervals collapse to single values. So, for example, we would store 1 kg to

\(^{1}\) International Vocabulary of Metrology, Edition 3, 2012
1 kg in the nominal indication interval to define a nominally 1 kg mass. The indication interval might correspond to its accuracy class, say, 0.999 997 5 kg to 1.000 002 5 kg for ASTM Class 1 and the measuring interval might store its assigned quantity value, say, 1.000 001 13 kg, as both endpoints.

Some properties we would likely calculate from others. For example, the VIM’s range of the nominal indication interval (nominal span) comes to 200 mV - (-200 mV) = 400 mV; similarly, the indication range equals 398.8 mV. The specifications apply to the two (negative and positive indication) spans computed from the measuring interval, both 189.9 mV.

What other range properties might we want? Quite a few actually. The VIM mentions resolution, sensitivity, selectivity, discrimination threshold, dead band, detection limit, stability, drift, variation due to influence quantities, and step response time. Inexperienced users often highly prize one or more of the preceding properties when selecting a measuring instrument. Though important, we will postpone addressing those properties to a future article and first emphasize measurement accuracy and uncertainty, probably the most critical data after measuring interval.

**Accuracy Anyone?**

We hope everyone would want to know the instrument’s “accuracy.” For strict computation though, we avoid that term because the VIM defines measurement accuracy as a general “closeness of agreement” concept without any quantified value. So instead, we speak of MPE, something we will put a number (and unit) to.

For comparisons and conformance tests, we would like to compute the instrument’s MPE on demand for any legitimate measurement. As we mentioned last time, the community has long since established straightforward methods to do so.

Most instruments specify MPE via one or more of the following simple formats: \( \pm a \), \( \pm b \text{ LSD}' \), \( \pm c \text{ of full scale}' \), \( \pm d \text{ of stimulus}' \). A data element collection such as the following would handle those MPE formats: Floor, Digits, Counts, FS, pFS, pStimulus. For example, we would store the MPE

\[
\pm (0.01 \text{ % of stimulus} + 1 \mu\text{V} + 1 \text{ LSD})
\]

as pStimulus = 0.01 %, Floor = 1 μV, Counts = 1. Once entered in a database, software may easily calculate MPE for any indication on any such instrument range. Occasionally the manufacturer defines full scale or range differently; for example, the indication interval may go up to 1.2 units, but for purposes of specifying MPE, the manufacturer defines full scale as 1.0 unit. Therefore, each range might have a separate data element for the full scale value.

The above scheme only handles straight-line specifications and piecewise combinations thereof. For human digestion, manufacturers almost always simplify their specifications to fit that format, drawing straight lines over the tighter, but unruly, specifications...
that engineering analysis and type testing discover. If we incorporate algorithms in the MII to handle more complex specifications, that would allow manufacturers more freedom to specify closer to actual performance. Furthermore, many instrument specifications do not fit such a rigid structure, either outright, or due to modifiers in the footnotes. Temperature and other influence quantities may either restrict the specification to some range of the influence quantity or alter the MPE directly as a function of the influence quantity. So, consider the following more versatile model:

**MPE**
- Specification Interval
- Quantity Function
- Condition Equation 1
- Condition Equation 2,
  - Condition Equation 3
- Calculation Script
- Renderer

**Quantity Definition**
- Quantity Symbol
- Default Value

A range might well have multiple MPE specifications, one for each Specification Interval, the calibration interval over which the manufacturer guarantees the MPE. We therefore include that data element here.

The quantity function would define the relationship between the MPE and the range’s influence and input quantities as an equation. For the example above, the electronic specification file would contain a function similar to

$$MPE = 0.01\% V_m + 1\mu V + 1 r,$$

where $V_m$ and $r$ represent the input voltage measurand and range resolution, respectively. Each measuring interval would have an associated quantity definition to link the instrument’s input and influence quantity values to their respective variables in the MPE function. Thus, an equation interpreter replaces the inflexible hard-coded calculator and simple database fields. The interpreter evaluates the MPE equation based on the variable values, with default values for any quantity value not otherwise supplied. This model supports any specification a mathematical function will represent. By defining the measurement error $\varepsilon$, or referencing the measurand symbol, an equation format also naturally supports asymmetric, e.g., $+4\mu m$, $-6\mu m$, and one-sided specifications, e.g., $> 1 M\Omega$:

$$-6 \mu m \leq \varepsilon \leq 4 \mu m$$

$$R > 1 M\Omega$$

The optional condition equations would supplement the primary, influence, and input quantity measuring intervals for more complex conditions involving combinations of quantities, such as frequency-amplitude restrictions on calibrator outputs. Such a combined condition might take the form $V f \leq 100 V MHz$, where the primary (voltage) and secondary (frequency) measuring intervals assign the variables $V$ and $f$, respectively.

As an alternative to the equation interpreter, MPE equation, and condition equations, a general purpose scripting language with a parameter interface to the quantity values and access to the other specification data would also fit the bill. The script attached to each set of measuring ranges would provide unlimited flexibility for electronic specifications. Scripting languages abound and typically run on many platforms. Python, for example, a free open-source language designed with mathematics in mind, runs under Unix, Linux, Mac OS, Windows, OS/2, Solaris, Android, iOS, and many others. Deploying scripted spec sheets, however, will require security protocols to guard against malicious code.

Whether MII spec sheets use the equation interpreter or scripting option, a Renderer object would provide the information MII software would use to render the specification for human consumption according to an OEM’s- or user-designated template. The spec sheet will include the OEM version, in a pdf, html, or other universal format, at the measuring system level. That grafts a few more bones to our framework. As mentioned in the last installment, some software already exists along these lines; we only lack the extensions discussed here and a standard data model for exchanging and sharing the specification files between metrology systems. The Mudcats™ SpecTrack module allows the user to define input parameters, intermediate variables and a script-like variable assignment sequence. That strategy provides powerful calculated specifications, but as of yet has no standardized or shared data format. Currently, SpecTrack scripts also lack access to some specification data the script author might want to use. SpecTrack will also generate human-readable files but requires third party software to change the format.

**Uncertain Specifications**

We have not yet considered instrumental measurement uncertainty, something quite different from MPE. Below the NMI level, many laboratories derive measurement uncertainty estimates for instruments they use as measurement standards from the MPE. Many practitioners, especially outside the United States, avoid this practice, due perhaps to the VIM’s traceability definition, and maybe because the derivation involves a bit of black magic. Though manufacturers consider measurement uncertainties when setting specifications, the warranted MPE represents a legal contract between the vendor and buyer and confidence proportional to the manufacturer’s reputability that the instrument will perform accordingly. In other words, the specs typically bury uncertainty under prudence.

Though we may choose to take the MPE as a coverage interval, an instrument owner rarely has the MPE’s corresponding coverage probability or probability distribution for the specific instrument at hand and therefore makes somewhat arbitrary and typically conservative assignments. The GUM certainly allows estimates in the uncertainty evaluation process, but we would like more rigorous information. Overestimated uncertainties incur higher expenditures for equipment and maintenance plus lost marketplace opportunities. Underestimated uncertainties (based on imprudent manufacturers’ specifications) increase the risk of consequence costs. Either way, we lose value.

* Original Equipment Manufacturer
The calibration process assigns uncertainties to a given measuring system, so our specification data model will not likely include assigned uncertainty elements; the calibration certificate would carry that responsibility. However, to propagate uncertainties through a measuring system, we would like the spec sheet to include the system’s parameterized measurement model, a quantity equation relating the system indications to measurement results based on calibration corrections. The VIM’s calibration definition sheds some light here:

**Measurement Model**
- Quantity Function
- Auxiliary Variable Definitions
- Parameter Definitions
- Standard Modeling Uncertainty
- Calculation Script

A typical linear range model’s quantity function would appear like

\[ q = g \cdot l + o, \]

showing a measurement result or output quantity \( q \) equal to an indication multiplied by a gain factor \( g \), nominally \( g = 1 \), plus an offset \( o \), nominally \( o = 0 \) unit. Calibration would estimate the actual parameter values for \( g \) and \( o \).

Again, as with the MPE equation, the MII spec sheet might use an equation for a mathematics-aware interpreter, a script, or both, with hooks to each measuring interval’s defined quantity variables. The designer might include Auxiliary Variable Definitions for intermediate computed quantities of interest. Parameter Definitions define the model quantities subject to calibration and would include nominal values for the model’s designed performance, i.e., for zero measurement error. Finally, the manufacturer or another entity would supply the standard modeling uncertainty determined by type testing, a typical residual or other uncertainty component that quantifies the model’s variance from reality.

**Modeling Example**
To harden things a bit, let’s examine a simplified model for an arbitrary length standard.

**Example Model Data**
- \( l_0 \) = \( l + \delta l \)
- \( q = (1 + \alpha(T - T_o))l_o \)
- Auxiliary Variable Definitions
  - Certified Length, \( l_o \), 25 mm
- Parameter Definitions
  - Certified Length Deviation, \( \delta l \), 0 mm
  - Certification Temperature, \( T_o \), 20 °C
  - Linear Coefficient of Thermal Expansion, \( \alpha \), 13 µm/(m K)
- 500 nm

Examining the data item by item, we first assume that the spec sheet defined a nominal length indication interval 25 mm to 25 mm, having the assigned symbol \( l \) and an appropriate influence quantity measuring interval with symbol \( T \) (mean instrument temperature). The quantity function produces a length measurement result \( q \) given the indication, temperature, and model parameter values. The quantity function has two parts in order to make available a defined auxiliary variable, the certified length. The parameter definitions list the remaining quantities and their nominal values, all subject to variation and untraceable without calibration: length deviation from nominal, certification temperature, and expansion coefficient. The 500 nm modeling uncertainty (within the defined measuring intervals) accounts for ignoring nonlinear expansion, contact force and geometry, oxidation and handling over the specification interval, and other modeling deficiencies.

**Dependents**
We have implied that each measurement range includes its own measurement model. Some instruments may follow that arrangement: those with entirely independent measurement functions and ranges. However, in the family of ranges, functions, and instruments comprising a system, some measurements will often depend on others and therefore we should account for the uncertainty deductions and penalties arising from those correlations. The measurement model would then default to the system level, as a vector equation or set of scalar equations, to capture all the interactions. For example, a DMM’s resistance and voltage measurement accuracy may influence its electrical current accuracy. A hygrometer’s ambient temperature accuracy likely affects its relative humidity accuracy. Therefore, the specification model should allow measurement models at any level. If a range lacks a model,
the function model will define the range behavior, if a function lacks a model, it will use the instrument model, and so on.

**Home on the Range**

In summary, we now have the following preliminary draft specification model at the measurement range level:

**Measuring Range**
- Range Identifier
- Full Scale Value
- Other Range Properties
- Indication
  - Nominal Indication Interval
  - Indication Interval
  - Measuring Interval
  - Quantity Symbol
  - Default Indication Value
- Influence or Input Quantity 1
  - Nominal Indication Interval
  - Indication Interval
  - Measuring Interval
  - Quantity Symbol
  - Default Quantity Value
- Influence or Input Quantity 2
- Influence or Input Quantity \( N_q \)
- MPE 1
- MPE 2
- MPE \( N_q \)
- Range Measurement Model
  - Quantity Function
  - Auxiliary Variable Definitions
  - Parameter Definitions
  - Standard Modeling Uncertainty
  - Calculation Script

All that for just one measurement range! Of course, with the right software, computers count that much data as child’s play. To maintain our focus and motivation for all this work, let’s consider the benefits from an MII-aware process flow involving specifications.

1. Manufacturers create MII spec sheets for their instruments.
2. Instrument vendors post the MII spec sheets on their web sites.
3. You have a new measurement application and enter your measurement range and MPE requirements into your MII lab management software.

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4. Your software locates all vendors hosting MII specifications, reads their spec sheets and lists the vendors and instruments matching your criteria.

5. Your software also searches MII-compatible accreditation scopes and locates calibration service vendors accredited to calibrate the instruments.

6. You select an instrument, vendor, and lab.

7. The first time the lab calibrated the model you chose, they downloaded the MII spec sheet. The lab’s MII-aware calibration software analyzed the spec sheet, selected the optimum test points using the MII measurement model to predict uncertainty and risk throughout the measurement space, created an automated calibration procedure, and set the MPE for each test point.

8. In fact, the lab previously downloaded MII spec sheets for its own instruments to lower costs, and used the modeling features to tighten up its uncertainty estimates and accreditation scopes, thus capturing your business.

9. When the lab calibrates your instrument, its MII lab management software creates an MII calibration certificate that includes certified parameter values for the instrument measurement model.

10. Your software receives the calibration certificate, combines the spec sheet measurement model with the certified parameter values and propagates the resulting instrumental measurement uncertainties to uncertainty analyses in your calibration workload that use your new measurement standard.

11. If you use the instrument for product testing, your MII testing software uses the spec sheet and certificate to correct for instrument bias, estimate false accept and reject risk on your production line, calculate measurement reliability, and determine when to return the instrument for recalibration.

12. You admire the clear skies and watch the data roam …or finally accomplish some creative work that computers won’t do.

**Sing Along, Please**

We have begun to frame in our first MII communication vehicle, instrument specifications. When complete, the specification model will outline how an MII spec sheet might work, subject to community input and standardization agreements. We still have “other properties” to specify at all levels, including a gaping hole (automation commands), so we will flesh out more details next time.

Meanwhile, we fast approach the 2014 Measurement Science Conference in Long Beach, CA. As with many conferences these days, its theme, “Achieving Competitive Advantage through Measurement Innovation,” coincidentally speaks to our MII goals. If you attend the seminars, tutorials, conference sessions, or committee meetings, keep the MII in mind and consider how what we explore now may seed new capabilities and efficiencies down the road.

A couple MII-related software developments also come to mind. ATS Metrology recently offered third-party support services for Edison ESI’s Mudcats™ with an eye toward a long-term migration to a new product. Hopefully the measurement community has an opportunity there to see some MII concepts implemented in the future. New software functionality often has long lead times, so whether you use Mudcats™, IndySoft’s Management Software, Fluke’s MET/TEAM™, ATS’s METBENCH, or another product, begin asking your vendor about MII features now.

In the second development, along a parallel line, Mike Schwartz presented the Metrology Services Bus™ concept from Cal Lab Solutions at the August NCSLI New England Region Meeting. Mike proposes a modular software solution architecture to flexibly integrate metrology systems. In the process, Cal Lab Solutions develops APIs for communicating metrology information between computers. If our industry standardizes such communication protocols, then everyone may adapt their software to them, taking us far down the MII road.

As always, we welcome your MII-related news, thoughts, ideas, and feedback. Until next time.

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7 Application Programming Interfaces
My name is Lucas Layher. I am an intern at Consumers Energy Laboratory Services and will be a senior at Northwest High School in Jackson, Michigan, in the upcoming 2013-2014 school year. From childhood, my parents have always instilled in me the importance of the work that I do; it’s a representation of the kind of person I am. “Never call something finished unless you’d be proud to put your name on it” is a phrase that my father has always emphasized to me. Those words have reverberated through my being and have helped me to become a very driven individual. It is for this reason that I do well in school and am constantly striving to improve. When I was informed Consumers Energy would offer the chance to apply for an internship through the “OPTIONS Program,” a high school outreach initiative allowing students, like me, to get real world experience in a legitimate business setting, I was committed to getting the position. After going through multiple interviews and expressing my love for engineering, I was selected for a summer position.

Early in the program, one of my supervisors, Robert (Bob) Sawyer gave me and a fellow OPTIONS intern, Brock Wowianko, a project. He proposed that we create a poster on the traceability of a unit of measurement to the international system of units (SI). The ultimate goal of this project was to create a deliverable that could be printed and distributed to any interested parties. The idea of being officially published was enticing. The topic and how we displayed the information was our choice. We had free reign to make this project our own. From there, the journey began.

It’s hard to understand the true scope of a project until you really start working on it. Take making a poster for example; you plug some key words in a search engine, come up with a design, find a picture or two, and congratulations, your project is finished! Sounds simple enough, right? Where did the picture come from? Do you actually own the said picture, or did you just find it on the internet? Is there any way to contact the owner of the image? Do they even own the picture, or did they just copy and paste it too? What about the facts; are they all up to date, or was the article you got them from written back in 1998? One publication presents the data one way, but another contradicts it; which one is correct? Are you even allowed access to resources that contain the information, or are they locked up in the membership only area? What is the origin of your resources? Are you sure you recorded them all, or were there a few you missed? These are some of the issues that related directly to the project at hand. Suddenly, our simple poster project had turned into a challenge for which we were required to have every answer.
After some contemplation and guidance from Bob, we decided that we would collaborate on the poster, using the “second” as our subject unit. Time is a constant in our everyday lives. We structure every aspect of our day to fit into a designated time slot. Take, for example, an average work day. You get up at a specific time so that you are able to go through your morning routine. You know exactly when you need to leave the house so that you are not late. Once you arrive, your daily time schedule dictates when something must be finished, what time you have to be at a meeting, when lunch is, and when you can leave. It is for these reasons that we chose time as our topic; it is something so crucial in our everyday lives, but even so, it is taken for granted. When you look at the time while sitting at your desk, you rarely question whether it is correct; you take it as law and you continue on with your day. How do you know, though, that every time the second hand moves, that is exactly one second? If someone would have proposed that idea before this project, I would not have known how to respond; it was a question that I had never considered before. We mold our day to fit around what the clock says, but who is to say the displayed time is correct?

We had been given a few resources to look into, as well as a professional contact, James (Smitty) Smith, with The Boeing Company, who would be helping to guide us, but the bulk of the research was ours to do. As we undertook our project, finding data was simple. After a few days, we had accumulated a fair amount of information.

Bob suggested I also speak with Jeff Guigue, one of the metrologists in the calibrations lab, about our own accuracy with time. Jeff showed me a device called a Timometer, which is a highly accurate time standard with traceability to the System International (SI). This lesson helped me to develop the hierarchy of time standards on the poster as well as get a better understanding of how time stays so uniform throughout all devices. Bob also put us in contact with Michael Lombardi, who works in the time and frequency division of the National Institute of Standards and Technology (NIST). Mike was very kind and more than happy to help us with our cause. I sent him what we had drafted and he quickly responded with corrections and updates.

The information was now correct, we had a decent design developed for the poster, but there was still something missing. The summer internship program was coming to an end, and regrettably a finished product was never produced, and no posters were ever made. Our first legitimate project had failed. Bob remained positive; I was not so okay with it though. In my mind, I had let Bob and everyone else down.

Time moved on. High school started back up, marching band and cross country seasons began, and before I knew it, my junior year was in full swing. Fall flew by with winter and spring right on its heels. Before I knew it, summer was approaching once again. I scored better than I had hoped on the ACT and state calculus test, and was able to enjoy many of the perks of being an upper classman, and I even maintained my 4.0 GPA. About a month before school ended, one of the women in charge of the OPTIONS program contacted me and informed me that Brock and I were invited back to work in the Consumers Energy lab over the summer. I was elated, and of course I told her that I could not wait to return. Two weeks after school ended, I was walking through the halls of Consumers Energy once again.

We were immediately put right back to work. Both the metallurgical department and calibrations lab had copious amounts of work for us to do and we took full advantage of it. Bob then emailed me and expressed interest in reviving the poster project. He wanted to give each of us our own projects to work on this year, and due to the amount of work I had put into the poster project the summer before, he handed the reigns over to me. Bob gave me a list of people to set up a conference call to help me move forward.

One of the people on the list was Jim Kaylor, an expert in marketing at Agilent Technologies in Colorado. Mr. Kaylor asked if we might want to transform the project into an article, highlighting the poster-making process. The chart was interesting and informative on its own, and with a few changes, it could easily be distributed. However, getting to read about the creation of such a project, especially first hand from a high school student who was still learning the ropes of the professional world, could be a very intriguing read. Bob and I both loved the idea. I was then told to contact Linda Stone, the editor of Metrologist magazine. Bob had already spoken with her briefly about it, but we were all in agreement that I should be the one to contact her.
I called Linda and she was aware of my situation. She clearly explained what I would need to do to turn the poster project into a published article, and her directions put me at ease.

Going into this project, I had no idea of the commitment it would entail. I assumed that making a single poster for work was no different from the countless projects I had done in my schooling, but I was definitely wrong. Even with such a simple concept, it was crucial to look at every angle in order to make a complete product for which I would be proud. After the events of the first summer, I was sure to delegate specific times each day to my project, as well as send updates to all involved parties. Communication is a vital skill! The way that I presented myself was the way that others viewed me. My phone skills still need some work, but I am more prepared than I ever would have been without this project. I experienced some embarrassing situations, but those were good experiences for me to have. Occasionally, you learn that those failures are substantially more useful than the success ever could have been.

I keep in mind the wise words of Robert Sawyer when I think of this lesson. He sent me this response after I talked about my failure of the first summer. “Remember you didn’t fail in my eyes; the project was a major success. You learned a lot in the process. Developing a product was a bonus. The adventure, lessons learned and the networking skills that you developed during your internship will give you the confidence that will support your future endeavors.” Thinking back, he was absolutely right. Without realizing it, I learned an immense amount about how to conduct myself and find information in the real world. I thought that I was just making a poster, but it ended up meaning so much more. And now, as I cross the finish line at the end of the trip through time, it is a special feeling to see my labor finally come to fruition.
The AIAG Quality Summit was held on September 16-17, 2013 at the Laurel Manor Banquet and Conference Center in Livonia, Michigan. This two day Quality Summit provides a learning opportunity for automotive OEM’S and suppliers from all tiers to gather insight from industry leaders on emerging risks and issues facing the automotive industry.

NCSLI volunteers provided training and exhibited at the event. AIAG was established in 1982 as a nonprofit association where professionals from a diverse group of stakeholders including retailers, suppliers, automakers, manufactures, service providers, academia, and government, work collaboratively to standardize processes.

SUMMIT HIGHLIGHTS

- **Keynote speaker Michael Hardie**, Director of Global Quality Strategy for General Motors, is responsible for developing the company’s quality strategy. Michael brought a wealth of experience in QMS and process improvement to the company’s goals of improving initial quality, long term durability, and product excellence.

- **Author and customer strategist Robin Lawton** shared his award winning presentation “Mind and Voice of the Customer: Uncover, Translate and Deliver What Customers Want.” Robin Lawton conducted a workshop on “Achieving 8 Dimensions of Excellence: Aligning Strategy, Measures & Service with Customer Priorities.” This session offered a pragmatic approach that strengthened your ability to achieve strategic outcomes that customers will notice and employees will deploy with enthusiasm.

- **A Measurement and Metrology Track**, explained how to select the right measuring device, how to properly calculate measurement uncertainty, how to select and audit a calibration supplier, gage R&R, and the fundamentals of the AIAG MSA Manual.

- **A Sub-Tier Supplier Development Track**, addressed the strategies, processes, and tools to strengthen the preventive quality focus through all levels of your supply chain.

- **ISO/TS16949** updates were provided by Chrysler, Ford, and General Motors.

**THE FOLLOWING NCSLI VOLUNTEERS SUPPORTED THE MEASUREMENT AND METROLOGY TRACK AND THE ASSOCIATED TRAINING EVENTS:**

- **Basics of Measurement Uncertainty**
  
  Steve Stahley, Cummins, Inc.

- **How to Read a Calibration Certificate**

  Dilip Shah, E=mc3 Solutions

- **How to Select a Calibration Supplier**

  Dilip Shah, E=mc3 Solutions

- **Fundamentals of AIAG’s Manual**

  Mike Down, AIAG

- **Calibration Services Buyers Beware**

  Phil Smith, A2LA

- **Basic Metrology / Measurement Literacy**

  Tim Osborne, Trescal and Bob Sawyer, Consumers Energy

- **Gage R & R**

  Steve Stahley, Cummins, Inc.

**Thank you** NCSLI volunteers!
During the 2013 Workshop & Symposium in Nashville, Tennessee our committee held three meetings. The first meeting was Monday evening for the Josephson Voltage System (JVS) Inter-Laboratory Comparison (ILC) Committee. Ten people attended to discuss the plans for the 2014 ILC. Jim Novak of Sandia and Yi-hua Tang from NIST led the discussions, most of which centered on determining which lab would pivot the ILC and which lab might provide the system to be used for the comparison. No final decisions were made because interested parties wanted time to discuss with their management before committing resources. Due to budget constraints, a number of labs that routinely participate in this ILC were not present. Dr. Tang stated that he would ensure that the labs not represented at the meeting were contacted regarding plans and would confirm their participation in the 2014 ILC.

The Measurement Comparison Program Committee met on Wednesday evening. Nineteen people attended the meeting representing government and industry labs from North America and Brazil. After introductions, Mike Cadenhead shared that the revision to RP-15 had been approved and released earlier in 2013. Mike then expressed the need to continue improving RP-15 to ensure that ILCs planned and executed using those guidelines would truly test a lab’s capabilities for a given parameter and also be acceptable to accrediting bodies. Mike also discussed the continuing development of committee operating guidelines for NCSLI sponsorship of ILC. The group then shared information on recently completed ILCs as well as information on in-progress and future comparisons.

Mike mentioned that the 2014 JVS ILC is still in-planning and that participant labs would be kept apprised of the final plans. Mike also mentioned the possibility of an ILC among users of the QHR or Quantum Hall Resistance Standard. He explains that one of the draw-backs is the small number of QHR owners. Marlin Kraft from NIST explained that he is still working towards an ILC among the DOD-QHR labs with plans to expand that into industry labs sometime in the future. Bart Schrijver from Agilent Technologies stated that he is still willing to lead ILCs using 8478B or 8485A power sensors and possibly other artifacts. Bart attempted to garner interest during the 2012 NCSLI Workshop & Symposium in National Harbor, Maryland but was unable to effectively communicate the plan. Mike said he would, with the help of NCSLI office staff, ensure NCSLI member labs with RF capabilities are notified once Bart provides a brief synopsis of the protocol. Joe Petersen of Abbott labs mentioned the possibility of reenergizing the effort for a Conductivity ILC if enough testing labs are interested. This was attempted years ago without success. Before proceeding with sponsoring the ILC, Joe wants to ensure the resources are still available.

Immediately following the Measurement Comparison Program meeting, the committee chair turned the floor over to Kai Wandler of NRC to provide an update on the North American 1 Ohm ILC now identified as sub-committee 132-5. Kai, along with Sylvain Berube, Hydro Quebec (CLAS), provided details on the scheduling and slight delays encountered. Canadian labs have completed their round and the artifact is now making its way through the US labs. The artifacts have been travelling well and seem stable. They expressed the importance of participant labs staying on schedule with measurements as well as reporting data. Throughout the ILC, NRC’s role has been as a mentor while Hydro Quebec’s role is collecting and analyzing data. Sylvain explained that quite a few North American labs wanted to participate in this ILC but they had to limit the number due to scheduling and logistical concerns. To eventually include those labs, he hopes that a high-level lab participating in the current ILC would volunteer to run a future ILC. He suggested that at least three of the labs participating in this ILC should also be in the next one along with the first-time participants to provide a strong link between the two ILCs.

After Kai and Sylvain’s presentation and before closing the meeting, Mike Cadenhead mentioned that the NCSLI Industrial Programs group had indicated interest in working more closely with the Measurement Comparison Programs Committee to develop and run comparison schemes. They are very active now but would like to do those more in concert with this committee. Mike said he would meet with Robert Sawyer, NCSLI Industrial Programs VP to discuss further.

mike.cadenhead.ctr@afmetcal.af.mil
The NCSLI Central Indiana Section fall meeting was held on October 24, 2013 at Eli Lilly and Company in Indianapolis Indiana. A total of 32 participants were in attendance. The theme of the meeting was “Walking in The Customers’ Shoes.” The weather outside was frightful with our first taste of winter including rain, sleet and a few snowflakes. Fortunately, the roads were clear and everyone arrived on time.

Our first speaker was Jay Bucher, Butcherview Metrology Services. His presentation was “Finally – Just the Facts” Exposing the lies, misnomers, and myths about traceable calibrations that meet ISO and FDA requirements within the biotech, pharmaceutical, and medical device industries. Jay could not be at our meeting in person so he made his presentation via the Internet. After a few adjustments on our side, his presentation worked well.

Jay’s learning objectives were: what do the standards and regulations say, the true meaning of calibration and traceability, debunking myths, the five parts of a quality calibration program, and calibration certificates and calibration records.

The second speaker was Lloyd Baker of Trescal and the NCSLI Mid-Western US Region Coordinator. Lloyd presented “Updates from the NCSLI Board of Directors.” Lloyd discussed how the board supports the regions, regions support local sections and local sections support calibration members. Lloyd announced information about the upcoming Technical Exchange in Raleigh, North Carolina and the NCSLI upcoming Workshop & Symposium in Orlando, Florida scheduled for July 28 - 31, 2014.

Our third speaker was Dilip shah, President, E=mc2 Solutions. His presentation was titled “Statistics from the Customer’s View.” Learning objectives were: Who is the customer? Why does the customer need to be more knowledgeable? And, how will customers become more knowledgeable?

Some key points presented were communicating with the test lab about unit under test (UUT) performance issues prior to calibration, knowing the calibration laboratory’s capabilities and knowing what to ask for. Customers should monitor calibration data by taking measurements before and after calibration, using statistical process control and/or using ANOVA analysis to determine significance of changes.

One example presented was a case where a customer was monitoring performance of a standard platinum resistance thermometer (SPRT) that showed shifts in temperatures that revealed that incorrect water was used to make ice. A root cause analysis determined that procurement had purchased mineral water instead of distilled water due to the price difference. Monitoring the process prevented disruptions and saved money in the long run.

Finally Dilip discuss how to review a calibration certificate looking for statements to question. Such statements may include uncertainty values larger than tolerance of the UUT, standards...
used that are less accurate than the UUT, uncertainties stated at 95% (k = 2) but no uncertainty data, a single PASS statement with no data, As-Left data worse than As-Found data and lastly identical data as last year’s data that may indicate duplication without actual calibration.

Our final speaker was Heather Wade, Calibration Officer, NSF International. Her presentation was titled “Effective Communication between Customers and Their labs.” Heather’s learning objectives were: A tool to easily standardize and document effective communication between labs and customers, please calibrate this, where is my data? But I need “X” calibrated! Why is it taking so long? How much for uncertainty data? Where is my as-found?

Heather discussed contract review, evaluating vendors before sending equipment, documenting special instruction in the PO so it’s legally binding, taking pictures of complex systems before sending to vendor, inspecting equipment upon return and what to do if the equipment is damaged or the service was not complete. Examples were discussed.

Our final group activity was a panel discussion titled “You Want What?” Panel members included; Heather Wade, Dilip Shah, Kevin Broderick of Tangent Labs and Rodger Hickey of Tangent Labs. There was lively discussion of various requirements, specifications and examples were given about vendor and customer interactions, both good and bad. Our moderator was Andre Pipkin of Johnson Controls.

The last activity of the day was an optional tour of the Eli Lilly and Company Corporate Standards Laboratory. Several attendees took advantage of this opportunity.

The Central Indiana Section steering committee members are Kevin Pata of Roche Diagnostics, Kevin Broderick of Tangent Labs, Bridget Bray, John Bush, Beverly Aikins, and Elizabeth Robinette of Eli Lilly and Company.

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The Michigan fall section meeting was held on November 20, 2013 at the Monroe County Community College (MCCC) campus at their new Career Technology Center in Monroe, Michigan. We started the meeting at 8:30 am after a 30 minute “meet-and-greet” light breakfast provided by MCCC. There were 20 attendees at the event. This was the first meeting planned by our newly appointed section coordinator Sam Davis from Robert Bosch LLC. The meeting was kicked off by a welcoming address from the MCCC President Kojo A. Quartey, PhD. He welcomed everyone to their campus. Next up was Lloyd Baker of Trescal who discussed the NCSLI highlights, region meetings and the value of NCSLI membership.

Doug Lynde from On-Time Support started with our first presentation on the history of calibration labels and its evolution through time using crystal report, to the challenges of printing labels in web application. His discussion focused on the use of calibration labels allowing the owner to store much more information on it using 2D barcode labels.

Parmeshwar “Peter” Coomar and Mike Taylor gave a presentation on the metrology courses offered through Monroe Community College and how we as sponsors can help up and coming metrologists by volunteering time and providing tours of our labs in a real world work environment.

Next we broke for lunch “Tour of the Islands” which was provided by Scott Stewart from Measurement Instruments located in Farmington Hills, Michigan.

After lunch Stephen “Steve” Bill from The Modal Shop gave two presentations the first on “The Construction and Characteristics of Accelerometers” and “The Calibration of the Various Accelerometers Including Low Frequency Calibration.” The last presentation was on Dynamic Pressure Calibration.

The day concluded with door prizes and a tour of the new Career Technology Center classrooms and labs. On the tour we were able to see the cutting edge technology that the students are involved in like an electric race car, CMM, and 3D printing.

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Mid-Atlantic Training Event
Rob Knake

NCSL International Mid-Atlantic Regional Coordinator, Rob Knake, in partnership with Henry Zumbrun and William Lane from Morehouse Instrument Company, and Dilip Shah of E = mc3 Solutions, coordinated a one day training event that was held September 26, 2013 at the Morehouse Instrument Company facility located in York, Pennsylvania. This was the third offering of the course and once again it was fully attended and a great success.

The instructors were Henry Zumbrun, William Lane and Dilip Shah and the topic was “Fundamentals of Force Calibration.” Once again, registration filled up very quickly and we unfortunately had to turn away some participants. However, we intend to offer another course in the future so there will be another opportunity to take advantage of this local training event.

The training included the use of primary standards and various force calibration equipment. The attendees physically tested measurement and test equipment and were shown the importance of using appropriate calibration adapters and setups as well as the errors introduced by using incorrect calibration adapters and set ups. The participants left with a better understanding of proper force calibration techniques. This training event also included more in depth training on the evaluation of the associated measurement uncertainty with force calibration.

If you were unable to attend this time, keep an eye out for the notification of future training opportunities which will be posted online in the near future at www.ncsli.org.

If you are interested in hosting future training events, or if you have topics that you would like to see covered during an upcoming training event, or if you are interested in serving as the NCSLI Maryland Section Coordinator, please contact Rob Knake at rknake@a2la.org for more details.

Lastly, special thanks to Mrs. Mary Lane for providing homemade cinnamon rolls for all the attendees. We continue to think that the registration numbers are directly related to her cooking!

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Morehouse 120,000 LBF Dead Weight Force Machine.
The Northwest semiannual region meeting was held October 17th at the PACCAR testing facility in Mt. Vernon, Washington. Our meeting was well attended, with a little over 60 attendees, presenters and vendors. A special thanks to Bert Turgeon, Mike Krogeman and PACAAR for hosting this region meeting. We had several students from Western Washington University, Skagit Valley Technical College, Edmonds Community College, and Bellingham Community College.

During this meeting we utilized several “hands-on” demonstrations presented by subject matter experts. We had five such demonstration tables. Brian Peters and Elliot Speidell from Interface Inc. demonstrated force testing and force measurements using load cells. David Mihal from Hexagon Metrology demonstrated 3D Coordinate measurements using an articulated arm. Guillaume Bock and Tony Spica from Bruel & Kjaer demonstrated the importance of correctly choosing the right microphone for your testing application. Katja Hinz led attendees through low pressure measurements and the variables that affect testing using pressure transducers. Mike Brown from Fluke Calibration demonstrated an infrared calibration on emissivity, showing how different detectors use different wavelengths and how to match black bodies to the IR measurement devices. During this meeting we also had two white paper presentations: Jeff Gust from the Fluke Calibration presented “Low Frequency Calibrators and Artifact Calibrations/Traceability” and Bret Corey presented his paper on “Plain Ring Gage Measurement and the Challenges Faced.” Both presentations were well presented and received.

James (Smitty) Smith opened the meeting with a brief discussion on NCSLI Board of Directors upcoming events, memberships that are available within NCSLI, the need for volunteers, and the focus of testing involvement and inclusion. Smitty shared the NCSLI Vision and Mission to the group to let them know that the testing world will be a key player in the advancement of measurement science and it was in our best interest to be as involved as we could.

After a quick explanation of how the meeting would progress we divided everyone into five groups, one group for each demonstration. Each demonstration lasted 40 minutes with five minutes for Q&A and a ten minute break before the next demo. During lunch the attendees were treated to an awesome tour of the extensive PACCAR Testing Facilities onsite. After the tour we had lunch and gathered for pictures. The remainder of our rotations were carried out in the afternoon, and we then gathered as a group to discuss the meeting and share with each other one thing learned during the meeting. This was an opportunity for a review and discovery of new ideas. We discussed the transition of leadership within the Washington/Oregon section to Mons Lee (Boeing) and Martin Kidd (Fluke). We discussed the evolution of these meetings and I challenged the attendees to bring two customers with them the next time they attended. A plug was made for the Community Outreach program and the use of the Measurement Kits that are available from the Boulder office.
On October 16, 2013 the NCSLI South Florida Section held its second meeting of the year. This fall event featured several guest speakers and a wide variety of topics including “Certificates of Calibration,” “Data Migration,” “Optical 3D Measurements” and a NCSLI Board of Directors brief. The government shutdown forced the cancellation of a guest speaker, but we were able to rearrange parts of the schedule and managed to have a great event.

We started the day on a solemn note as we honored the passing of Del Caldwell of Caldwell Consulting Group and NCSLI Past President, and Kisan Pandit of the US Navy, Naval Sea Systems Command and their many contributions to the world of metrology.

Dilip Shah started the guest speakers program with an outstanding presentation on “Certificates of Calibration.” This training and discussion led to many questions and comments and I am pretty sure could end up becoming a topic for future meetings.

Our second speaker, Miguel Decos with On Time Support, provided an in-depth lecture on data migration. This topic is becoming more relevant in computer age as we are starting to see more independent software packages having to share data.

Our third featured speaker, Bill Greene with Level 3, provided an excellent lecture on “3D Optical Metrology” that included accuracies and data points that many of us (myself included) didn’t even know was possible.

Mark Lapinskes, Tektronix and the NCSLI Southeastern US Division VP, rounded out the day by providing a board of directors update and talked about the NCSLI Workshop & Symposium in Nashville.

We concluded the day with a drawing and door prize give-away courtesy of Quality Systems Labs.

So many people helped make this event happen but special thanks to Dilip Shah and Mark Lapinskes for their continued support and leadership, Ed Brown, Cheryl Thibodeau and the Quality Systems Labs staff for hosting, food and logistics, Paul Hanssen of WorkPlace Training, for his help setting up the meeting and all the rest of the guest speakers and attendees for making this an outstanding event!

We look forward to building on and continuing our success with our spring meeting and event to be determined.

Thank you to all....Bravo Zulu.
The NCSLI Southern Ohio/Kentucky Section held a fall meeting on October 30, 2013. The Bionetics Corporation, Newark Metrology Operations, sponsored breakfast and the meeting at the historic Davis-Shai house in Heath, Ohio. Several door-prizes were provided by meeting attendee, Ms. Jill Hammond, Technical Maintenance Inc., and presenter, Mr. Jon Busald, Fluke Calibration and NCSL International.

Following breakfast, Mr. Matthew Denslow, Bionetics Training Manager and Section Coordinator, welcomed all attendees and went over the agenda for the day.

Mr. Lloyd Baker, NCSLI Mid-Western Region Coordinator, kicked off the day’s program with a short talk about the recent NCSLI Board of Directors’ meeting. Lloyd encouraged the meeting participants to attend the upcoming Workshop & Symposium in Orlando, Florida from July 28-31, 2014 and the upcoming Technical Exchange in Raleigh, North Carolina from February 5-7, 2014. Lloyd discussed the spring regional meeting in Ft. Wayne, Indiana and the importance of section meetings in general to the NCSLI program.

Mr. Jeremy Sims, Transcat Inc., presented the combined works from three NCSLI conference papers submitted by Transcat personnel. The subjects included “PAR vs. PUR, Suitability of Instruments, and Producing Valid Results.” Mr. Sim’s presentation provided information on assuring quality for customer’s processes and products and explained the importance of using the appropriately calibrated equipment.

Mr. Judah Green, American Association for Laboratory Accreditation (A2LA) discussed the “Ten Most Common Deficiencies Noted during ISO 17025 Assessments.” Always willing to corner an assessor, the attendees asked numerous questions and had good discussion about deficiencies and the steps taken to ensure consistency in all assessments.

Ms. Karen Semer, NCSLI Conference Committee VP, took a few moments to discuss the importance of these NCSLI section meetings to the metrology community, and encouraged everyone to try to attend the annual conference in Orlando, and the upcoming Technical Exchange in Raleigh, North Carolina. Karen announced that she would be stepping down as Conference VP at the end of year as she was also retiring from her government job.
Mr. Eric Seller, The Modal Shop, provided insight into the difficulties of calibrating accelerometers at very low frequencies. The presentation titled, “Low Frequency Accelerometer Challenges and Improvement” demonstrated how improvements in equipment have reduced calibration times and measurement uncertainties.

Next Mr. Andy Brush, TEGAM Inc., explained the operation of a new coaxial flow calorimeter for RF power measurements. Mr. Brush identified the sources of measurement error in an instrument of this type. He described the conversion of microwave energy and the measurement of temperature within the flowing water system. The equipment’s measurement processes mitigate or compensate for each error in the determination of the final applied power.

Concluding our technical presentations, Mr. John Busald, Fluke Calibration, presented one of the numerous Fluke Webinars live for our attendees. “The Techniques for Oscilloscope Calibration” demonstrated the typical parameters of an oscilloscope that require calibration. Additionally Mr. Busald offered many tips for improving calibration accuracy and reducing calibration time through updated equipment and process automation.

Ending the day, Mr. Matthew Denslow drew names for door prizes and collected meeting feedback forms. A total of 27 personnel attended the morning and afternoon events. We were glad to welcome some new faces as well as some returning members to the meeting. Planning is underway for our next meeting, April-May 2014. We hope to have an enjoyable and worthwhile meeting, so please email any suggested topics to Matthew Denslow.

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The NCSLI Mexico Region held its meeting on October 25, 2013 in the city of Monterrey where 45 attendees had the opportunity to learn about the concepts of metrology in different arenas.

The meeting started with the presentation of Roberto Benitez Chavez. Mr. Benitez covered the benefits of NCSLI membership, the upcoming Workshop & Symposium in Orlando, Florida and the volunteer opportunities.

The second speaker was Tuly Treviño who is an expert in human resources; she spoke about the process of how people learn. Miguel Rodriguez from Perry Johnson presented “The Top Ten Non-Conformances during ISO-17025 Audit.”

One of the fastest growing and important areas where metrology is getting involved is Healthcare and in this field PhD. Bernabé Rodríguez spoke about the application of the measurements in ionizing radiations.

At the end of the meeting Mr. Javier Pedro, presented the development of the Instituto Tecnológico de Metrología and how this institution is providing calibration training in Northern Mexico.

The meeting attendees represented the automotive industry, aeronautics, healthcare, accreditation bodies and calibration laboratories. Some have been working in metrology in Mexico for more than 30 years.

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The 22nd Annual NCSLI-Japan Technical Forum was held at the Tokyo Metropolitan Ohta-ku Industrial Plaza on November 8, 2013, along with NMIJ Measurement Standards Seminar attracting 300 participants, under auspice of the Japan Measurement Standards Forum.

The forum started with opening messages by Mr. Takashi Sugiyama of Japan Measurement Standards Forum and Dr. Takuichiro Tada of METI. The keynote talk followed, entitled “Scientific Measurements and Innovation” by Mr. Keiichi Yoshida of Shimadzu Corporation. There were two paper presentation sessions: NCSLI-Japan Session and NMIJ Session, a Poster Session and exhibits of products and services of 16 organizations.

The forum was concluded with a talk entitled “Clinical Significance of Analysis of Amino Acid in Blood Plasma,” and the Reference Material’ by Dr. Hiroshi Miyano of Aginomoto Co., Inc.

NCSLI-Japan Session Papers

National Standard Level Lightning Impulse Voltage Measurement System Comparative Testing, and Measurement Uncertainty
Etsuhiro Hino, Mitsubishi Electric Corporation

An Overview of a Phasor Measurement Unit (PMU) and its Calibration - Saytaro Kon

Fluke Thermometer and its Patents
Naoto Kawabe, Fluke Japan

Thermocouples with Improved High-Temperature Creep Property by Oxide Dispersion Strengthening
Tokio Hamada, Tanaka, Kikinzoku Kogyo K.K.

Measurement and Standard, High Dewpoint
Shinichiro Hama, Shinyei Technology Co, Ltd.

Calibration of contact Instruments for Measurement of Surface Texture
Haruhisa Ofuchi of Japan Quality Assurance Organization (JQA)

The Management of the Measurement Risk and Adequacy, The Inspection Specification
Teruhisa Tsuru, Murata Manufacturing Co Ltd.

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This year’s fall NCSLI Canadian Region Conference was held in the beautiful city of Vancouver, British Columbia, Canada. The event took place over three very full days from Wednesday, November 6th to Friday, November 8th, 2013. The agenda was packed with fascinating technical and managerial presentations, an exhibitors’ hall to view the latest in measurement equipment, a fun-filled museum tour and banquet dinner at Deely Harley Davidson, and then a day-trip down to Everett, Washington, to visit the Fluke primary standards laboratory and Boeing manufacturing facilities. The varied activities were extremely beneficial to the approximately 70 participants and guests who attended the function.

Despite the grey clouds and intermittent rain drops in Vancouver, the atmosphere at the conference was very positive and sunny! Welcome proceedings were launched by Lonnie Spires, NCSLI President, who offered greetings to a standing-room only crowd. Lonnie shared some news with the attendees, announcing that in 2014 Dr. Malcolm Smith will be assuming the NCSLI Canadian Region VP position, as Ingrid Ulrich assumes a two-year mandate as NCSLI Treasurer. Lonnie thanked the many volunteers for their contributions, and encouraged all attendees to benefit from this event and the many other NCSLI activities and resources available to members.

Prior to the commencement of the technical papers, Malcolm Smith took a few moments to present commemorative plaques to a number of individuals he had identified as “Canadian Champions.” Malcolm presented an interesting overview of the history of NCSLI activities and events in the Canadian region, and described how the contributions of volunteers helped to further the awareness of NCSLI. For most of the individuals, this represented many years if not decades of involvement. In Malcolm’s words “Thank you for keeping the flame alive.”

Unbeknown to me, Malcolm had snuck a plaque into this list for me as well, which I could only accept under the heading of “Rookie”!

Since the conference was being held in the days subsequent to the NCSLI Board of Directors’ meeting held in the same Sheraton Hotel, we had the privilege of having ten members of the NCSLI Board in attendance at this event. Participants therefore had the chance to meet the board members one-on-one during the networking events, and were also given the opportunity to attend the presentations given by these metrology experts. Our roster distinguished from members of the board (in order of appearance) included Dr. Alan Steele of NRC, Vernon Alt of Northrop Grumman, Marcus McNeely of Blue Mountain Quality Resources, Georgia Harris of NIST, and Dr. Malcolm Smith of Wescan Calibration. We were provided with valuable insight on the subjects of the “International Temperature Scale,” “Being a Metrology Ambassador,” “Paperless Management Software,” “Proficiency Testing,” and “Mismanaging Your Lab to Greatness,” complete with the mysteries of secret languages like High Metrology and Mumbly Measurement.


After a first full day of presentations on Wednesday, it was time to kick back and enjoy the more rebellious side of measurement science. We were offered the exclusive chance to tour the “Motorcycles in the Movies” museum exhibit at the Deely Harley Davidson dealership in Vancouver. Some conference attendees admired old, rare and vintage motorcycles in the museum while others seized the moment to hop on the latest shiny arrivals in the modern showroom with smiles from ear to ear; an enjoyable banquet dinner was had by all.
So it is time once again to wrap up the Canadian activities for another year.

My heart-felt thanks go out to all those volunteers who helped to make this event a success. As well, the assistance and administrative support of the NCSLI head office staff was greatly appreciated. Last but certainly not least, special thanks go to Malcolm Smith for being the “feet on the ground” in working out the Vancouver logistics and to Pat Stuart for his tireless efforts in organizing the Friday Tour which was fully-sponsored by Fluke.

During the presentations: we listened and we learned; we took notes and we asked questions. During the breaks: we met and we talked; we exchanged business cards and we gathered brochures.

During the dinner: we ate and we drank; we smiled and we laughed.

During the tours: we walked and we observed; we marvelled and we appreciated … and we dreamt!

But the most important thing we did was connect. We were brought together by our shared interest, dare I say passion, for measurement science. And we all went home richer for the experience, our energy renewed from having learned, having shared and having connected.

With sincerest gratitude, I look forward to seeing you all again soon! - Ingrid Ulrich

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In recent years, issues related to incorporation by reference (IBR) have commanded increased attention, particularly in connection to requirements that standards that have been incorporated into federal laws and regulations be “reasonably available” to the U.S. citizens and residents affected by these rules.

This requirement had led some to call for the invalidation of copyrights for IBR standards. Others have posted copyrighted standards online without the permission of the organizations that developed them, triggering legal action from standards developing organizations (SDOs).

As coordinator of the U.S. standardization system, the American National Standards Institute (ANSI) has taken a lead role in informing the public about the reality of free standards, the economics of standards setting, and how altering this infrastructure will undermine U.S. competitiveness. We have been pleased to work closely with colleagues at the Administrative Conference of the United States (ACUS) and the National Institute of Standards and Technology (NIST) on this issue, as well as the hundreds of SDOs whose standards ensure the quality, safety, and efficiency of products, services, systems, and personnel.

First of All, What Are Standards?
Standards are the backbone of trade, the building blocks for innovation, and the basis for quality, safety, and interoperability. Voluntary consensus standards and compliance activities are essential to the U.S. economy. Market driven and highly diversified, standards support technological innovation, build bridges to new markets, and create gateways for businesses in this increasingly complex world of global access. Standardization also helps to assure health, safety, and quality of life for individuals in the United States and around the world.

Why Does IBR Matter to the Standardization Community?
In all of our collective discussions about the IBR issue, the question we are trying to answer is simple. Why aren’t standards free? In the context of IBR, it’s a valid point to raise. A standard that has been incorporated by reference does have the force of law, and it should be available. But the blanket statement that all IBR standards should be free misses a few important considerations.

First, if SDOs cannot charge for standards, this disrupts the standards development ecosystem . . . and the funding for standards development has to come from somewhere. If participation fees have to be increased to offset lost sales revenue, the result will be significantly reduced participation by those without deep pockets—especially consumers and small businesses. Those with the money will have all the influence.

Even worse, if private-sector SDOs cannot afford to stay in business, the result could be a dangerous lack of standards addressing new technologies or updating of current standards. The government will have to step up, take over what is now a market-driven system, and somehow find the money and expert manpower. Today’s standardization system is balanced and consensus-based... but if the government has to take over, there would be a single, dominant voice driving the decisions that affect our products, services, and systems.

Clearly it is a complex issue, with the potential for far-reaching, significant consequences not just for SDOs, but for government, industry, and society as a whole. As a result, ANSI has made it a top priority to speak to as many members of our community as we can, find out where the SDO community stands on the topic, and work toward a solution that is based on the broadest input and offers the greatest positive impact.

ANSI’s New IBR Portal
On Monday, October 28, 2013, we launched the ANSI IBR Portal, an online tool for free, read-only access to voluntary consensus standards that have been IBR-ed into federal laws and regulations.

IBR standards hosted on the portal are available exclusively as read-only files. In order to protect the intellectual property rights of the groups holding these standards’ copyrights, the portal has built in security features that prevent users from printing, downloading, or transferring any of the posted standards; in addition, screenshots will be disabled and the standards will contain an identifying watermark.

For this first phase of the portal, ANSI has secured the participation of thirteen major domestic and international standards developers. Those that have agreed to have their IBR standards directly available on the ANSI IBR Portal include:

- the International Organization for Standardization (ISO);
- the International Electrotechnical Commission (IEC);
- the Association of Home Appliance Manufacturers (AHAM);
- the American Welding Society (AWS);
- the International Association of Plumbing and Mechanical Officials (IAPMO); and
- the Illuminating Engineering Society (IES)
In addition, seven SDOs have agreed to allow the portal to provide direct links to read-only versions of IBR standards hosted on their own websites. Those organizations are:

- the American Petroleum Institute (API);
- the American Plywood Association (APA);
- ASHRAE;
- MSS – the Manufacturers Standardization Society;
- NACE International - the Corrosion Society;
- the National Fire Protection Association (NFPA); and
- UL (Underwriters Laboratories).

With the launch of Phase I of the portal, ANSI expects that many more SDOs – both in and outside the community of ANSI-accredited standards developers – will sign on to participate.

In our discussions with regulators, policy makers, SDOs, consumer representatives, and academia, ANSI has heard that there is demand for a single solution, to make it easy for those affected by any piece of legislation to view the related IBR standards. But at the same time, there is also a strong need to allow for flexibility, so that each SDO can provide reasonable access in the way that makes sense for their business model and doesn’t undermine their ability to function.

ANSI launched its portal to bridge that gap, and we are very proud to present the IBR Portal as one solution to the access issue. To view the ANSI IBR Portal, visit ibr.ansi.org.

About ANSI
The American National Standards Institute (ANSI) is a private non-profit organization whose mission is to enhance U.S. global competitiveness and the American quality of life by promoting, facilitating, and safeguarding the integrity of the voluntary standardization and conformity assessment system. Its membership is comprised of businesses, professional societies and trade associations, standards developers, government agencies, and consumer and labor organizations. The Institute represents the diverse interests of more than 125,000 companies and organizations and 3.5 million professionals worldwide.

The Institute is the official U.S. representative to the International Organization for Standardization (ISO) and, via the U.S. National Committee, the International Electrotechnical Commission (IEC).

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I once again had the honor to represent NCSL International at the annual ILAC General Assembly, held this year in Seoul, South Korea. These meetings are held over ten days, but fortunately, the meetings of most interest to NCSL are held consecutively. I attended the Accreditation Issues Committee (AIC) meeting, Laboratory Committee (LC), and the ILAC General Assembly from October 20 to 23, 2013.

The issue that affects the membership the most is the impending review date of ISO 17025. This document is due for review in 2015, but has been largely unchanged since its release in 1999. It was communicated by the ISO/CASCO representative during the LC meeting that many regulators look at the dated language in ISO 17025 and feel that this is not a suitable standard to adopt. This impedes the growth of and acceptance of the standard, which directly affects the potential business growth of laboratories already accredited to ISO 17025.

In order to ensure that the laboratories have adequate representation on any such review or revision of ISO 17025, the Laboratory Committee requested that ISO/CASCO establish a new work item to comprehensively revise ISO/IEC 17025:2005 as soon as practicable. The General Assembly agreed to allow accreditation bodies to have a 90 day consultation period with their accredited laboratories, commencing on 1 November 2013. A letter ballot, based on one vote per member, on whether to proceed with the request to submit a new work item to ISO/CASCO will be commenced on 1 February 2014.

In preparation of a possible review and revision of ISO 17025, the AIC formed a work group to consider improvements or changes desired in ISO 17025. The co-conveners of the work group are Erik Oehlenschlaeger of DANAK and Barbara Belzer of NVLAP. A survey has been established to solicit proposed areas of concern regarding ISO 17025 and the AIC will circulate the survey among the accreditation bodies. The survey will also be distributed to NCSLI members, who are encouraged to provide information on sections or ISO 17025 that are currently contentious, or if there are gaps in metrology quality that ISO 17025 does not currently address.

AIC Meeting Highlights
Currently, ILAC has a small library of documents available at its site. There has been a fair amount of discussion as to how this library should be maintained. It was finally decided that in a world where search engines can return appropriate results in an efficient manner, that the concept of an ILAC library is most likely outdated. The ILAC library will be abolished and in its place, a notice will state that the Laboratory Committee will be happy in assisting the sourcing of information.

Workgroup 2 on Calibration and Traceability issues reported the following:

• ILAC Guidelines for remote calibration will not be pursued as a work item.

• For the assistance of test laboratories, ILAC currently has published ILAC G17:2002, Introducing the Concept of Uncertainty of Measurement in Testing with the Application of the Standard ISO/IEC 17025. The AIC is considering formulating a policy document as to what must be included in uncertainty for test labs. The possible benefits of such a policy could be the encouragement of testing laboratories to report uncertainty, where the information is relevant, such as when taking uncertainty into account for compliance statements. There will be a workshop to continue a discussion on this at the next mid-term meeting.

• Internal calibration – part 1: AIC completed a memo on ILAC P10:2013 and internal calibrations. The main concern is interpretation of P10 which states that if a measurement is not on the scope of a laboratory’s accreditation, that they would not meet the requirements of P10. The memo seeks to clarify this and states that any organization that disseminates traceability internally would still be permitted to do so, but would also be subject to assessment of relevant portions of ISO 17025 regarding the internal calibration.

• Internal calibration – part 2: The question was raised regarding what exactly were the relevant portions of ISO 17025 that should be assessed for laboratories performing internal calibrations. The present state is that there are no consistent policies on how the laboratory is assessed regarding internal calibrations. The result is great variation, and often the assessment is made by assessors that are not calibration experts, or perhaps not an expert in the calibration discipline in question, because the internal calibration was not made clear by the scope accreditation application documents. A survey will be circulated soon to accreditation bodies that seek to determine if policies need to be developed on this subject. If such a policy is developed, then I would anticipate that this would mean more work for calibration laboratories, because the organizations that are currently performing internal calibrations may lack critical qualifications that would be scrutinized under a potential new policy.

• The work group also proposed the establishment of a VIM mirror group that can comment and provide input from ILAC to the VIM WG in ISO. The goal is to ensure that a document is developed that provides practical guidance and application of the VIM with language and explanations that are understandable to all levels of those involved in the science of measurement. During the LC meetings, it was communicated that EURACHEM already has a VIM translation document for the analytical chemistry industry.
The ILAC/OIML Liaison reported that the results of the periodic review of OIML D10/ILAC G24:2007, Guidelines for the determination of calibration intervals of measuring instruments, determined that this document should be revised. The AIC has formed a small working group with OIML to consider revisions to the document. Since NCSLI has an OIML Liaison, we will work with him directly on this issue.

ILAC P9:11/2010 “ILAC Policy for Participation in Proficiency Testing Activities” has been revised in a limited way, to clarify its applicability to inspection. It was circulated to members of the PTWG and a further revision was prepared following comments from members of the PTWG. The AIC approved the revised document for circulation to ILAC members for a 60-day comment period, as soon as possible. The revised language only affects organizations accredited to ISO 17020 for inspection, there is no change for ISO 17025 accredited laboratories.

ISO DIS 13528 (Statistical methods for use in PT by interlaboratory comparisons) was out for comment with a closing date of 22 April 2013. The document was discussed at the PTWG meeting on 17 April 2013. ISO/TC 69/SC6 Plenary met in Milwaukee, Wisconsin, USA on 7 June 2013. The WG agreed that a second DIS ballot is necessary. It will be prepared by September 30, 2013, then ISO will edit and translate for a three month ballot that will close by 31 March 2014. Comments will be discussed at the next TC69 meeting in June 2014.

**LC Meeting Highlights**

The LC discussed and developed a document that would be presented at the next ILAC/BIPM meeting which asks BIPM to encourage National Metrology Institutes to cooperate with the highest level calibration laboratories in their economy in order to support their demonstration of technical competency through the application of PT/ILC activities.

The largest part of the LC meeting was debate and discussion about the previously mentioned resolution to the ILAC general assembly regarding the revision of ISO 17025. The motion for the resolution was approved, but it was not a unanimous decision. There are still communities that hold the position that although ISO 17025 has challenges, they would prefer to stay with the present edition. It was also communicated by ISO/CASCO that in 2015, ISO/IEC 17025 must be revised to meet the formatting requirements of the ISO 17000 series documents, and it must also be aligned to the present ISO 9000 requirements.

**General Assembly Highlights**

- A new regional cooperation was accepted by ballot, the Arab Accreditation Cooperation
- 18 organizations either joined the ILAC Mutual Recognition Arrangement or expanded the scope of their recognition

**Future Meetings**

Mid Term Meetings:
- April 2014 Oslo Norway

2014 General Assembly:
- October 2014 Bangkok Thailand

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On its 30th anniversary, the International Congress of Metrology confirms its excellent health...

The Congress took place at the Porte de Versailles in Paris October 7-10, 2013 in association with the Enova trade fair exhibition.

With the maturity gained from the first 30 years, the organizers focused on three main priorities in preparing for the event:

• Permanent openness to all areas of interest, all countries and all activity sectors,
• A concern for innovation, and both technical and technological skill,
• An unfailing ambition to promote encounters between different worlds: the famous transfer...

The 2013 Congress offered attendees a wide variety of technical presentations to choose from during the three and a half day event:

• 180 technical presentations,
• Six industrial round-table discussions,
• Three company tours, and
• An exhibition in the Mesurexpovision section of the Enova trade fair.

But the goal was also to follow the evolutions in participants’ working lives and to meet the needs of as many visitors as possible; the world is changing, and no one is still working in the same way as five years ago.

Several innovations were introduced during this year’s congress:

• A session on the benefits of measurement-related careers at the opening of the congress,
• Two European metrology research programs came to present their progress,
• Subjects such as food processing, energy challenges and nanotechnology.
36 different countries were represented, and 35% of participants came from abroad, mainly from Europe but also from North and South America, Africa, the Middle East and Asia.

With this blend of standard themes and new areas, the visitor numbers recorded for this congress were exceptional, placing the event in a world-leading position with:

- 850 participants and exhibitors, with full access to the whole congress, 6% more than in 2011.
- 36 different countries were represented, and 35% of participants came from abroad, mainly from Europe but also from North and South America, Africa, the Middle East and Asia.
- 53 companies had a presence in the Metrology Village at the heart of the event, the gathering place for friendly downtime at the congress: breaks, poster sessions, cocktails and aperitifs.
- The scientific and technical level of the congress was judged excellent or satisfactory by 87% and 90% of participants respectively.
- The industrial benefits are seen as excellent or satisfactory in 83% of survey responses.
- The gala evening at the Eiffel Tower attracted nearly 200 congress attendees and partners from all backgrounds.
- In addition, 5,900 people visited the Enova exhibition dedicated to electronics, measurement, optics and RF technology. These visitor numbers are higher than the previous year, and the organizers noted a return to a “positive business climate.”

The Congress also confirmed that it appeals to all audiences and stakeholders in the field of measurement:

- 68% of participants are industrial users of measurement in all types of sectors; analysis and metrology laboratories, equipment manufacturers etc.
- 11% are representatives of major national and international organizations; the national laboratories of the large European countries, ministries, accreditation bodies, international organizations etc.
- 13% are academics or researchers.
- 8% came from other backgrounds; hospitals, training organizations, consultants, the press etc.

The Collège Français de Métrologie, the organizer of the event, wishes to extend its warm thanks to everyone who attended and all the partners of the congress:

- The members of the Organizing Committee: Acac, BEA Métrologie, BIPM, Cetiat, EDF, Hexagon Metrology, IMQ, INSA de Lyon, LNE, Metas, NIST, NPL, Novartis, OIML, Peugeot Citroën Automobiles and Trescal.
- The event’s sponsors and partners were; A+ Métrologie-Apave, Carl Zeiss, Hexagon Metrology and Implex,
- The institutional supporters were; the Ministry for the Productive Recovery and the DGCIS (Department of Competitiveness, Industry and Services), the Ministry of Culture.

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www.metrologie2013.com
EUROLAB in 2014

This Letter from Europe gives a concise actual overview of EUROLAB, starting with a brief introductory reflection of its evolution and objectives.

EUROLAB Evolution

• Set up in Brussels April 1990 in connection with the formation of the European Union (EU), since 1998 Legal Entity under Belgian Law.
• Composed of National Associations of Measurement, Testing and Analytical Laboratories all over Europe and International Affiliates.
• Grouping more then 2,400 Conformity Assessment Bodies representing about 250,000 technical experts and laboratory practitioners.

EUROLAB Objectives

• Representation by formulating and voicing the opinion of European laboratories.
• Coordination by interfacing with partner organisations of interest to the laboratory community.
• Action by providing adequate means for exchange of information and experience.
• Promotion of cost-effective measurement, testing, calibration and analytical services.

EUROLAB Organization

EUROLAB is organized as follows: the General Assembly (GA) is the central body. It consists of two representatives from every National Member Association (one from the public and one from the private sector) and one representative from every International Affiliate. The General Assembly elects the Board of Administrators (BoA) and confirms the Technical Secretariat nominated by the BoA.

The 2013 EUROLAB General Assembly (GA) took place in Woerden, The Netherlands, April 2013. During the General Assembly, the electoral body of EUROLAB – consisting of 25 National Associations of Measurement, Testing and Analytical Laboratories – re-elected the President, Vice-President, and Treasurer for the next two years term. Mrs. Ewa Bulska (Poland) joined the Board as a new member and Mr. José Luis Sánchez (Spain) was re-elected for a new term.

EUROLAB Objectives

• President: Jiri Sobola, Technical and Test Institute for Construction (TZUS) Prague, Czech Republic
• Vice-President: Jeff Llewellyn, The British Measurement and Testing Association (BMTA), UK
• Treasurer: Jan Basten, TÜV Rheinland Quality, The Netherlands

EUROLAB is pleased to welcome a new member, MAKLAB, the National Association of Laboratories of MACEDONIA. On accession of CROTI to the European Union (1st July, 2013), CROLAB, EUROLAB’s Croatian member has upgraded its membership from Associated Member to an Active Member. With the new memberships, EUROLAB is successfully fulfilling its goal to extend the European Laboratory Community.

New National Members

• EUROLAB welcomes as new member, MAKLAB, Macedonian Association of Laboratories.
• EUROLAB’s Croatian member CROLAB upgrades – on accession to the European Union in July 2013 – its membership from Associated Member to an Active Member.
EUROLAB Working Structure

The working structure of EUROLAB consists of two groups (see charts to the right):

A. Measurement, Testing, and Analytical Laboratories

The largest member group is composed of materials/production test labs, followed by environmental labs, calibration labs and clinical/medical labs. Almost all laboratories are accredited.

B. Certification and Inspection Bodies

Here, membership is equally distributed between (i) Product certification bodies and (ii) Inspection bodies.

EUROLAB Activities and Services

The EUROLAB activities are performed by Working Groups, Cooperation Committees, and Sectorial Networks. An overview of the activities and services of EUROLAB is given in the two boxes to the right.

The results of the work of EUROLAB – information, communication, data, reports – are distributed to all EUROLAB parties by the central EUROLAB Secretariat in Brussels and the National Member Secretariats. Documents of general importance are available via the internet: see www.eurolab.org.

Acknowledgement

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