SIM Senior Policy Makers Dialogue Forum
5-6 November, 2009, Rio de Janeiro, Brazil

Purpose: to provide a venue for dialogue among policy officials and national decision-makers within the Americas regarding the need and value of investing in national programs in chemical metrology to support:

- International Trade
- Food Safety and Nutrition
- Sustainable Energy
- Healthcare Decision-Making
- Consumer Protection
- Sustainable Economy

Agenda: SIM Senior Policy Makers Dialogue Forum; 5-6 November, 2009, Rio de Janeiro, Brazil

Thursday, 5 November: Evening Reception, Hotel Windsor Barra

Keynote Address: Dr. Hratch Semerjian, Director, U.S. Council for Chemical Research
"Chemical Metrology: What it is and Why You should Invest in it"

Friday, 6 November: Morning Plenary Session, Inmetro

Welcome: Humberto S. Brandi, SIM President

Roundtable Discussion: Chemical Metrology and Its Impact on Industry and Quality of Life

Moderator: Willie E. May, Chair, SIM Chemical Metrology Working Group
Rapporteur: Ulf Hillner, PTB Technical Cooperation Program

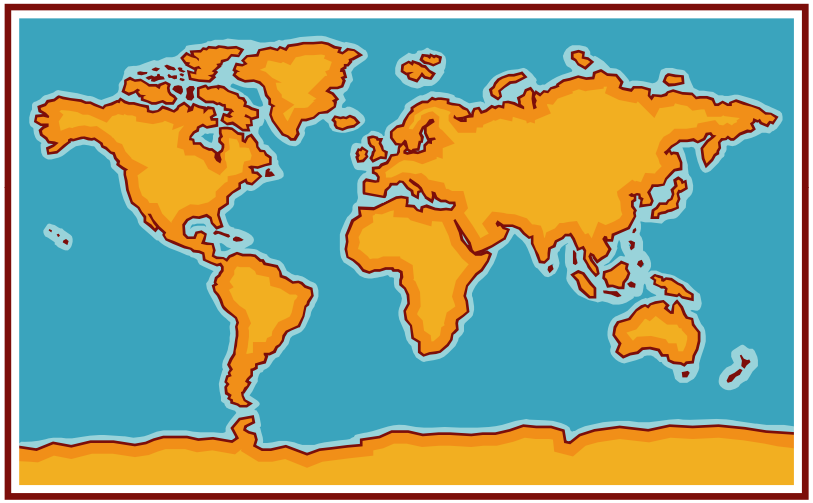
Testimonials and Dialogue regarding the rationale for and return on investment from National programs in Chemical Metrology

Panelists

1	João Jornada	President, Inmetro	Brazil
2	Gabriela Massiff	Director, Fundacionchile CMQ	Chile
3	Yoshito Mitani	Director for Materials Metrology, CENAM	Mexico
4	Wynand Louw	Acting CEO, NMISA	South Africa
5	Chainarong Cherdchu	Director for Chemical Metrology and Biometry, NIMT	Thailand
6	Robert Kaarls	CIPM Secretary and CCQM President	

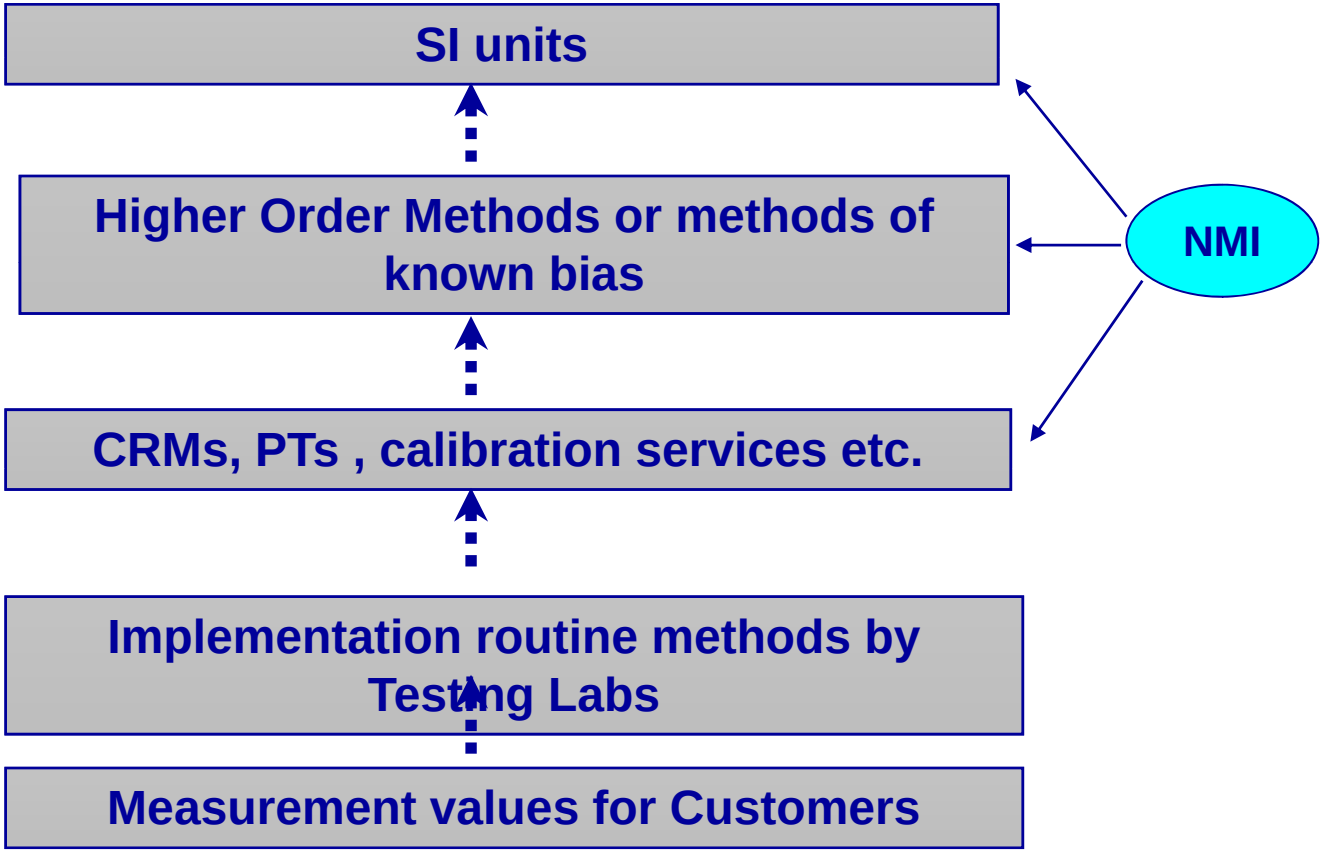
return

Chemical Measurement Results of known quality are Extremely Important



Because the World
is becoming a single neighborhood

Chemical and Biological Measurements

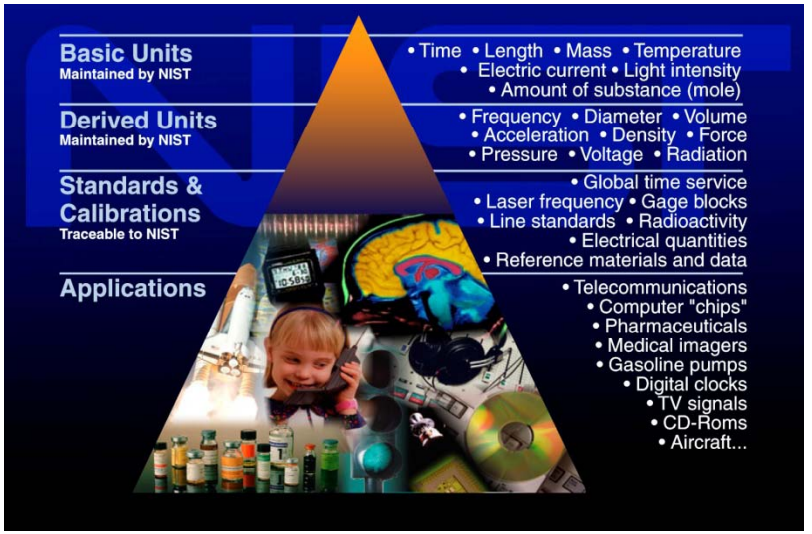


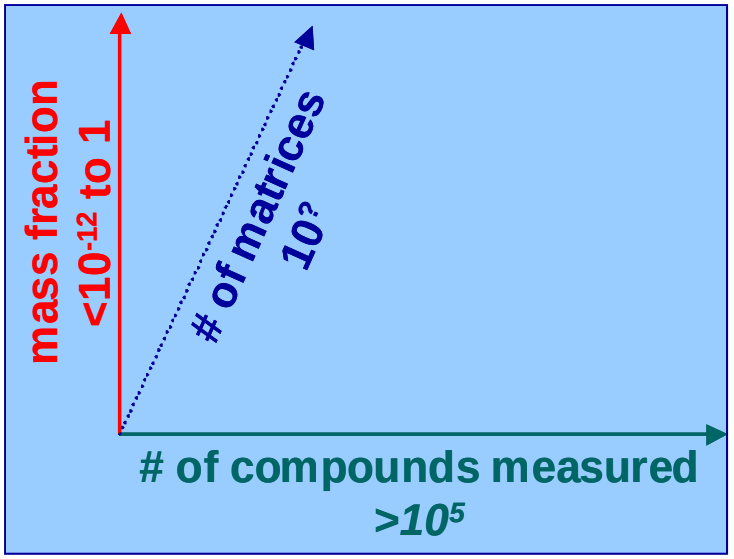
A Context for the Importance and Complexity of Chemical Measurements

- According to a study released by the Council for Chemical Research, **chemistry is core or important to virtually all industrial sectors and technology areas**
  - ***"Measuring Up: Chemical R&D Counts for Everyone", CCR, 2006***

- **For metrology in chemistry** the task is to determine the quantity of a **specific chemical entity in a given matrix** and not merely "amount of substance" *(i.e., requires confirmation of identify as well as amount)*

- **Chemical measurements are multidimensional**
  - a large number of chemical entities (>10^5)
  - in a broad range of matrices ($10^{?}$)
  - and mass fractions ranging from <10^{-12} to 1

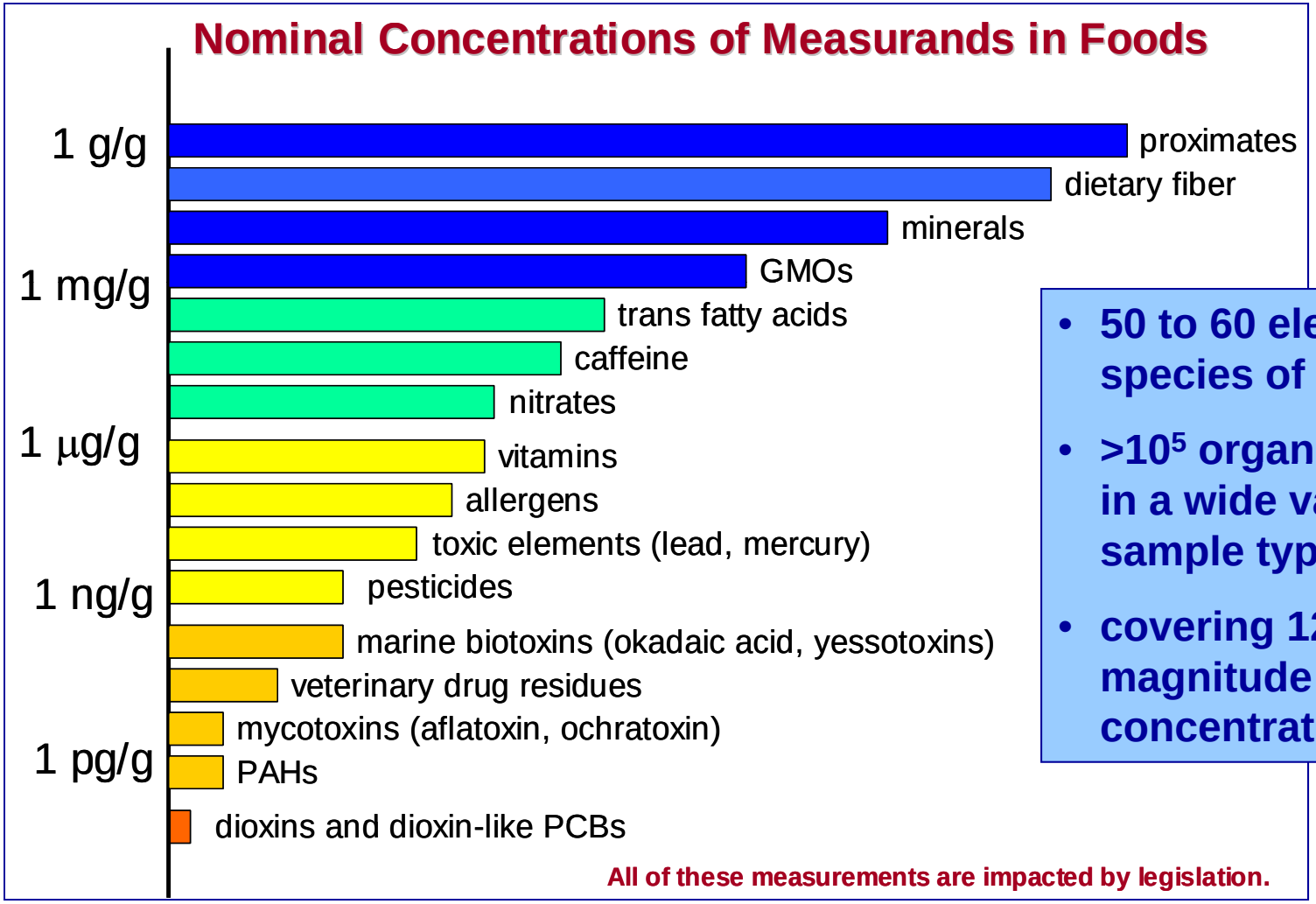




... an example of this complexity

Regulated Classes of Chemicals in Foods

(there are multiple measurands within each class)



- **50 to 60 elemental species of importance**
- **>10^5 organic species in a wide variety of sample types**
- **covering 12 orders of magnitude in concentration.**

The typical role of an NMI is to establish and maintain:

Scientifically-Sound, Metrologically-Based Competencies and Measurement Capabilities that are internationally Vetted and Recognized

To provide calibration and measurement services disseminated to Customers via mechanisms such as:

– Validated Reference Methods
– Certified Reference Materials
– Reference Data
– Value-assignment of customer-provided samples or materials
– Value-assignment of Proficiency Testing samples
– Measurement Services for other Government Agencies
– Etc.

NIST ID/MS MEASUREMENTS OF CHOLESTEROL

Computation of Expanded Uncertainty

Material K6-A				
	Uncertainty type		*Relative Uncert (%)*	*d.f.*
Steps in Process	*A*	*B*		
Purity of reference standard		X	0.050	inf
Hydrolysis of cholesteryl esters and Equil.		X	0.100	inf
Stability of cholesterol in base		X	0.100	inf
GC/MS measurements	X		0.123	2
Combined rel std uncertainty			0.194	
Calculated degrees of freedom			12.3	
k-factor			2.179	
Relative expanded uncertainty (%)			0.423	
Mean value			2.215	*mg/g*
Abs. expanded uncertainty			0.00938	*mg/g*

NIST Standards for Chemical Measurements

Chemical standards constitute over 2/3 of ~1,400 NIST SRM types, and ~26,500 of over 32,000 NIST SRM Units sold in 2007

- **High Purity Neat Chemicals**
- **Organic Solution Standards**
- **Inorganic Solution Standards**
- **Gas Mixture Standards**
- **Isotopics**

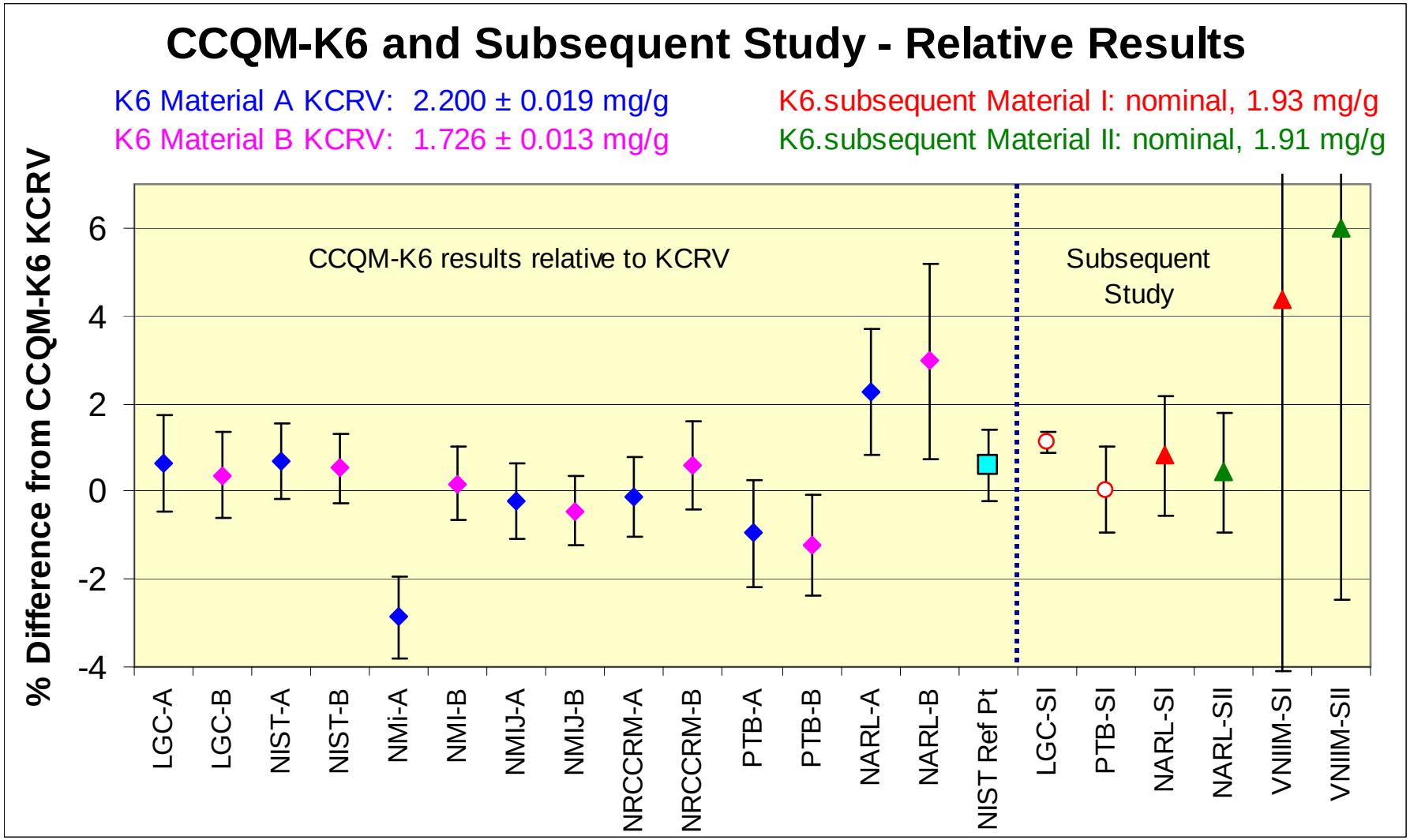
Complex Matrix Standards

- Advanced Materials
- Biological Fluids/Tissues
- Foods/Botanicals
- Geologicals
- Metals and Metal Alloys
- Petroleum/Fossil Fuels
- Sediments/Soils/Particulates
- Cements

- **Molecular Spectrometry Standards**
- **Electrolytic Conductivity Standards**
- **pH / Ion Activity Standards**

~50% shipped to non-U.S. addresses

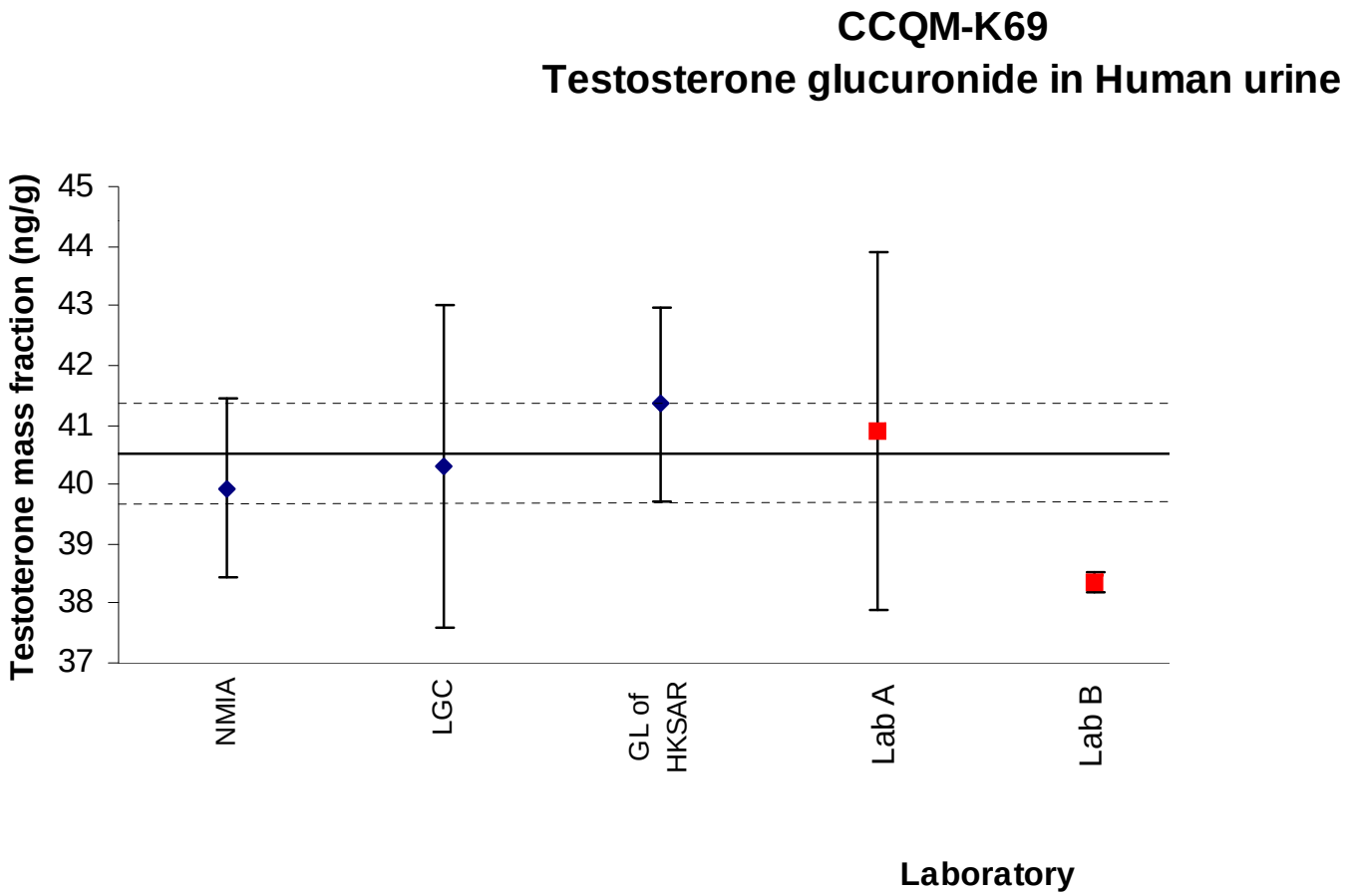
CCQM-K6 and Subsequent Study



K69 / P115: Participants' Methodologies

Laboratory	Method Summary	Instrumentation	Form of analyte being measured
NMIA	Exact matching IDMS, D_3TG Solvent extraction Enzyme hydrolysis LLE & HPLC fractionation Trimethylsilylation	GC/HRMS (Confirmation by LC/MS/MS)	Free testosterone Free epitestosterone (representing glucuronides)
GL of HKSAR	Single point IDMS , D_3TG Solvent extraction Enzyme hydrolysis SPE and LLE Trimethylsilylation	GC/HRMS	Free testosterone (representing testosterone glucuronide)
LGC	Addition of d3-TG, solvent extraction, evaporated, reconstituted	LC/MS/MS (Confirmation by LC-FAIMS-MS/MS)	Testosterone glucuronide
Lab A (P115)	Addition of d3-TG and d3-EG, SPE, extract reconstituted in mobile phase	GC/MS	Free testosterone Free epitestosterone (both from glucuronide forms)
Lab B (P115)	Addition of d3-TG and d3-EG, free steroid extraction, enzyme hydrolysis, liquid-liquid extraction, TMS derivatisation, GC/MS	LC/MS/MS	Testosterone glucuronide Epitestosterone glucuronide

All participants' Results for K69 and P115 for TG

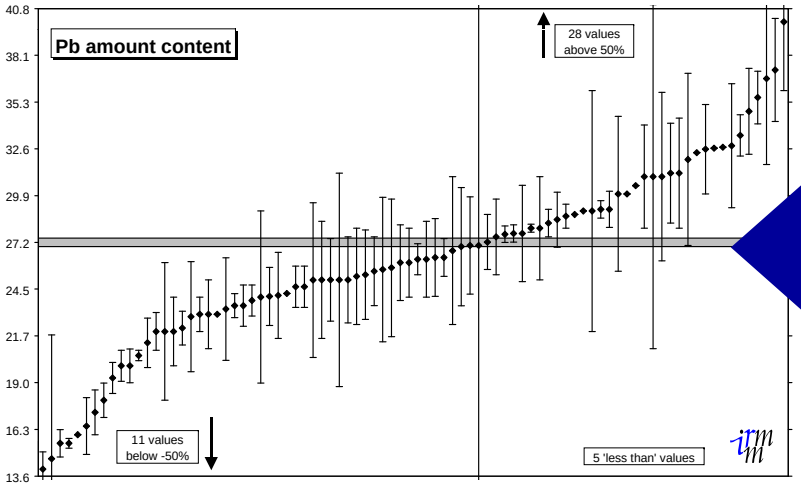


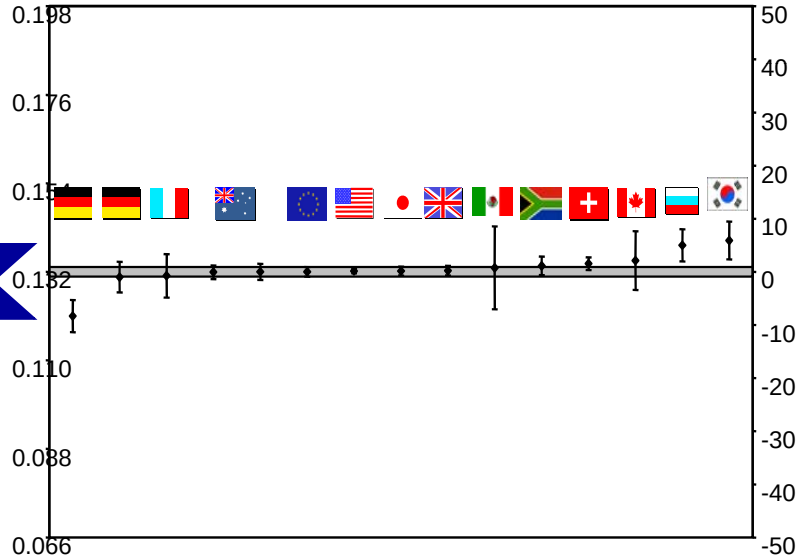
Blue = K69, Red = P115

Assessing the Quality of Results of Field Measurements

Example:

- **Lead in Wine**
- **International Measurement Evaluation Program (IMEP)**
- **Conducted by EC's JRC IRMM, 138 participating labs worldwide**





IMEP-16 **CCQM-P12**

- **NMIs provide traceable reference value**
- **Field laboratories assess their proficiency**

Friday, 6 November: Morning Plenary Session, Inmetro

Welcome: Humberto S. Brandi, SIM President

Roundtable Discussion: Chemical Metrology and Its Impact on Industry and Quality of Life

Moderator: Willie E. May, Chair, SIM Chemical Metrology Working Group

Rapporteur: Ulf Hillner, PTB Technical Cooperation Program

Testimonials and Dialogue regarding the rationale for and return on investment from National programs in Chemical Metrology

Panelists

1	João Jornada	President, Inmetro	Brazil
2	Gabriela Massiff	Director, Fundacionchile CMQ	Chile
3	Yoshito Mitani	Director for Materials Metrology, CENAM	Mexico
4	Wynand Louw	Acting CEO, NMISA	South Africa
5	Chainarong Cherdchu	Director for Chemical Metrology and Biometry, NIMT	Thailand
6	Robert Kaarls	CIPM Secretary and CCQM President	