NATIONAL LABORATORY ASSOCIATION
SOUTH AFRICA

What will the 'new GUM' mean for 'old GUM' laboratories

Steve Sidney

Chair – ILAC Laboratory Committee

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The view from an ISO17025 lab

Introduction

Context

Differences

Impact

What might ILAC do

Wrap up


AFRICA
EUROPE
EUROPE
ASIA
Mediterranean Sea
Caspian Sea
Strait of Gibraltar
Madeira (PT)
Canary Islands (ES)
Atlas Mountains
MOROCCO
TUNISIA
ALGERIA
LIBYA
Qattara Depression
Libyan Desert
EGYPT
Lake Nasser
Red Sea
Nubian Desert
Nile
WESTERN SAHARA
S A H A R A
Tropic of Cancer
MAURITANIA
CAPE VERDE
SENEGAL
THE GAMBIA
GUINEA-BISSAU
GUINEA
MALI
NIGER
CHAD
SUDAN
ERITREA
Ras Dejen ▲4533 m
DJIBOUTI
Lake Tana
Blue Nile
White Nile
Niger
BURKINA FASO
Lake Chad
SIERRA LEONE
LIBERIA
CÔTE D'IVOIRE
GHANA
TOGO
BENIN
NIGERIA
SOUTH SUDAN
ETHIOPIA
SOMALIA
Mt Cameroun 4100 m
CAMEROON
CENTRAL AFRICAN REP.
Ubangi
Congo
Rift Valley
L. Turkana
UGANDA
KENYA
EQUATORIAL GUINEA
Equator
GABON
CONGO
RWANDA
Lake Victoria
SÃO TOMÉ AND PRÍNCIPE
DEMO.REP. OF THE CONGO
BURUNDI
Kilimanjaro 5895 m
SEYCHELLES
Lake Tanganyika
TANZANIA
S O U T H
A T L A N T I C
O C E A N
Lake Malawi
COMOROS
Mayotte (FR)
ANGOLA
ZAMBIA
Zambezi
MALAWI
St Helena (UK)
NAMIBIA
ZIMBABWE
MOZAMBIQUE
Mozambique Channel
MADAGASCAR
Reunion (FR)
Namib Desert
BOTSWANA
Tropic of Capricorn
Kalahari Desert
Orange
SOUTH AFRICA
SWAZILAND
MAURITIUS
LESOTHO
Prime Meridian
Great Karoo
Drakensberg
Cape of Good Hope
LEGEND
Country Boundary
River
Lake
Mountain Peak
0 500 1000 Km
0 250 500 Miles
Copyright © 2013 www.mapsofworld.com
(Updated on 18th January, 2013)

The **True Size** of **Africa**

A small contribution in the fight against rampant *Immappancy*, by **Kai Krause**

Graphic layout for visualization only (some countries are cut and rotated)
But the conclusions are very accurate: refer to table below for exact data

COUNTRY	AREA x 1000 km²
China	9.597
USA	9.629
India	3.287
Mexico	1.964
Peru	1.285
France	633
Spain	506
Papua New Guinea	462
Sweden	441
Japan	378
Germany	357
Norway	324
Italy	301
New Zealand	270
United Kingdom	243
Nepal	147
Bangladesh	144
Greece	132
TOTAL	**30.102**
AFRICA	**30.221**

Top 100 Countries

Area in square kilometers, Percentage of World Total
Sources: Britannica, Wikipedia, Almanac 2010

In addition to the well known social issues of *illiteracy* and *innumeracy*, there also should be such a concept as "*immappancy*", meaning *insufficient geographical knowledge*.

A survey with random American schoolkids let them guess the population and land area of their country. Not entirely unexpected, but still rather unsettling, the majority chose *"1-2 billion"* and *"largest in the world"*, respectively.

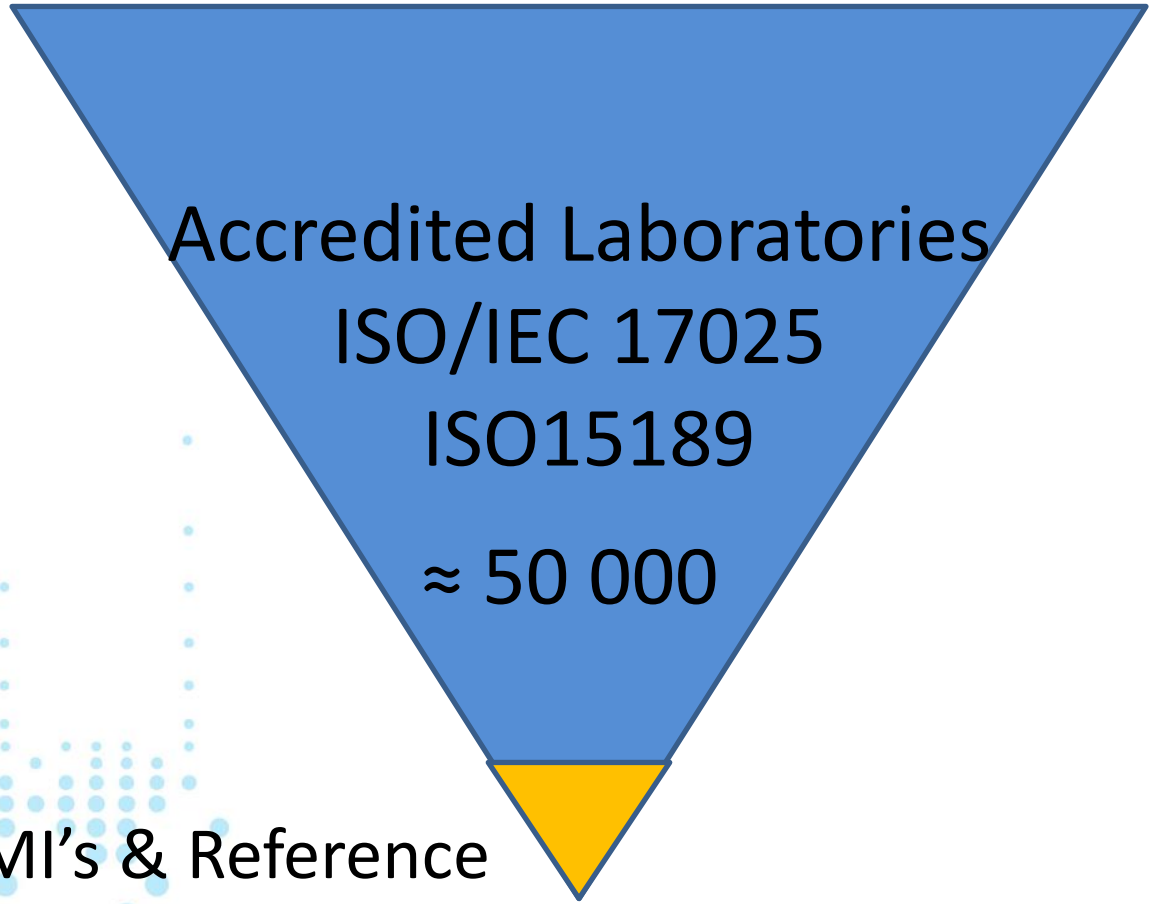
Even with Asian and European college students, geographical estimates were often off by factors of *2-3*. This is partly due to the highly distorted nature of the predominantly used mapping projections (such as *Mercator*).

A particularly extreme example is the worldwide misjudgement of the true size of *Africa*. This single image tries to embody the massive scale, which is larger than the *USA*, *China*, *India*, *Japan* and *all of Europe..... combined!*

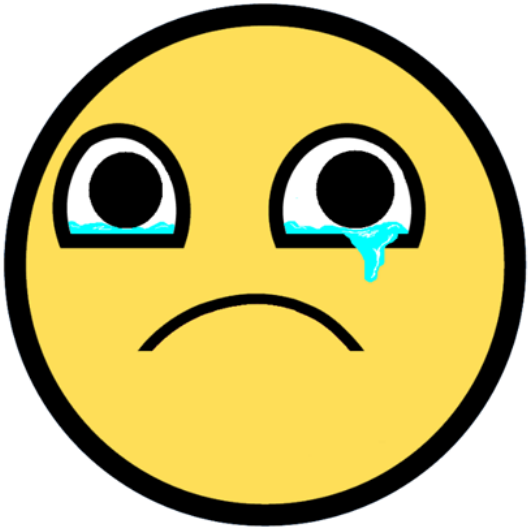
The view from an ISO17025 lab

- Difficulties
  - Modelling
  - Small number of repeat measurements
  - Identifying uncertainty contributors
  - Accreditation Bodies
  - Regulators
  - Sustainability

Context


Accredited Laboratories
ISO/IEC 17025
ISO15189
≈ 50 000
NMI's & Reference Labs

Context



Comparison

Steps	GUM 1993	GUM 2015
Model	✓	✓
Repeat Measurements	$\frac{s}{\sqrt{n}}$ or $\frac{s}{\sqrt{(n-1)}}$	$\frac{\sqrt{(n-1)}}{\sqrt{(n-3)}}$
Evaluate and if Model Linear	✓	✓
(V_{eff} , k) U = k.u(y)	✓	N/A
PT	✓	✓

EA 4/02 Supplement 2
Eg 2 – Calibration of 10 kg weight

Key	Values
s	25 mg
n	4
v_{eff}	80
k	2,02
u (GUM 1993)	28,45 mg
u (GUM 2015)	33,49 mg
U (GUM 1993)	57 mg
U (GUM 2015)	67 mg
Difference	17,5 %

Reporting results – 1

- Four laboratories A, B, C and D
  - same equipment
  - same linear measurement model
  - same result y=100
  - Evaluate the same uncertainty u(y) = 5 either by calculation or by MCM

Reporting results – 2

- Lab A reports that y is in the interval 100 ±22,4 with a probability of at least 95 % **assuming no particular PDF**
- Lab B reports that y is in the interval 100 ±14,9 with a probability of at least 95 % **assuming a symmetric PDF**
- Lab C reports that y is in the interval 100 ±10 with a probability of 95 % **assuming a Gaussian PDF**
- Lab D reports that y is in the interval [92;112] with a probability of 95 % **on the basis on a state-of-knowledge PDF**

Impact

Standards

Accreditation

Regulators

ILAC – what to do ?

- Will they need to evaluate all uncertainty "budgets" for linearity – then what?
- When major contribution n < 10 – then what?
- Current guidance – what comes first?
- Transition period – (1 to 10 years)?

Considerations

Recognise the progress that has been made

Build on it

Don’t ignore the 80:20 rule

Wrap up

Thank you

Content:
Erik Oehlenschlaeger – DANAK (ILAC)