EUROMET General Assembly 2004

EUROMET

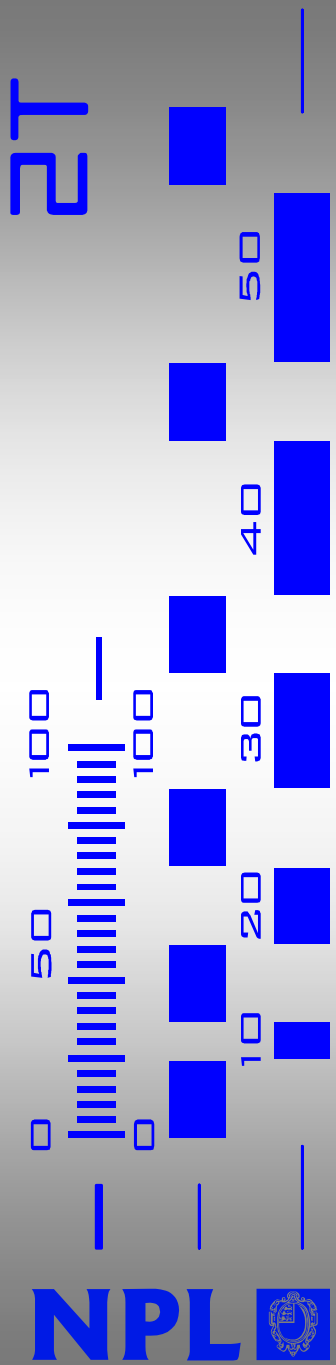
Technical Committee - Length

Chairman's Annual Report

(2003/2004)

Andrew Lewis

June 2004



Outline

- Status of key comparisons
- Periodicity of key comparisons
- Most important issue: new style key comparisons
- Other MRA issues
- Selected projects for case study

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Status of key comparisons

CCL key comparisons

KC	Pilot	Status	EUROMET participants	EUROMET meas. date
CCL-K1 Gauge blocks	CH	completed	CH GB FR	1999
CCL-K2 Long gauge blocks	GB	completed	GB IT DE	1999
CCL-K3 Angle (polygons)	ZA	draft A seen	FR IT CH DE	2001
CCL-K4 Diameter (rings)	USA	draft A seen	CH DE GB IT	2000 - 2001
CCL-K5 1-D CMM artefacts	DE	completed	ES IT CH DE	2000 - 2001
CCL-K6 2-D CMM artefacts	MX	draft A expected	FR CZ NL GB DE	2001 - 2002

➔ First set of CCL key comparisons completed by late 2004

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Status of key comparisons

EUROMET key comparisons

KC	Pilot	Project	Status	Meas. date	Comments
EUROMET.L-K1	FR	471	draft B seen	1999 - 2000	supersedes L-K1.PREV (1993-1995)
EUROMET.L-K1.1	NO	643	draft B submitted	2002	subsequent to L-K1
EUROMET.L-K2	GB	602	running	2002 - 2005	supersedes L-K2.PREV (1991-1992)
EUROMET.L-K3	DE	371	completed before MRA	1996 - 1999	L-K3.2005 to be planned
EUROMET.L-K4	CH	384	completed before MRA	1996 - 1998	L-K4.2004 planning about to start
EUROMET.L-K5	DE	372	completed before MRA	1996 - 1998	L-K5.2004 planning about to start
EUROMET.L-K6	DE	743	running	2004 - 2005	Just started

➔ Full set of EUROMET key comparisons completed by 2005

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Key comparisons workload: CCL & EUROMET

➔ CCL key comparisons operate on ~ 7 year cycle

RMO	KC L.	1998	1999	2000	2001	2002	2003	2004	2005
CCL	K1								
	K2								
	K3								
	K4								
	K5								
	K6								
EUROMET	K1								
	K2								
	K3/K3 prev								
	K4/K4 prev								
	K5/K5 prev								
	K6								

6 completed CCL key comparisons
Involving CH, GB, FR, IT, DE, ES, CZ, NL

Linking labs CH, GB, FR, IT, DE, ES, CZ, NL
4 completed EUROMET key comparisons
2 running EUROMET key comparisons

➔ EUROMET has almost full set of linking RMO key comparisons (missing K6) available for CMC evidence

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Key comparisons workload: other RMOs

RMO	KC L.	1998	1999	2000	2001	2002	2003	2004	2005
APMP	K1							A	
	K2						A		
	K3								
	K4								
	K5								
	K6								
SIM	K1/K1 prev					B		K	
	K2								
	K3								
	K4								
	K5								
	K6 prev								
COOMET	None								
SADCMET	None								

2 completed APMP key comparisons

Linking labs AU, KR, CN

No other CCL members

1 completed SIM key comparison
2 previous SIM key comparisons

1 key comparison just starting

➔ Other RMOs still not achieved full set of key comparisons and next round of CCL comparisons due to start

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Issues with length key comparisons

Non numerical linking CCL - RMO key comparisons

- Measurands are properties of artefacts and not realizations of the SI unit
- Degrees of equivalence are artefact dependent
- Artefacts become damaged during normal use in key comparisons
- Numerical linking is not sensible - linking is only by ‘competency’

Double work of linking laboratories

- Have to participate in RMO comparison and CCL comparison
- Some regions have few labs able to participate in CCL comparisons
- Insufficient resources/funding for two comparisons

Poor performers in key comparisons

- Hard to find bilateral partners – additional workload

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➔ New style of comparisons

CCL key comparisons no longer operated

- Only arrange new CCL comparisons for special reasons

RMO key comparisons continue

- CCL specifies the key comparison topics, oversees process
- RMOs organise the RMO key comparisons
- Expect and require inter-RMO participation (linking)
- Time-staggered start dates across regions
- Each NMI to participate in each topic at ~7 year intervals – can choose to be in any regional key comparison

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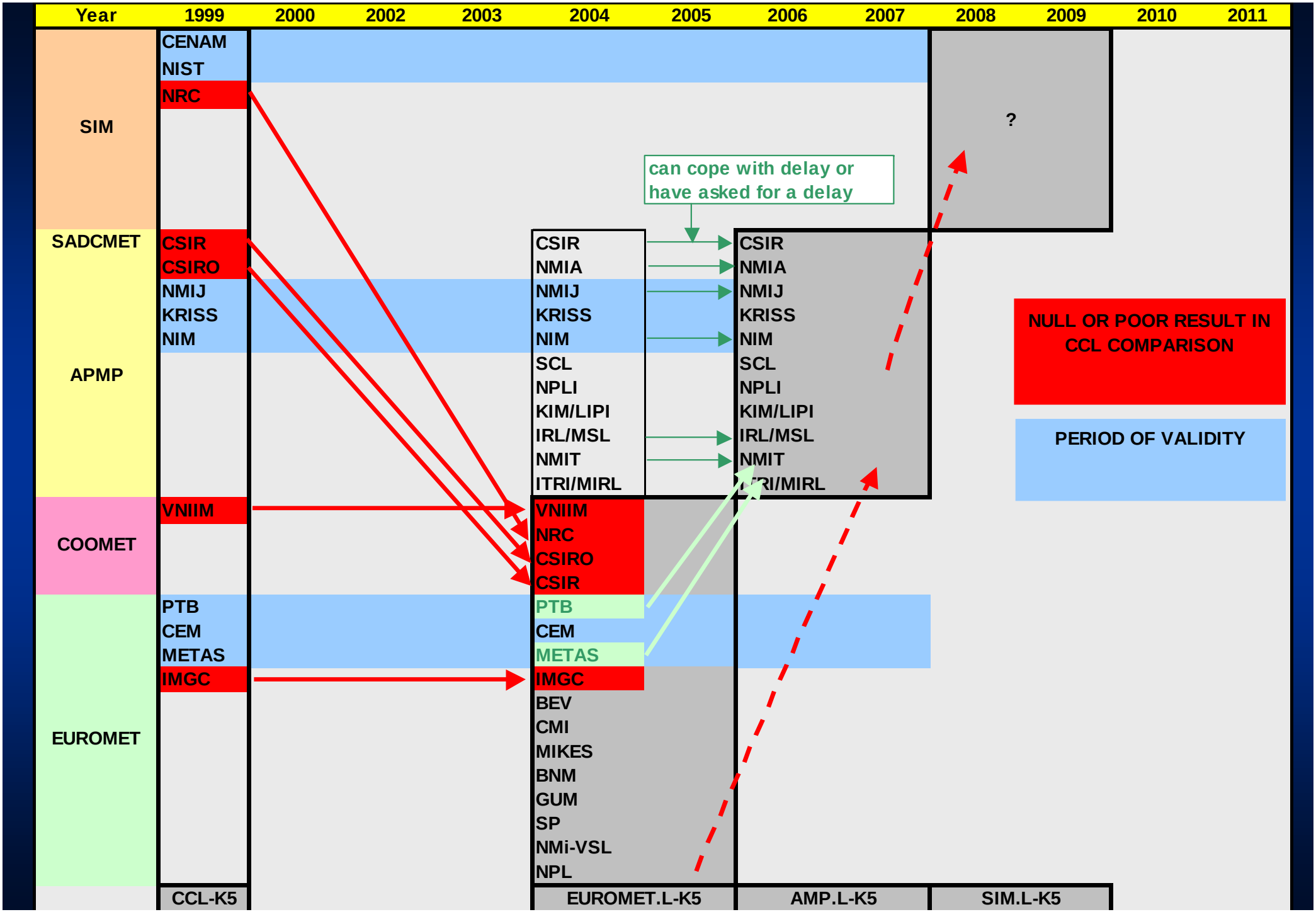
Year
1999
2000
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
SIM
SADCMET
APMP
COOMET
EUROMET
CENAM
NIST
NRC
CSIR
CSIRO
NMIJ
KRISS
NIM
VNIIM
PTB
CEM
METAS
IMGC
?
can cope with delay or
have asked for a delay
CSIR
NMIA
NMIJ
KRISS
NIM
SCL
NPLI
KIM/LIPI
IRL/MSL
NMIT
ITRI/MIRL
VNIIM
NRC
CSIRO
CSIR
PTB
CEM
METAS
IMGC
BEV
CMI
MIKES
BNM
GUM
SP
NMi-VSL
NPL
NULL OR POOR RESULT IN
CCL COMPARISON
PERIOD OF VALIDITY
CCL-K5
EUROMET.L-K5
AMP.L-K5
SIM.L-K5

Other MRA issues

Anomalous results in key comparisons

"… pilots of key comparisons provide interim reports to participants as soon as it is technically possible. Where the participant clearly has reported an anomalous result the participant should be invited to check their results for numerical errors but not be informed of the magnitude or sign of the apparent anomaly".

Examination of CMCs after comparisons are completed

- Agenda item at TCL meetings
- Executive Reports from key comparison pilots

CMC delays

EUROMET.L.3.2003: > 1 year for internal review of ~ 90 entries

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Case study candidate projects

588: Traceability of surveying and geodetic instruments

- Partners: CEM (ES) and most of EUROMET

- Survey into available specification standards, services, techniques and expertise
- Facilitated national metrology decisions
- ‘Filling in the gaps’

- Shows how EUROMET can act as a focus for such issues

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Case study candidate projects

593: PRAQIII Inter-comparison of length measurements

- Partners: (LNE) FR, HR, LI, LV, EE, SL, PL, CZ, HU, SK, BG, RO, YU

- Funded by PRAQIII, organized within EUROMET
- Wide variety in partners' metrology backgrounds

- Demonstration of equivalence
- Data to support entry of new EUROMET members

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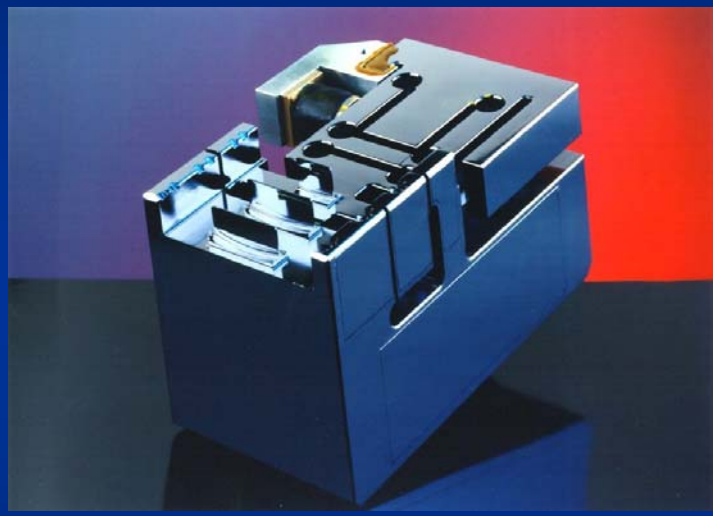
Case study candidate projects

659: The combination of scanning probe microscopy, optical interferometry and x-ray interferometry

- Partners: NPL (UK) and PTB (DE)
- Collaboration on research
- Sharing of resources: equipment & staff
- Staff secondments via fellowships



- World-leading picometric accuracy
- Traceability for nanometric accuracy length measuring instruments
- Building on previous collaboration, NPL, PTB, IMGC

- The sort of research collaboration that was difficult before EUROMET was set up

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TC Length 2002 Maribor