Consultative Committee for Length (CCL)
President A Sacconi, Executive Secretary L Robertsson

Meets every - 2 years **Last meeting -** September 2012 **Members/Observers** 25/1	**Working groups**: Nano, WG MRA, Strategy; Joint CCL-CCTF Frequency Standards WG +12 sub-groups		
Comparison activity	**Completed**	**In progress**	**Planned**
CCLKCs (& CC Supplementary)	8+ (4)	2	9
RMO KCs (& SCs)	18 + (23)	12 + (13)	3 + (no data)
BIPM comparisons	2	0	0
CC Pilot studies	4 (later upgraded to SCs)	0	2
CMCs	1341 CMCs in 102 service categories		

Pointers to the future, stakeholder needs and technological developments

- **Nanotechnology**: application of crystal lattice based length standards, methods divergence (e.g. between AFM, SEM and optical metrology of linewidth).
- **Coordinate metrology**: verifying flexible measurement systems, automated uncertainty analysis
- **Optical frequency combs**: widespread adoption of comb technology might require new comb verification methods.
- **Angle measurement technology**: Encoder technology taking over while traditional artefacts such as angle blocks rapidly diminishing in importance.
- **Industrial demand for higher accuracy** in dimensional metrology: coordinate measurement via X ray tomography, articulating arms, laser trackers & scanners, indoor GPS; digital manufacturing, GNSS impacting at macro scale, refractive index measurements in non-uniform environments (& thermal compensation on measurands to 20 °C), multi frequency/colour combs/lasers for absolute interferometry (departing from 633 nm helium neon), large areas assessment in manufacturing, intrinsically traceable metrology, in process metrology.

Workload Trend & Workload Management

- Currently 7 comparisons test the 7 principle techniques (gauge blocks, angle standards, cylindrical diameter, step gauges, line scales, surface texture and laser wavelength). The set may evolve but no plans to reduce, it is considered a minimum set needed to test basic measurement techniques.
- 8 of the tentatively planned KCs are repeats only. Thus if the discussed new technologies do indeed lead to the need for comparisons, list may grow but the resources to participate in comparisons is relatively modest. Needs for new comparisons might be particularly anticipated in nanometrology and 3D flexible CMMs.
- With a set list supporting the basic techniques, possible increase in the workload depends on whether potential new measurement areas develop in the NMIs, requiring new comparisons.
- Lengthening the time between comparisons would in principle have little adverse effect, if the quality system is working properly.
- There is already a lack of support in the NMIs for taking on the burden of piloting (and the associated purchase of the required artefacts, which are often unusable after comparison circulation).
- Resources: Piloting 1.0 pm, Participation 0.14 pm. Values given are minimal, for repeating well-established comparison with no unusual problems/measurement requirements, and with much overhead at the time of the KC assigned not to the KC but to maintenance of the quality system.

BIPM – references to laboratory activity at the BIPM

- BIPM has no laboratory activity in Length so reference to historical BIPM comparisons only, there are no suggestions in the strategy for activity at the BIPM. Recommend continuation of educational activities.