Consultative Committee for Thermometry (CCT)
President Y Duan, Executive Secretary S Picard

Meets every 2 or 3 years **Last meeting** in June 2017 **Members/Observers** 23/2	**Working groups**:[1] Contact Thermometry (WG-CTh); Environment (WG-Env)[2]; Non-Contact Thermometry (WG-NCTh); Humidity (WG-Hu); Key Comparisons (WG-KC), CMCs (WG-CMC); Strategic Planning (WG-SP)		
Comparison activity	**Completed**	**In progress**	**Planned**
CCT KCs (& CC Supplementary)	14 (1)	8 (2)	1
RMO KCs (& SCs)	31 (17)	12 (17)	8 (8)
BIPM comparisons (all on-going)	0	0	0
CC Pilot studies	4	0	No Data
CMC	2551 CMCs in 46 service categories		

Pointers to the future, stakeholder needs and technological developments

- The **redefinition of the kelvin (K)** foreseen in 2019 will have small impact on the daily life but represents important advantages in the long term. The future ***Mise en Pratique* of K** has been drafted and information on associated primary thermometry methods (e.g. **spectral radiometry**, **acoustic gas thermometry**, **dielectric constant gas thermometry**, **noise thermometry**, and other kinds of **gas thermometry**) have been completed or are in progress. It may be noted that the development of the primary instruments has also generated several spin-off applications.
- In the short-term, the ITS-90 **(International Temperature Scale)** will still be relevant and subject for incremental improvements. In the long term (10+ years), merging the ITS-90 with the PLTS-2000 (**Provisional Low Temperature Scale**) although possible (leading to a future temperature scale ITS-20xx) any decision to do so would need to be carefully balanced against real stakeholder needs and cost of implementation.
- **Primary radiometry** and High Temperature Fixed Points will be used to disseminate low-uncertainty thermodynamic temperature realizations for the high-temperature region. As increasing numbers of institutes opt for these alternatives it is possibile that the ITS-90 in this temperature region will be superseded. Ensuring world-wide equivalence of temperature in this increasingly mixed situation will be a key role of the CCT in the coming decade.
- The use of **mercury** (Hg) is increasingly controlled and its possible ban in some countries would cause a disruption of the ITS-90. Research should be stimulated to find alternatives and the CCT will need to plan how the ITS-90 could be maintained if mercury was banned.
- **Humidity** metrology is driven notably by environmental needs and climate observations, advanced production processes and global interoperability of industry. Relative humidity has a problem of multiple definitions that are non-unique, or inapplicable in certain ranges, and therefore solutions such as a fugacity-based definition are being considered.
- **Thermophysical quantities** are particularly valuable to support the climate and energy sectors. Support to CMC entries and review in this area are presently being prepared.
- **Environmental observations** are linked to temperature and humidity measurements. Collaboration with the World Meteorology Organization (WMO) via a CCT Working Group allows a reciprocal exchange of expertise and advice - a valuable resource also for the potential creation of a Global Surface Reference Network for climate variables.
- **Photonic devices** are presently being exploited for temperature measurements and **emerging technologies** will allow self-diagnosing and self-calibrating small-scaled instruments. Such sensor networks will impact on a broad range of industries. These technologies and benefits are presently being studied in a Task Group of the CCT and will be reported subsequently.

Workload Trend & Workload Management

- CCT workload increased with the forthcoming redefinition of kelvin and is expected to increase further with consideration of primary methods as well as novel secondary methods for disseminating temperature unit.
- 6 KCs cover presently the total temperature range and 2 KCs cover humidity needs. Two repeats, CCT-K9 and CCT-K10 are both expected to be completed in 2018. A first repeat of Water Triple Point Cell comparison will be triggered around 2018-2019. Repeats will be generally made on a 10 year interval.
- Resources to pilot or participate in comparisons may to some extent be decreased by benefiting from accumulated experience.

BIPM – references to laboratory activity at the BIPM

- BIPM has no laboratory activity in thermometry.

[1] Status as of 11 October 2017

[2] Presently a Task Group – recommended to become a Working Group at the 28th meeting of the CCT.