Consultative Committee for Amount of Substance – Metrology in Chemistry and Biology (CCQM)
President W May, Executive Secretary R Wielgosz

Meets every year **Last meeting** 27-28 April 2017 **Members/Observers/Liaisons** 24/11/6	**Working groups**: Organic Analysis (OAWG); Gas Analysis (GAWG); Inorganic Analysis (IAWG); Electrochemical and Classical Analysis (EAWG); Protein analysis (PAWG); Nucleic Acid Analysis (NAWG); Cell Analysis (CAWG);Surface Analysis (SAWG); Key Comparison and CMC (KCWG); Strategic Planning (SPWG); ad hoc WG on the mole; ad hoc WG on KCDB 2.0.	
Comparison activity	**Completed/In progress**	**Planned**
CCQM KCs (& CC Supplementary)	172	12 per year
BIPM on-going comparisons	1	2
CC Pilot studies (stand-alone)	134	4 to 5 per year
CMC	6227	

Pointers to the future, stakeholder needs and technological developments

The scope of this CC is very diverse and complex and should provide for evolving and expanding measurement service needs. Specific examples of important issues and trends in various sectors that are likely to drive the development of NMI activities are given below. Future CCQM comparisons, stakeholder engagement and progress in the state of the art for chemical and biological measurement science will be driven by needs to establish the international equivalence of measurement standards and services in these sectors.

Healthcare: reference measurement systems for diagnostics, traceability of quantitative measurements of nucleic acids, proteins, polysaccharides and cells to the SI including high accuracy purity assessment; systems biology support (e.g. combined 'omic' approaches covering lipids/cells/genes/proteins…) including interactions in immune systems; measurements to support bio/pharmaceutical identity, quality, safety and efficacy; measurements of immunosuppressants; quality of medical gases; standardization of regenerative medicine therapeutics

Food safety and nutrition: Residue and contaminant quantification, microbial identification and quantification, nutrient quantification, food constituent labelling, food provenance and adulteration.

Environment: reference measurement systems for: Long-term global, direct and remote monitoring of greenhouse gases; development of emission controls on toxic and reactive gases from industrial activities to atmosphere and workplace; particulates and nanoparticles semi-volatile organic compounds and in indoor and urban air including real time analysis of composition; Isotope ratio measurements for sensitive environmental studies; Water quality and Long-term monitoring of the oceans.

Energy: diversification in the supply of energy gases (e.g. biogas, coal mine methane, shale gas); dissolved gas in water (e.g. methane and methane hydrates); emerging hydrogen economy (e.g. measurements of impurities in hydrogen); usable energy from bio waste; Industrial biotechnology (harnessing sustainable microbial energy); Chemico-physical properties of biofuels; State of health and of charge of energy storage systems (e.g. batteries in the automotive sector); injection of non-conventional gases into existing gas grids; alternative technologies in photovoltaic systems.

Advanced materials: Development of metrologically underpinned characterization tools and protocols for analysis of nano-structured surfaces, nano-particles. Research towards traceability of toxicity measurements will on focus on chemical and biological characterization of nano-particles; development of new materials with functional surfaces including, biomaterials, meta materials, and hybrid materials; electrochemical sensors to monitor and feedback on the performance of smart materials; embedded chemical sensors in intelligent buildings; nanoporous materials for applications as adsorbents, catalysts and gas cleaning.

Workload Trend & Workload Management

- CCQM WGs have developed a core comparison approach to the organization of Key Comparisons in order to maintain the total number of key comparisons and pilot studies constant whilst increasing their scope and impact.
- The CCQM is actively working on the concept of 'broad claim CMCs' as an effective approach to presenting capabilities and managing resources required for their review.

BIPM – references to laboratory activity at the BIPM

- The BIPM Chemistry Department coordinates key comparisons and pilot studies prioritized by the CCQM in response to NMI needs (6 key comparisons (2012-2016), with over 100 NMI participations in these comparisons), for:
  a) greenhouse and air quality gases to ensure the long term accurate global monitoring of these species, including BIPM.QM-K1 for surface ozone and BIPM.QM-K2 for CO_2 in air (planned).
  b) pure small and large molecule organic calibrators (source of traceability for measurements of the amount of organic species in a wide range of clinical, environmental, food, forensic and drugs in sport applications).
  In addition the Department runs capacity building and knowledge transfer laboratory activities for Metrology for safe Food and Feed and Clean, including the running of comparisons to demonstrate competencies acquired through the projects.