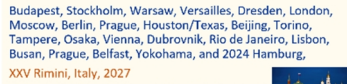
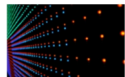
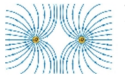
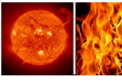
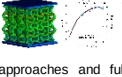
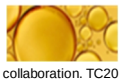
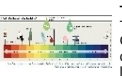
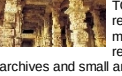


International Measurement Confederation E-mail address: imeko@hunmeko.org   42 Member Organisations Worldwide IMEKO for Metrology list of authors: IMEKO “Metrology for Humanity” the XXV World Congress Rimini, Italy. 	Who we are: IMEKO (International Measurement Confederation) is a global organisation – a non-governmental and non-profit federation of 42 Member Organisations, each concerned with the advancement of measurement technology. Its fundamental objectives are promoting the international interchange of scientific and technical information in measurement and instrumentation and enhancing international cooperation among scientists and engineers from research and industry.  The Confederation was founded in 1958 by Dr György Striker, and since then, it has played a significant role in metrology.  Our first conference took place in 1958. Since then, IMEKO has regularly organised events, such as symposia, conferences, workshops, and seminars on specific topics, as well as world congresses, and publishes events, scientific papers, textbooks, and studies in various countries worldwide. The activity of IMEKO is mainly carried out through 26 Technical Committees, which cover the breadth and diversity of the field of measurement and metrology today.  From 26 to 29 August 2024, experts, researchers, and industry leaders from around the globe convened in Hamburg's newly renovated Congress Centre (CCH), setting the stage for meaningful scientific dialogue, collaboration, and groundbreaking presentations. The 24th IMEKO World Congress attracted over 1,200 registered participants from 78 countries, reinforcing IMEKO's commitment to advancing the frontiers of measurement and instrumentation.	How we Support Metrology  IMEKO International Relations IMEKO values its international collaborations. As a worldwide organisation, IMEKO has a series of memoranda of understanding with most regional metrology organisations and EUROLAB. It is also a signatory of the Joint Statement of Intent on Digitalisation.  Scientific Publication IMEKO reaches out to the global scientific community through a series of publications which are widely read by the measurement and metrology communities: - Acta IMEKO – a diamond open-access journal (its impact factor is 1.13). - Measurement is an IMEKO Journal published by Elsevier. As a top-quartile journal, it is one of the most recognised journals, with high scientific content and an impact factor of 5.2. - Elsevier publishes several more IMEKO journals to extend the scope of its publishing activities, including: - Measurement Sensors, - Measurement Food, - Measurement Energy, - Measurement Digitalisation. IMEKO TC Conferences and 24 World Congresses  Apart from the regular 'Technical Committees' conferences, very successful World Congresses are organised triennially. These are based on the activities of the IMEKO Technical Committees, which provide a forum for international research across the breadth of measurement and metrology. A major industry-focused exhibition is also held, emphasising the close links to industry. 	IMEKO – from Today into the Future The Confederation is a long-established yet dynamic global organisation specialising in measurement and metrology. It constantly evolves to serve the metrology and instrumentation community's current and future needs. IMEKO aligns closely with the United Nations Sustainable Development Goals, spanning the more traditional field of measurement to the upcoming quantum technology and digitalisation areas. UN Goals  "The 2030 Agenda for Sustainable Development, adopted by all United Nations Member States in 2015, provides a shared blueprint for peace and prosperity for people and the planet, now and into the future. At its heart are the 17 Sustainable Development Goals (SDGs), an urgent call for action by all countries developed and developing in a global partnership. They recognise that ending poverty and other deprivations must go hand-in-hand with strategies that improve health and education, reduce inequality, and spur economic growth, all while tackling climate change and working to preserve our oceans and forests." IMEKO, working through its General Council and especially its Technical Committees, has a major opportunity and a key role to play in providing the basis for the better technical measurement systems needed globally to allow these Goals to be achieved and their achievement verified, underpinned by the work on measurement standards at our national metrology laboratories. IMEKO and the Forum of Joint Statement of Intent on Digitalisation  The Forum was established by the International Committee for Weights and Measures (CIPM / CGPM27) to address the challenges of the global digital transformation for metrology and to digitalise the services and products offered by BIPM. As an inclusive horizontal organisation, its mission is to act as a platform for exchanging information and creating synergies. IMEKO was one of the first organisations to sign the Statement and join the Forum. The Forum is made up of six task groups and three working groups: Task Group on FAIR for Metrology, Task Group on Secure and Trustworthy AI (new name: Building a safe and trustworthy AI), Task Group on SI-digital Framework, Task Group on Metrological Semantics, Task Group on Harmonizing DCC and DRMC, Task Group on Data Quality in Metrology, Committees, Working Group on coordination between Regional Metrology Organizations, Working Group on Strategy (steering committee). The TGs on Metrological Semantics and Data Quality have applied for a merger. The proposal to establish a 'Joint Statement of Intent (JSI) signatory roundtable' to serve as a platform for discussion between the signatories had been welcomed by the CIPM (CIPM/112-40) and had led to the Workshop 'Towards Digital Quality Infrastructure' which had taken place at the BIPM Headquarters on 5–6 March 2024 immediately preceding the first Forum. IMEKO is one of the signatories, and Frank Härtig, the Advisory President of IMEKO, is currently chair of the JSI Hub. The task of the JSI Hub is to establish a link between the TGs and WGs of the Forum and the JSI stakeholders. The JSI Hub is part of an ongoing initiative by CIPM and FORUM-MD to develop and establish a worldwide uniform and secure data exchange format based on the SI associated with machine-actionable vocabularies, SMART standards, GUM in the digital age, FAIR principles, point as a separator, and SI reference point. There were two workshops in 2024 by the JSI Hub, one from NCSLI on the challenges and opportunities of Digital Transformation in Metrology and one on traceability as part of the IMEKO World Congress in Hamburg. The next activity of the JSI Hub will be a joint conference organised by IMEKO and OIML on 7 October 2025 in Berlin, Germany.	A Strategy for IMEKO for the 2030s IMEKO Vision 2030 The vision of IMEKO is to become the primary global organisation promoting excellence across the breadth of measurement and instrumentation in metrology (MIM).  Making IMEKO a dynamic and responsive organisation. - Through IMEKO's breadth of activities, we support stakeholders and facilitate exchanges to respond to the needs of the changing world in which we live and work. - IMEKO is committed to creating a culture in which diversity and equality of opportunity are promoted actively and in which discrimination is not tolerated, and also to building and maintaining an environment which values the diversity of its community. Supporting its Technical Committees (TCs) to operate at the forefront of science and industry. - Promoting the TCs to enable their activity to reflect the state-of-the-art in the field, putting them at the core of IMEKO's technical activities. - Ensuring that the Technical Committees reflect the breadth of topics in MIM today. - Organising events such as Technical Committee Symposia, Conferences and the triennial World Congress to bring communities in metrology together and network. - Organising scientific events to allow researchers and scientists to communicate their research and expand scientific activities. Ensuring that IMEKO is well recognised as an effective, global organisation. - Engaging scientists and engineers from across the world in its activities. - Building an environment that supports its membership and the activities of scientists and researchers worldwide. - Creating and improving the standing of IMEKO to better serve the global community. - Collaborating with other organisations across the world to maximise impact for the community. Enabling IMEKO to have a real outreach to serve and support its breadth of stakeholders. - Serving our stakeholders in understanding and improving the state-of-the-art in MIM. - Expanding the network of scientists working across the areas of MIM. - Fostering new, cross-disciplinary areas in MIM as a key part of IMEKO's activities. - Building active collaborations with other international organisations with similar aims and objectives for mutual benefit. Ensuring that IMEKO excels in its publication and web presence. - Through its journals, publishing all valuable high-impact work globally in the field of MIM. - Being ambitious and creative in providing new publication opportunities to support the MIM community globally. - Growing the reputation and reach of all IMEKO journals worldwide across IMEKO's remit. Equality, Diversity and Inclusion - IMEKO supports an inclusive culture in which diversity and equality of opportunity are actively promoted.
The TECHNICAL Committees of IMEKO Our 26 Technical Committees form the backbone of IMEKO's technical work. The wide range of activities includes regularly organised workshops, seminars, symposia, and conferences on specific topics. Our events bring together researchers, engineers, and industry professionals to explore cutting-edge advancements in metrology and their impact across diverse domains. IMEKO also publishes proceedings of events, textbooks, glossaries, and studies. Besides those with long traditions, the Technical Committees also represent vital and current topics, such as Digitalisation and Quantum Technology.				
TC1: Education and Training in Measurement and Instrumentation TC1 is concerned with all matters of education and training of professional scientists and engineers for measurement and instrumentation, including curricula, syllabuses and teaching methods, as well as the nature and scope of measurement and instrumentation as an academic discipline.  TC2: Photonics TC2 promotes modern optical measuring techniques, focusing on their theoretical foundations, principles, and applications. It encompasses methods based on detecting and observing interactions between photons or electromagnetic radiation and the item under test. The scope includes advances in optical metrology, novel sensor technologies, precision measurement techniques, and their applications across various scientific and industrial domains. TC3: Measurement of Force, Mass, Torque, and Gravity TC3 aims to bring to the forefront the latest developments and achievements in the measurement of force, mass, torque, gravity, and related quantities. The scope of TC3 covers all areas, from industrial applications and new transducers to improvements of the scales for the different quantities, the realisation of new standards, and fundamental research. TC3 regularly organises international scientific events related to the measurement of these quantities and provides a forum for an international exchange of opinions among experts in the relevant fields.  TC4: Measurement of Electrical Quantities TC4 focuses on measuring electrical and magnetic quantities and processing measurement data using hardware and software tools. The Committee explores how electronics and informatics provide flexible instrumentation solutions, enabling efficient data acquisition and extracting additional information from observed processes. Digital post-processing plays a key role in error reduction, employing techniques such as auto-calibration and self-testing to enhance measurement accuracy. The accuracy of electronic instruments largely depends on the analog-to-digital conversion process and mitigating errors from various interference sources. An objective of TC4 is to recommend continuous updates to standards, ensuring they reflect advancements in electronic instrumentation and measurement technologies. TC5: Hardness Measurement TC5 is concerned with organising international symposia on new theoretical knowledge in hardness testing and presenting papers, including on recently developed equipment. Topics are the exchange of experiences among members of the Committee to solve outstanding problems and transmit the results to interested organisations or experts in different countries. The activities include, if necessary, initiating or guiding metrological activities in international cooperation (e.g. hardness comparison), which can help to elaborate and revise international standard specifications.  TC6: Digitalisation TC6 aims to develop, organise and disseminate fundamental concepts of measurement science related to digitalisation and digital transformation in science, industry, and society. The TC promotes the accumulation and curation of knowledge in various forms relating to the digitalisation of measurement methodologies and measurement outcomes. Its purpose is to provide a robust body of knowledge to support digital transformation when measurement is involved. Digitalisation's multidisciplinary nature is expected to overlap with other IMEKO groups' interests. TC6 thus encourages collaborations and joint activities with other TCs.	 TC7: Measurement Science TC7 proactively develops, disseminates, and implements Measurement Science nationally and internationally by organising meetings, workshops, scientific symposia, and other events to create opportunities for sharing research work, ideas, and new developments and collaboration among researchers active in the field. TC7 promotes building a body of knowledge of concepts, axioms, rules, principles, methods, and procedures for obtaining, processing, expressing and communicating correct and reliable measurement results of physical and non-physical quantities. In the IMEKO community, the Committee is characterised by its emphasis on the methodological issues of measurement and the exploration of its pervasive and interdisciplinary role by including, for example, the study of such topics as historical, social, and ethical aspects of Measurement Science. The subject areas being studied at present within TC7 are, among others: measurement uncertainty; measurement in soft systems; epistemology of measurement; generic techniques for the design of measurement systems; models in measurement; formal theories of measurement; semantics of measurement; measurement of non-physical quantities; intelligent measurement; emerging challenges and novel concepts of Measurement Science.  TC8: Traceability in Metrology TC8 deals with the fundamental criteria and technical aspects of traceability in metrology, the rules of calibration chain systems, and the reliability and limitations of traceability schemes. It provides a forum for an international interchange of opinions among experts in the relevant field. By organising international scientific events such as symposia, workshops, roundtable sessions, and activities on traceability, calibration procedures, intercomparisons, uncertainty evaluation, and other related topics, in close cooperation with international organisations in legal metrology, the Committee shares knowledge and experience. These activities aim to improve comparability and compatibility among measurements and calibrations worldwide, foster collaborative projects among international groups, and support mutual recognition of measurements and calibrations between National Metrology Institutes (NMI) or Accreditation Bodies to harmonise criteria, procedures, and uncertainty evaluation methods to facilitate technical information exchange.  TC9: Flow Measurement TC9 aims to support the development and dissemination of scientific and technological advances in flow measurement by facilitating the exchange of knowledge on current research, technical data, and best practices through technical conferences, member meetings and scientific papers. TC9 fosters collaboration between National Metrology Institutes (NMIs), Designated Institutes (DIs), Universities and other Laboratories in flow measurement. It facilitates knowledge transfer and discussions on key flow measurement developments, including new and improved flow measurement technologies, measurement uncertainty, traceability, calibration methodologies and best practices. TC10: Measurement for Diagnostics, Optimisation & Control TC10 facilitates the exchange of scientific and technical information on diagnostics, optimisation and control methods, measurement, instrumentation and systems by organising annual conferences and discussion meetings, and encouraging the publication of scientific papers. Also, the cooperation between scientists and engineers in different subject areas in solving various diagnostics, optimisation, and control problems is supported. TC11: Measurement in Testing, Inspection and Certification TC11 is dedicated to developing measurement science by creating knowledge networks to exchange scientific and technical information among experts and organisations internationally and to promote the best practices applied in industry, such as environmental protection, healthcare, safety, and quality of life. The Committee provides a forum for organising international scientific and technical events like congresses, conferences, seminars, workshops, training courses and meetings to share the latest achievements, knowledge, experiences, thoughts, views and ideas.  TC12: Temperature and Thermal Measurements TC12 provides a forum at the international level for exchanging opinions and experiences among experts in temperature and thermal measurements, discussing the main trends of research, development and applications. Attention is paid to sensors, new measurement methods, and instrumentation for temperature and thermal measurements. Emphasis is given to accurate measurements and improving efficiency in scientific, industrial, environmental and medical applications.	 TC13: Measurements in Biology and Medicine TC13 promotes advancements and innovations in: - Measurements: whole-body to molecular-level assessments, sensing physical, chemical, physiological and biological measures; bioelectric and biomagnetic measurements and simulations; electromagnetic compatibility of materials with human tissues; safety and performance evaluations and technical standards and regulatory framework for health measurement and biomedical instrumentation; bedside, in vitro, and clinical laboratory diagnostics, biosensors, and omics-based clinical measurements; biotechnology, nanobiology, biological reference materials, systems biology measurements, proteomics, transcriptomics, genomics, metabolomics, lipidomics, epigenomics and phenomics; drug metabolism, physiological modelling; assessing health and psychosocial attributes related to subjective phenomena, SI units, and biotechnical considerations. - Medical Imaging: Diagnostic imaging (X-rays, MRI, radionuclides, biomagnetic); biosignal processing; electromagnetic diagnostics; ionising radiation metrology; Monte Carlo simulations; drug delivery mapping. - Medical Information Systems: Information processing (signals and images) within the doctor/patient control loop for diagnostics, decision-making, and patient management; knowledge-based systems; measurement information systems in laboratory medicine; digital transformation in biology and medicine; telemedicine; wearable health devices, self-powered physiological sensors and portable monitoring systems; intelligent instrumentation, and medical informatics in healthcare and pharmaceuticals.  TC14: Measurement of Geometrical Quantities TC14 promotes and develops the theoretical knowledge, fundamental research and practical applications of measurement technologies for product inspection, process control and quality management in dimensional metrology. Our members are actively working on research and development in precision engineering, nanomanufacturing, bioengineering, and production (in the automotive, aerospace, space, machine, and energy sectors). The most important and recent issues arising from digital transformation in metrology that our Committee try to address include: - Development of novel measurement systems, with a primary focus on optical measurements, in-process and in-line systems, - Development in quality control systems for additive manufacturing, - Research on accuracy assessment, traceability assurance methods, and digital twin models for measurement systems used in metrology in the era of digital production, as well as the development of material standards insusceptible to ambient conditions changes, which may be used in demanding industrial conditions.  TC15: Experimental Mechanics TC15 aims to advance experimental measurement techniques by developing innovative, non-standardised testing methods and designing specialised experimental infrastructure with state-of-the-art instrumentation. Emphasising multimodal approaches and full-field evaluation, TC15 integrates diverse measurement techniques to enhance data accuracy and reliability. Additionally, it focuses on developing closed-loop, fully automated testing procedures to improve efficiency and repeatability in experimental studies, paving the way for more robust and comprehensive material and structure characterisation.  TC16: Pressure and Vacuum Measurement TC16 provides a forum for an international interchange of opinions among experts in the relevant field to share, at a worldwide level, knowledge and experience, which seeks to achieve comparability and compatibility among the measurements and calibrations carried out in all regions.	To pursue this goal, we organise symposia, workshops, round table sessions and activities on pressure measuring techniques, sensors and instrument design, calibration procedures, comparisons, uncertainty evaluation and other related applications. The Committee has been excited about several new projects that have become recently important: - Projects on the quantum pascal use gas refractometers to replace mercury manometer pressure standards. - The advancement of dynamic pressure measurements, with activities advancing in both theory and laboratory measurement. - About vacuum measurements that are based on cold-atom clouds. This last area demonstrates the overlap with vacuum technology and its importance in the next generations of quantum technology. TC17: Measurement in Robotics TC17 deals with all aspects relevant to internal and external robot sensors, such as force, tactile, distance, visual, and others, employed in robot motion and navigation control principles, methodology, and applications. Communication sensors that interface between man and robot are also included.  TC18: Measurement of Human Functions TC18 provides an opportunity and forum for discussing all aspects relevant to the measurement, analysis and modelling of human functions: movement, perception and cognition. Human movements and actions include hand manipulation, arm movements, posture control, gait locomotion, sports exercises, etc. Human perception and cognition: vision, auditory and somatosensory systems, space and motion perception, attention and performance, et al. Interaction and integration of human perception and cognition with movements and behaviours. Related Fields: Human Interface, Brain Sciences, Rehabilitation and Welfare, Sports Science, Human Factors.  TC19: Environmental Measurements TC19 created an international platform for collaborating in the field of environmental measurements. The main fields of activity are: analytical measurement of the three leading environmental media - air, water, and soil; instrumental methods for the measurement of environmental noise and vibration pollution; development and improvement of analytical methods for measuring environmental pollutants; development of new analytical methods, smart sensors, and instruments for monitoring of air and water quality in residential, industrial, and agricultural areas; measurement of soil characteristics; development and improvement of remote sensing methods for measuring environmental quality; development of new platforms and image processing techniques for detection of potential sources of contamination and monitoring of air, water, and earth quality; evaluation and assessment of environmental data; development of AI models associated with pollutants' classifications and pollutant concentration prediction; quality assurance and quality control of environmental measurements.  TC20: Measurements of Energy and Related Quantities TC20 provides an international forum for effective energy measurement and energy-related metrology collaboration. TC20 aims to bring the latest developments and achievements in the measurement and traceability of all types of energy, energy efficiency, related physical quantities, and relevant substance properties to the IMEKO community. Its goal is to facilitate cutting-edge research, address industrial needs, and make the results publicly available.	 TC21: Mathematical Tools for Measurements The scope and aims of TC21 are: - To promote the harmonisation, the co-ordinated use and the development of new mathematical and statistical tools for measurements and their implementation in guides, procedures and codes, acting as a portal in an international environment - To promote collaboration and synergy amongst scientists working in the fields of measurement science, metrology, testing, applied mathematics, statistics, computational science and data science - To enable scientists to understand the needs of enterprises and accelerate the transfer of research results to users in enterprises To collaborate with other IMEKO TCs to address their challenges relating to the development of mathematical and computational techniques and tools.  TC22: Vibration Measurement The objective of TC22 is to provide metrologists in the field of shock and vibration with an international forum for scientific information exchange. This promotes the latest developments and achievements and enables researchers to work more effectively. The title of TC22, "Vibration Measurement", is meant to enclose the measurement of the dynamic quantities displacement, velocity and acceleration not only if encountered in a periodic form but also as static or transient measurands (e.g. shock). The motion sensed may be translational and rotational (angular vibration).  TC23: Metrology in Food and Nutrition Food and Nutrition (F&N) metrology is an emerging discipline that helps strengthen the reliability of analytical data and integration of metrological concepts into the measurement process. Reliable measurements are necessary to ensure sustainability and reliable FAIR food and nutritional data. These tasks are looked upon as a twin assignment under TC23: - Enhancing the reliability of F&N measurements by introducing metrological concepts and - Strengthening the metrological capability of the professional pool (capacity building for young investigators) since the academic systems in the F&N domain insufficiently address the metrology concept. TC23 addresses various metrological issues concerning nutrition, food quality, and safety.  TC24: Chemical Measurements TC24 provides an international forum for effective collaboration in all Chemistry and Chemical Metrology branches. We aim to improve chemical measurements' reliability, comparability, and traceability in many sectors, addressing industrial needs, monitoring laboratories' demands and requirements for on-site measurements and strengthening the cooperation between experts. During the last few years, significant changes have occurred in the world of chemical measurements, and we at TC24 raise awareness and share knowledge about them through our activities.  TC25: Quantum Measurement and Quantum Information TC25 provides a forum to discuss advances in quantum-based measurements, the quantum technologies they support, and the changes they imply for the international metrology infrastructure and applications. The TC explored the expanding role of national metrology institutes in the quantum era in a Nature Physics comment and has organised multiple conference panels and special events to further the discourse on quantum for metrology and metrology for quantum.  TC26: Metrology for Cultural Heritage TC26 was conceived as a meeting place to promote interdisciplinary work between researchers from different scientific sectors and show and share the latest innovations in the measurements applied to cultural heritage. This allows for intersectional exchange between researchers and professionals from public structures such as museums, galleries, libraries, archives and small and medium-sized enterprises. Due to the scientific complexity of the topic that requires, in most cases, continuous comparison and teamwork between sectors of both the hard sciences and the humanities, the interdisciplinary approach we want to give to the TC is highly encouraged. Cultural heritage metrology is a new discipline that could strengthen the reliability of analytical data.