CONFERENCE PROGRAM

2025 IMEKO TC6 INTERNATIONAL CONFERENCE ON METROLOGY AND DIGITAL TRANSFORMATION

BENEVENTO, ITALY   SEPTEMBER 3-5, 2025

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Welcome Message from the General Chairs

On behalf of the Organizing Committee, we warmly welcome you to the **2nd International Conference on Metrology and Digital Transformation** (*M4DConf 2025*), organized by IMEKO TC-6. We are proud to mark the second edition of this rapidly growing conference, which has quickly established itself as a premier global event in the field of metrology for digital transformation. This milestone is a testament to the dedication of our organizers, the contributions of our participants, and the increasing global interest in this dynamic field. Since its inception, M4DConf has served as an international meeting place for researchers, professional engineers, and academics to discuss cutting-edge advancements in metrology, measurement, and digital transformation. The conference fosters collaboration between experts in measurement, instrumentation, and industrial testing and those driving innovation in digital metrology. The diverse participation from fields such as data science, artificial intelligence, and cybersecurity has enriched the conference, creating a vibrant platform for interdisciplinary exchange. This 2nd edition of M4DConf will be hosted at Complesso Sant'Agostino, an Augustinian convent dating back to the XIII century, from University of Sannio, Benevento, Italy, a prestigious location that reflects the conference's commitment to excellence. After the challenges of the global pandemic, which required virtual formats for many events, we are thrilled to welcome you in person to this inspiring venue. Located in the heart of Benevento, the conference center offers a perfect backdrop for intellectual exchange and networking.

M4DConf 2025 continues its mission to advance the state-of-the-art in metrology for digital transformation. The program will focus on key topics such as metrological traceability, sensor network metrology, digital calibration, legal metrology, and digital infrastructure for measurement. We aim to explore how these advancements drive innovation across industries, from smart manufacturing to sustainable technologies. The M4DConf 2025 Technical Program is robust and diverse, featuring three keynote speeches, 10 technical oral sessions over three days, one tutorial session, and two panel discussion events. We received 85 extended abstracts from around the world, each rigorously peer-reviewed by our dedicated program committee and additional reviewers. Based on quality, originality, and relevance, 72 papers were selected for presentation. We extend our gratitude to all reviewers for their meticulous efforts in ensuring a high-quality program. Accepted and presented papers will be submitted for inclusion in the IMEKO Proceedings website, and for inclusion in *SCOPUS* Database (as 'Conference paper').

This year's keynote speeches will feature distinguished experts in metrology and digital transformation:

- **Frank Härtig**, *Physikalisch-Technische Bundesanstalt, Germany,* will address "Status of Developments in Digital Quality Infrastructure and Traceable AI".
- **Sundeep Bhandari**, *National Physical Laboratory (NPL), United Kingdom*, will discuss "Trust and Confidence in AI - The Role of National Metrology Institutes".

- **Luca Mari**, *Università Cattaneo - LIUC, Castellanza, Italy*, will present on "Foundational Concepts of Measurement in the Context of a Formal Ontology".

We are honored to have these thought leaders share their insights and expertise with our community. This edition also includes exciting initiatives:

- A Tutorial on "***Advancing Automotive Precision: The Evolution of GNSS Technology and Sensor Fusion***", organized by Domenico Di Grazia, Salvatore Crasta, and Domenico Rega, from STMicroelectronics, aimed at exploring emerging trends into the latest developments in GNSS technology.
- A Panel Discussion on "***Driving Change: Digital Transformation in Metrology***", organized by Blair Hall from Measurement Standards Laboratory, New Zealand, to promote diversity and mentorship in the field.
- A roundtable "***Metrology & Marine Power Equipment***" (hosted by Shanghai Marine Equipment Research Institute) organized by National Metrology Data Construction and Application Base for Marine Power Equipment, fostering dialogue on the digital transformation of metrology, which offers enhanced reliability, safety, and performance through digital twin technology and wireless sensor networks, while addressing challenges such as adapting measurement uncertainty methods, ensuring hardware security, and establishing traceability in complex, real-time data streams. The discussion will prioritize developing international standards, overcoming hardware bottlenecks like low power consumption and anti-interference, and fostering collaboration between national metrology institutions and industry to support robust software tools and data interoperability.

Several awards will recognize outstanding contributions, including the "**Best Conference Paper Award**," the "**Best Paper Presented by a Young Researcher**," and the "**Best Paper Presented by a Woman**." These accolades celebrate excellence and inspire the next generation of researchers and professionals.

Organizing M4DConf 2025 has been a monumental effort, requiring coordination across technical programs, logistics, and social events. We extend our heartfelt thanks to our organizing team, volunteers, and supporting organizations, including IMEKO TC-6, for their invaluable contributions. Special thanks go to sponsors of the M4DConf 2025 conference for their unwavering support in managing the complex details of the conference. We invite you to immerse yourself in the technical sessions, engage with colleagues, and enjoy the cultural and natural beauty of Benevento. Your feedback is invaluable to us as we strive to enhance the quality of M4DConf and achieve lasting excellence. It is with great honor and pride that we welcome you to Benevento, Italy and to M4DConf 2025. We hope you find the conference both professionally enriching and personally enjoyable.

Warm regards,

Ioan Tudosa*, University of Sannio, Italy*
Sascha Eichstädt*, Physikalisch-Technische Bundesanstalt (PTB), Germany*
M4DConf 2025 General Chairs

IMEKO M4DConf 2025 Committee

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Status of Developments in Digital Quality Infrastructure and Traceable AI

Frank **Härtig**

Physikalisch-Technische Bundesanstalt, Germany

ABSTRACT

Metrology is currently strongly influenced by the rapid developments in digital infrastructure and the challenges of traceable AI. In the area of machine-actionable infrastructure from the machine to automated comparative measurements, first realizations exist. These are based on digital certificates, which can also be seen as indicative for the development of smart standards. Digital metrology experts are also currently being developed. The example shows how these can already quantify AI systems today.

SPEAKER BIOGRAPHY

Dr.-Ing. Prof. h. c. **Frank Härtig** is a distinguished mechanical engineer and metrologist, currently serving as the Vice-President of the Physikalisch-Technische Bundesanstalt (PTB) since May 2020. His extensive career reflects a profound commitment to precision measurement and metrology.

Dr. Härtig commenced his academic journey in 1980, studying mechanical engineering at the University of Karlsruhe (TH), where he earned his degree as a graduate engineer. In 1992, he obtained his PhD (Dr.-Ing.) from the same institution, following external research at the Institute for Institute of Production Science (Werkzeugmaschinen und Betriebstechnik WBK). His early professional experience includes roles as a development engineer at Dr.-Ing. Höfler Messgerätebau in 1987 and leadership positions at Carl Zeiss, where he led a team focused on measuring gear cutting tools and later became the deputy director of the software development department.

In 1995, Dr. Härtig joined PTB as a scientific employee in the department of Coordinate Measuring Machines. He briefly led software and electronic development at Werth Messtechnik GmbH in 1998 before returning to PTB in 1999 for a permanent position in coordinate

metrology. Over the years, he ascended through various leadership roles, including head of the "Gearing and Threads" project in 2002, head of the "Coordinate Measuring Technology" department in 2008, and head of Division 1 "Mechanics and Acoustics" from 2014 to 2020.

Beyond his responsibilities at PTB, Dr. Härtig has been actively involved in international metrology organizations. He served as President of the International Measurement Confederation (IMEKO) from September 2021 to August 2024, after being President Elect from 2018 to 2021. His academic contributions have been recognized with several awards and honoraries, including a Professorship honoris causa from the Harbin Institute of Technology in 2016 and Guest Professorships at Beijing University of Technology.

Dr. Härtig's dedication to metrology is further evidenced by his leadership roles, such as chairing Conformity Assessment Body and the Rule Determination Committee both located at PTB. His work has earned him several accolades, including the Technology Transfer Award from the Chamber of Industry and Commerce Braunschweig in 2005 and 2019, and the Seifriz Award in 2020 for collaborative efforts in precision measurement.

Throughout his career, Dr. Härtig has significantly advanced the field of metrology, contributing to both the scientific community and industrial applications.

Plenary Session - Thursday September 4 - H 14:00

Trust and Confidence in AI - The Role of National Metrology Institutes

Sundeep **Bhandari**

National Physical Laboratory (NPL), United Kingdom

ABSTRACT

As Artificial Intelligence (AI) systems become increasingly embedded in critical decision-making processes, the need for scientifically rigorous, trustworthy, and safe AI has never been more urgent. This presentation explores the pivotal role of National Metrology Institutes (NMIs) in shaping the future of AI assurance through the lens of measurement science. The talk introduces the Trustworthy and Safe AI Lifecycle (TSALC) framework, illustrated through real-world applications. It will also stress the need for the global measurement community to collaborate in shaping interoperable, impartial, and internationally aligned approaches to AI assurance – through pre-normative research and the creation of science-based benchmarks and metrics for AI evaluation – to ensure that innovation is underpinned by confidence and trust. Lastly, the talk will also outline NPL's own approach to developing, deploying and benefitting from the application of AI across their operations and into scientific workflows.

SPEAKER BIOGRAPHY

Sundeep (Sunny) works at the National Physical Laboratory (NPL) the UK's National Measurement Institute, responsible for measurement strategy and delivery in the UK. NPL develops and maintains the national primary measurement standards and is a Public Corporation owned by the Department for Science, Innovation and Technology (DSIT). Sunny's work focuses on shaping the evolution of physical metrology and measurement into the new digital world, embedding measurement and traceability into processes using digital and data sciences to deliver confidence in the intelligent and effective use of data. NPL's more recent work address' research and development in measurement standards that provide traceability and confidence in end-end digital process', as well as develop the assets required in the future to underpin and enable economies and societies to have confidence in 'data driven decision making at the speed of AI'.

Sunny sits on multiple cross-government and departmental steering boards and coordination groups that cover digital technologies and digital technology standards as well as being a member of several external steering and advisory boards. He has led NPL's involvement in the partnership tasked with establishing the UK Governments AI Standards Hub.

Foundational Concepts of Measurement in the Context of a Formal Ontology

Luca **Mari**
Università Cattaneo - LIUC, Italy

ABSTRACT

In the last decades, the foundations of measurement science have been reconceived from multiple perspectives, through the analysis of questions like: what is a quantity? what is a measurement unit? what is a measurement scale? what is the value of a quantity? what is the true value of a quantity and have true values any role in measurement? how is measurement itself characterized as a specific kind of process?

The International Vocabulary of Metrology (VIM) – a guidance document produced by the Joint Committee for Guides in Metrology (JCGM) – is possibly the most authoritative reference about these subjects, and nevertheless it remains a vocabulary, in the sense of ISO terminology standards, and as such it lacks the formal structure required for an effective machine readability of its contents. A next step to this goal could be to develop of formal ontology grounded on the (relevant parts of the) VIM, an endeavor of which the VIM itself would plausibly benefit. On this matter the talk proposes some background information and sketches some hypotheses.

SPEAKER BIOGRAPHY

Full Professor of measurement science with Università Carlo Cattaneo - LIUC, Castellanza, Italy, teaching courses on measurement science and statistical data analysis, systems theory, and digital thinking.

Research and dissemination activities in the broad context of information science and technology, from fundamental topics of measurement science to dynamical systems theory and modeling, artificial intelligence, e-learning. In the international context, an International Electrotechnical Commission (IEC) expert in the WG2 (VIM) of the Joint Committee for Guides in Metrology (JCGM). President of the Society for the Study of Measurement (SSM) and chair of the Task Group on Fundamental Concepts in Metrology (CCU-TG-FCM). Former chair of TC1 (Terminology) and secretary of TC25 (Quantities and units) of the IEC, and chair of TC7 (Measurement Science) of the International Measurement Confederation (IMEKO).

Advancing Automotive Precision: The Evolution of GNSS Technology and Sensor Fusion

Domenico **Di Grazia**
STMicroelectronics

Salvatore **Crasta**
STMicroelectronics

Domenico **Rega**
STMicroelectronics

ABSTRACT

The introduction of Global Positioning System (GPS) technology has revolutionized the fields of localization, navigation, and synchronization of receiving equipment in the automotive industry. With the growing prevalence of autonomous driving applications, the requirements for onboard GNSS (Global Navigation Satellite System) receivers are becoming increasingly demanding. Key priorities such as position accuracy, protection levels, high availability, operational robustness, and integrity are shaping a new class of automotive components and systems.

These systems must operate reliably across diverse environments, including urban areas, tunnels, and regions with poor satellite visibility. The keynote aims to guide the audience through the evolutionary path of Satellite Navigation, transitioning from GPS to GNSS, while introducing concepts such as Sensor Fusion and Satellite Modernization for precise positioning in target applications. It will also explain the milestones and trends shaping this sector.

The lecture will provide insights into the latest developments in GNSS technology and its application in the automotive industry to enhance safety, efficiency, and performance. Additionally, part of the talk will focus on GNSS ST's offerings, including a brief demo using the STM32 board.

SPEAKERS BIOGRAPHIES

Domenico Di Grazia is a GNSS System Architecture and Software R&D Principal Engineer at STMicroelectronics and a Senior Member of the ST Technical Staff. He has over 15 years of

experience in the telecom and semiconductor industries. He holds an MSc degree in Telecommunications Engineering (summa cum laude) from the University of Naples Federico II (2001), Naples, Italy, and a Ph.D. in Information and Communication Technology and Engineering (2024) from the University of Naples "Parthenope," specializing in GNSS receiver modernization and techniques for autonomous driving.

Domenico leads the GNSS Measurement Engine Team in Naples and is actively involved in several EUSPA projects. He is the (co-)author of more than 20 technical publications, including international conference papers and journal articles, and holds over ten granted patents.

Salvatore Crasta was born in 1992 in Naples, Italy.

He earned a Master's degree in Telecommunications Engineering from the University of Naples "Federico II", in 2021. Salvatore is currently working as Software Design Engineer in the Software R&D team at STMicroelectronics, focusing on research and software development in the field of signal processing applied to GNSS (Global Navigation Satellite Systems). His professional activities center on technological innovation and the optimization of software solutions to enhance the performance of satellite navigation systems.

He is also actively involved in STEM events organized by STMicroelectronics, contributing to disseminate the latest advancements in the GNSS world and ST's GNSS technology among young students.

Domenico Rega was born in 1993 in Mercato San Severino, Italy.

He is currently working as a GNSS Software Validation Engineer at STMicroelectronics, where he plays a key role in ensuring the reliability and performance evaluation of GNSS software systems. Domenico holds a Master's Degree in Electronic Engineering from the University of Salerno.

During his academic journey, he gained valuable experience through collaborations with university spinoffs, focusing on Electronic Measurements and embedded systems.

Outside of his professional career, Domenico is a photography enthusiast, has a deep love for motorsports and enjoys playing the piano.

For the past six years, Domenico has also been actively involved in organizing STEM events at STMicroelectronics, contributing to the promotion of technology, engineering, and embedded systems among young talents and undergraduates.

IMEKO M4DConf 2025 Venue

IMEKO M4DConf 2025 will be held at **Complesso Sant'Agostino**, an Augustinian convent dating back to the XIII century.

The Auditorium Sant'Agostino is located inside the unconsecrated church, which can host up to 300 attendees. The adjacent cloister will be arranged and decorated to accommodate tables, seats, and buffets for coffee and lunch breaks.

ADDRESS

Complesso Sant'Agostino - University of Sannio
Via Giovanni De Nicastro, 13
Benevento

Use the QRCode to open the location on *Google Maps*

IMEKO M4DConf 2025 Social Events

GUIDED TOUR OF BENEVENTO
Wednesday September 3 - H 18:20

On **Wednesday, September 3**, at the end of the technical sessions (18:20), a guided visit to the city of Benevento will take place with the kind support of FAI (Fondo Ambiente Italiano – Benevento section). **This walk will lead participants together to the Welcome Party venue**, the *Hortus Conclusus*. The tour will be a unique opportunity to admire some highlights of Benevento's historical heritage, including the majestic Arch of Trajan and the renowned Norman church of Santa Sofia.

All participants will gather in front of the entrance of the Sant'Agostino Auditorium.

WELCOME PARTY
Wednesday September 3 - H 19:00

The IMEKO M4DConf 2025 **Welcome Party** will be held at the **"*Hortus Conclusus*"** on **Wednesday, September 3** - **19:00**. Entrance for conference delegates will be through the Rectorate Bulding (Palazzo San Domenico), Piazza Guerrazzi 1.

Use the QR Code to reach the Rectorate Building - Palazzo San Domenico.

ADDRESS
Rectorate Building (Rettorato - Università del Sannio)
Palazzo San Domenico - Piazza Guerrazzi, 1 - Benevento

The Hortus Conclusus in Benevento is a unique open-air museum and garden located within the former garden of the Dominican Fathers' monastery. It features contemporary sculptures by Mimmo Paladino, an Italian artist, creating a dialogue between the ancient monastic space and modern art. The garden also incorporates fragments of Roman columns, capitals, and tympanums, further blending historical and contemporary elements.
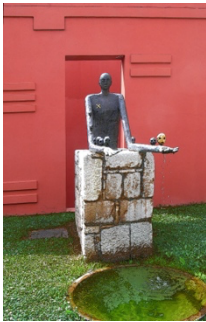
GALA DINNER
Thursday September 4 - H 20:00

The IMEKO M4DConf 2025 **Gala Dinner** will be held at "*La Rossella*" Restaurant on Thursday, September 4 - 20:00.

ADDRESS
Ristorante La Rossella
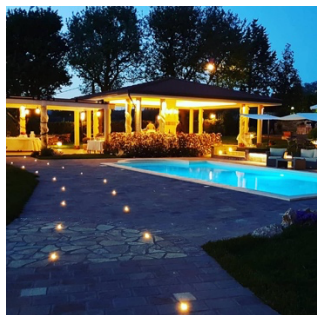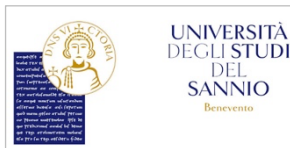Contrada Torrepalazzo II, 92 - Torrecuso (Benevento)

SHUTTLE SERVICE
A shuttle service will be provided for conference participants. The meeting point is at **19:45** in **Via del Pomerio 3**, in front of "Centro Clinico Morgagni" - 300 m from the Traiano Arch.

IMEKO M4DConf 2025 Local Patronages

Città di Benevento

IMEKO M4DConf 2025 Patronages

IMEKO M4DConf 2025 Sponsors

Program Schedule - Wednesday, September 3

	WEDNESDAY - SEPTEMBER 3	
09:00 - 09:30	Opening Ceremony - Welcome Addresses *Auditorium Sant'Agostino*	
09:30 - 10:50	**Auditorium Sant'Agostino**	**ROOM SA3**
	S1.1 - General Track - PART I	S1.2 - General Track - PART II
10:50 - 11:10	COFFEE BREAK	
11:10 - 13:10	S2.1 - Calibration and Comparison in a Digital Era - PART I	S2.2 - General Session - PART III
13:10 - 14:10	LUNCH	
14:10 - 15:00	**TUTORIAL SESSION** - *STMicroelectronics* Advancing Automotive Precision: The Evolution of GNSS Technology and Sensor Fusion *Auditorium Sant'Agostino*	
15:00 - 16:20	**Auditorium Sant'Agostino**	**ROOM SA3**
	S3.1 - Calibration and Comparison in a Digital Era - PART II	S3.2 - Advancing Sensor Network Metrology for Industry 4.0 and IoT Applications
16:20 - 16:40	COFFEE BREAK	
16:40 - 18:00	S4.1 - Digitalisation of Measurements for Industrial Processes: Enabling Smart and Sustainable Manufacturing	S4.2 - General Session - PART IV
18:20 - 19:00	GUIDED TOUR OF BENEVENTO - From Complesso Sant'Agostino to Hortus Conclusus	
19:00 - 21:00	WELCOME PARTY - Hortus Conclusus	

Program Schedule - Thursday, September 4

THURSDAY - SEPTEMBER 4		
	Auditorium Sant'Agostino	**ROOM SA3**
09:00 - 10:00	Panel Discussion "Metrology and Marine Power"	S5.2 - Metrologically Validated Digital Twins for Medical Diagnostics and Industrial Applications
10:00 - 11:00	**KEYNOTE SPEAKER** - Frank Härtig, PTB Status of Developments in Digital Quality Infrastructure and Traceable AI *Auditorium Sant'Agostino*	
11:00 - 11:20	COFFEE BREAK	
11:20 - 12:50	Panel Discussion - Driving Change: Digital Transformation in Metrology *Auditorium Sant'Agostino*	
12:50 - 14:00	LUNCH	
14:00 - 15:00	**KEYNOTE SPEAKER** - Sundeep Bhandari, NPL, United Kingdom Trust and Confidence in AI - The Role of National Metrology Institutes *Auditorium Sant'Agostino*	
	Auditorium Sant'Agostino	**ROOM SA3**
15:00 - 16:20	S6.1 - Just Ask the Metrologist: Eliciting Domain Knowledge for Digitalisation in Metrology	S6.2 - Enabling smart grid technologies for the digitalization of electrical power systems
16:20 - 16:40	COFFEE BREAK	
16:40 - 18:00	S7.1 - Pathways to digital transformation - PART I *Auditorium Sant'Agostino*	
19:45	BUS DEPARTURE - Via del Pomerio, 3	
20:00	GALA DINNER - La Rossella Restaurant	

Program Schedule - Friday, September 5

FRIDAY - SEPTEMBER 5		
	Auditorium Sant'Agostino	**ROOM SA3**
09:30 - 11:30	S8.1 - Digital Transformation of the Quality Infrastructure - PART I	S8.2 - Pathways to digital transformation - PART II
11:30 - 11:50	COFFEE BREAK	
11:50 - 12:50	**KEYNOTE SPEAKER** - Luca Mari, Università Cattaneo - LIUC, Italy Foundational Concepts of Measurement in the Context of a Formal Ontology *Auditorium Sant'Agostino*	
12:50 - 14:00	LUNCH	
	Auditorium Sant'Agostino	**ROOM SA3**
14:00 - 15:00	S9.1 - Digital Transformation of the Quality Infrastructure - PART II	S9.2 - General Session - PART V
15:00 - 16:00		IMEKO TC-6 Board Meeting
16:00 - 16:20	COFFEE BREAK	
16:20 - 16:40	CLOSING AND AWARD CEREMONY *Auditorium Sant'Agostino*	

08:30 - 18:00	*Complesso Sant'Agostino - Ground Floor* **REGISTRATIONS**

09:00 - 09:30	*Auditorium Sant'Agostino* **OPENING CEREMONY - WELCOME ADDRESSES**

09:30 - 10:50	*Auditorium Sant'Agostino* **Session 1.1 - General Session - PART I** **Chairs:** Sascha Eichstädt, *Physikalisch-Technische Bundesanstalt, Germany* Ioan Tudosa, *University of Sannio, Italy*

09:30   **From the past to the Future: <Calibration Certificates for Radioactivity @PTB>**
Stefan Röttger and Annette Röttger (Physikalisch-Technische Bundesanstalt, Germany)

09:50   **Digital Transformation: Interoperable Processes and Services Based on a Cloud Native Architecture**
Alexander Reissert, Samuel Eickelberg, Petra Tsesmetzi and Abdul Rehman (Physikalisch-Technische Bundesanstalt, Germany)

10:10   **Advanced Metrological Knowledge Representation in the D-SI Metadata Model**
Daniel Hutzschenreuter, Matthias Bernien, Frauke Gellersen, Moritz Jordan and Benedikt Seeger (Physikalisch-Technische Bundesanstalt, Germany)

10:30   **Approximative Bayesian Approach for Uncertainty Evaluation in Machine Learning-Based Hardness Measurement**
Junnosuke Takai, Yukimi Tanaka, Masahiro Yoshioka and Katsuhiro Shirono (National Institute of Advanced Industrial Science and Technology, Japan)

09:30 - 10:50	*Room SA3 - First Floor* **Session 1.2 - General Session - PART II** **Chairs:** Francesco Picariello, *Universitas Mercatorum, Italy* Arman Neyestani, *University of Sannio, Italy*

09:30   **A Torque Sensor with a Unified Coupling Interface for SWPDT System**
Yuehua Chen and Jiahui Zheng (Ningbo University, China); Xianglong Ma (China); Gang Zhang (Ningbo University, China)

09:50   **Innovative Approach in Industry 5.0: Use of Multiple Sensors in a Real Production Process to Enhance Workers' Well-Being**
Matteo Zendri, Francesco Pilati, Francesca Calabrese and Qingwei Cai (University of Trento, Italy)

10:10   **Calibration of Storage Tanks in the Oil and Gas Industry Based on the Concept of Digital Metrology and Big Data Analytics**
Ankica Milinkovic (Calibration Laboratory Vekom Geo, Serbia & University of Jaen, Spain); Sanja Tucikešić (University of Banja Luka, Bosnia and Herzegovina)

10:30   **Structural Connection Parameter Measurement for Precision Motion Systems Using Accelerometers: a Preliminary Study**
Li Li, Yang Zheng and Ziqing Jia (Harbin Institute of Technology, China)

11:50 - 11:10   *Complesso Sant'Agostino - Ground Floor*
COFFEE BREAK

11:10 - 13:10   *Auditorium Sant'Agostino*
Session 2.1 - Calibration and Comparison in a Digital Era - PART I
Chairs: Shanna Schönhals, *Physikalisch-Technische Bundesanstalt, Germany*
Daniel Hutzschenreuter, *Physikalisch-Technische Bundesanstalt, Germany*

11:10   **Interoperability of DCCs for Weights and Weighing Instruments Through Standardization**
Julian Haller (Sartorius Lab Instruments GmbH & Co. KG, Germany); Gisa Foyer (Physikalisch-Technische Bundesanstalt, Germany)

11:30   **Towards Seamless Digitalisation in TUBITAK UME Mass Laboratory**
Emrecan Keskin and Beste Korutlu (TUBITAK National Metrology Institute, Turkey)

11:50   **Automated Calibration System with Digital Calibration Certificates Support**
Serhii Kursin, Oleh Velychko, Ihor Pototskyi and Andrii Bachynskyi (SE Ukrmetrteststandard, Ukraine)

12:10   **Transition to DCC-Based Calibration Management: Findings from Proof-of-Concept Investigations**
Tuukka Mustapää (Beamex Oy Ab, Finland)

12:30   **Dcclib - Consolidation of Digital Calibration Certificate (DCC) Tools into a Unified Python Library**
Jan Henry Loewe, Justin Sebastian Jagieniak and Shanna Schönhals (Physikalisch-Technische Bundesanstalt, Germany)

12:50   **Development and Application Study of a Calibration Certificate Anomaly Detection System**
Dong-Hun Ryu, Chaewook Lim (Korea Testing Laboratory, South Korea)

11:10 - 13:10	*Room SA3 - First Floor*
	Session 2.2 - General Session - PART III
	Chairs: Eulalia Balestrieri*, University of Sannio, Italy*
	Fatemeh Khalesi*, University of Sannio, Italy*

11:10 **Checking Traceability by Analyzing DCC Blockchain Transactions**
Cristian Zet (Technical University of Iasi, Romania); Gabriel Constantin Dumitriu (Individual Enterprise GCD, Romania); Cristian Fosalau (Technical University of Iasi, Romania)

11:30 **Automatic Method of Assessment and Grading of Students in a Measurement Laboratory**
Cristian Zet, Anamaria Hariton, Cristian Fosalau (Technical University of Iasi, Romania)

11:50 **Quantum Communications for Distributed Measurement Systems: Current Situation and Research Trends**
Arman Neyestani, Ioan Tudosa, Luca De Vito, Fatemeh Khalesi and Sergio Rapuano (University of Sannio, Italy)

12:10 **Quantum Channel Characterization in QKD: A Metrological Perspective**
Fatemeh Khalesi and Ioan Tudosa (University of Sannio, Italy); Francesco Picariello (Universitas Mercatorum, Italy); Arman Neyestani and Sergio Rapuano (University of Sannio, Italy)

12:30 **Machine Learning-Based Classification and Identification of Arabic Dialects Through Acoustic Feature of Guttural Sounds**
Seyed Ebrahim Hosseini, Shahbaz Pervez and Hamed Al-Tairi (Whitecliffe, New Zealand)

12:50 **Measuring Privacy: Critical Reflections and Directions for a Metrology-Based Approach**
Eulalia Balestrieri (University of Sannio, Italy); Ilaria Amelia Caggiano (Università Degli Studi Suor Orsola Benincasa, Italy); Francesco Picariello (Universitas Mercatorum, Italy); Ioan Tudosa (University of Sannio, Italy)

13:10 - 14:10	*Complesso Sant'Agostino - Ground Floor*
	LUNCH

14:10 - 15:00	*Auditorium Sant'Agostino*
	TUTORIAL SESSION
	Chair: Ioan Tudosa, *University of Sannio, Italy*

Advancing Automotive Precision:
The Evolution of GNSS Technology and Sensor Fusion

Domenico Di Grazia, Salvatore Crasta, Domenico Rega
STMicroelectronics

15:00 - 16:20   *Auditorium Sant'Agostino*
Session 3.1 - Calibration and Comparison in a Digital Era - PART II
Chairs: Shanna Schönhals, *Physikalisch-Technische Bundesanstalt, Germany*
Daniel Hutzschenreuter, *Physikalisch-Technische Bundesanstalt, Germany*

15:00   **Digital Metrological Expert - Design of a Software for Automated Key Comparison Data Analysis in a Digital World**
Daniel Hutzschenreuter, Clifford Brown, Moritz Gafert, David Urban and Wafa El Jaoua (Physikalisch-Technische Bundesanstalt, Germany)

15:20   **Digital Transformation Applications in Mechanical Quantities - Hardness Measurements**
Moritz Loewit (Bundesamt für Eich- und Vermessungswesen, Austria); Cihan Kuzu (Turkiye Bilimsel ve Teknolojik Arastirma Kurumu, Turkey); Alessandro F.L. Germak and Andrea Prato (INRiM - National Institute of Metrological Research, Italy); Febo Menelao (Physikalisch-Technische Bundesanstalt, Germany); Miha Hiti (ZAG, Slovenia); Tatiana Apostol (I.P. Institutul Naţional de Metrologie, Moldova)

15:40   **Automating Photometric Measurements Using LabVIEW-Python-Based AI: Enhancing Precision in Luminous Intensity, Responsivity, Illuminance, and Flux Analysis at Saudi Standards, Metrology & Quality Org**
Mohammed Dhafer M Almelfi, Ahmed El-Matarawey and Saad Bin qoud (National Metrology and Calibration Center & Saudi Standards, Metrology & Quality Org-SASO, Saudi Arabia); Rawan Almutairi (Calibration Specialist, Saudi Arabia)

16:00   **Thermometry Machine Learning Model for Digitized Metrological Calibration of Platinum Resistance Thermometer**
Ahmed El-Matarawey (NIS, Saudi Arabia & SASO, Saudi Arabia); Saad Bin qoud (SASO-NMCC, Saudi Arabia)

15:00 - 16:20   *Room SA3 - First Floor*
Session 3.2 - Advancing Sensor Network Metrology for Industry 4.0 and IoT Applications
Chairs: Shan Cui, *National Metrology Centre, A*STAR, Singapore*
Anupam Vedurmudi, *Physikalisch-Technische Bundesanstalt, Germany*
Narin Chanthawong, *National Institute of Metrology, Thailand*

15:00   **Sensor Fault Diagnosis Using Spectral Principal Component Analysis and CNN Deep Learning**
Jianqiang Mou and Shan Cui (National Metrology Centre, Singapore)

15:20   **Setup of a Distributed Sensor Network for Acquiring Environmental Data**
Alicja Wiora and Jozef Herbert Wiora (Silesian University of Technology, Poland)

15:40 **Metrology-Driven Standardization of Sensor Networks in Mining: a RAMI 4.0 Approach to Sustainable and Efficient Ventilation Systems**
Armin Shirbazo, Binghao Li, Seher Ata, Hamed Lamei Ramandi and Serkan Saydam (UNSW, Australia)

16:00 **Infrastructure Requirements for Metrological Distributed Sensor Networks**
Martin Koval (Czech Metrology Institute, Czech Republic); Gertjan Kok (VSL Dutch Metrology Institute, The Netherlands); Maximilian Gruber (Physikalisch-Technische Bundesanstalt, Germany); Shahin Tabandeh (VTT-MIKES, Finland); Martin Staněk (Czech Metrology Institute, Czech Republic)

16:20 - 16:40   *Complesso Sant'Agostino - Ground Floor*
COFFEE BREAK

16:40 - 18:00   *Auditorium Sant'Agostino*
Session 4.1 - Digitalisation of Measurements for Industrial Processes: Enabling Smart and Sustainable Manufacturing
Chair: Francesco Picariello, *Universitas Mercatorum, Italy*

16:40 **Single-Device Integration of Legal Metrology and Third-Party Software via Virtualization**
Nicola Zingirian (University of Padova, Italy); Marco Profeti (Sampi S.p.A, Italy); Federico Botti (Click & Find s.r.l., Italy)

17:00 **Supporting Medicines Manufacturing Through Semantic Technologies**
Nina Peric, Moulham Alsuleman, Joao Gregorio, Paul Duncan and Michael Chrubasik, National Physical Laboratory, United Kingdom)

17:20 **Designing a Fatigue Monitoring Sensor System with Industry 5.0 Principles**
Qingwei Cai, Francesco Pilati, Francesca Calabrese and Matteo Zendri (University of Trento, Italy)

17:40 **Preliminary Experimental Assessment of an IoT-Based Fatigue Monitoring System for Industrial Operators**
Enrico Picariello (University of Sannio, Italy); Francesco Picariello (Universitas Mercatorum, Italy); Ioan Tudosa (University of Sannio, Italy)

16:40 - 18:20   *Room SA3 - First Floor*
Session 4.2 - General Session - PART IV
Chair: Ioan Tudosa, *University of Sannio, Italy*

16:40 **Soil Digitalization Using Micro-Sensors**
Federico Fina (Roma Tre University, Italy); Massimo Piotto (University of Pisa, Italy); Simone Contardi (University of Pisa, Italy & Sensichips Srl, Italy); Fabio Leccese (Roma Tre University, Italy)

17:00   **Characterization of the Lighting System of Hospital Rooms**
Marian-Andrei Vieru, Cristian-Gyozo Haba (Technical University of Iasi, Romania)

17:20   **Machine-Readable Data for Measurements of Total Luminous Flux Using Goniophotometer: A Step Toward Digitalized Metrology**
Khaled Abdelftah (SASO, Saudi Arabia)

17:40   **A Python-based graphical uncertainty calculator with optimal propagation of uncertainty and Monte-Carlo evaluation possibility**
Khaled Abdelftah (SASO, Saudi Arabia)

18:00   **Metrological Data Application Solutions in the Field of Marine Power**
Hao Wu (Shanghai Marine Equipment Research Institute, China)

18:20 - 19:00	**GUIDED TOUR OF BENEVENTO** *From Complesso Sant'Agostino (Conference venue) to Hortus Conclusus (Welcome Party venue)*

19:00 - 21:00	*Hortus Conclusus - Entrance from Rectorate Building, Piazza Guerrazzi 1* **WELCOME PARTY**

Technical Program - Thursday, September 4

08:30 - 17:00	*Complesso Sant'Agostino - Ground Floor* **REGISTRATIONS**

09:00 - 10:00	*Auditorium Sant'Agostino* **Round Table "Metrology and Marine Power"** **Chair:** Yuxin Sun, *Shanghai Marine Equipment Research Institute, China*

Roundtable host by National Measurement Data Application Base (Marine Power Equipment), affiliated to Shanghai Marine Equipment Research Institute

09:00   **Opening and play the introduction video of BASE**
Sun Yuxin

09:10   **Introduction of PTB's metrology digitization**
Dr. Sascha Eichstadt

09:20   **Introduction of the current status and challenges of data acquisition systems used in the digitalization process of applied metrology**
Dr. Ioan Tudosa

09:30   **Introduction to National Measurement Data Application Base (Marine Power Equipment)**
Dr. Ma Xianglong

09:40   **Discussion**
Moderator: Sun Yuxin
Participants: Mr. Ji Jiangang, Mr. Ma Xianglongo, Dr. Sascha Eichstädt, Dr. Ioan Tudosa, Dr. Blair Hall

09:00 - 10:00	*Room SA3 - First Floor* **Session 5.2 - Metrologically Validated Digital Twins for Medical Diagnostics and Industrial Applications** **Chairs:** Francesco Picariello, *Universitas Mercatorum, Italy* Luca De Vito, *University of Sannio, Italy*

09:00   **Barriers to Implementing Digital Twin Technologies in Industrial Settings**
Jozef Herbert Wiora, Alicja Wiora and Faisal Saleem (Silesian University of Technology, Poland)

09:20 **Metrological Validation of a Digital Model for a CMM Including Digital Bias Correction**

Marcel van Dijk, Walter Knulst, Devrim Nalbantoglu and Gertjan Kok (VSL Dutch Metrology Institute, The Netherlands)

09:40 **Towards Safety and Accuracy of Hydrogen Refuelling Stations Through Digital Twins**

Christian Klaus, Ricardo Soruco Aloisio, Claudia Koch and Matthias Prellwitz (Bundesanstalt für Materialforschung und -prüfung, Germany)

10:00 - 11:00 *Auditorium Sant'Agostino*
PLENARY SESSION - KEYNOTE SPEAKER
Chair: Sascha Eichstädt, *Physikalisch-Technische Bundesanstalt, Germany*

Status of Developments in Digital Quality Infrastructure and Traceable AI

Frank Härtig, *Physikalisch-Technische Bundesanstalt, Germany*

11:00 - 11:20 *Complesso Sant'Agostino - Ground Floor*
COFFEE BREAK

11:20 - 12:50 *Auditorium Sant'Agostino*
Panel Discussion "Driving Change: Digital Transformation in Metrology"
Chair: Blair Hall, *Measurement Standards Laboratory of New Zealand*

The digital transformation in metrology is arguably the most wide-ranging and ambitious attempt to reshape the international quality infrastructure ever undertaken. As measurement underpins virtually every aspect of modern society, the implications of this transformation are likely to be profound and global. Many organisations will be involved, including national metrology institutes, national standards and accreditation bodies, commercial calibration laboratories, manufacturers and other industrial consumers of traceable measurement services, regulatory authorities, environmental protection authorities, scientific research organisations, and others.

The panel discussion will explore facets of planning for - and leading - this digital transformation, which is still in its early stages. Digitalisation - the precursor to digital transformation - involves identifying representations of workflows and processes carried out by skilled operators. Within the metrology community, there is growing awareness of the complexities inherent in these tasks.

The panellists include leaders from national metrology institutes, experts in metrological concepts and terminology, thought leaders in digital transformation from industry, and specialists in digital systems and system architecture. They will share insights, consider

progress to date, and identify opportunities and challenges that lie ahead in the digitalisation of metrology.

PANELLISTS:

Steve Capell, Annette Koo, Mark Kuster, Georgette Macdonald, Luca Mari, Anjali Sharma

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12:50 - 14:00   *Complesso Sant'Agostino - Ground Floor*
               LUNCH

14:00 - 15:00   *Auditorium Sant'Agostino*
               PLENARY SESSION - KEYNOTE SPEAKER
               Chair: Francesco Picariello, *Universitas Mercatorum, Italy*

Trust and Confidence in AI - The Role of National Metrology Institutes

Sundeep Bhandari, *National Physical Laboratory, United Kingdom*

15:00 - 16:20   *Auditorium Sant'Agostino*
               Session 6.1 - Just Ask the Metrologist: Eliciting Domain Knowledge for Digitalisation in Metrology
               Chairs: Blair Hall, *Measurement Standards Laboratory of New Zealand*
               Anjali Sharma, *National Physical Laboratory of India*
               Julia Neumann, *Physikalisch-Technische Bundesanstalt, Germany*

15:00   **Metrology and Architectural Description: a Case Study of the Hybrid Comparison System**
         Blair Hall (Measurement Standards Laboratory of New Zealand, New Zealand); Diego Coppa (National Institute of Industrial Technology, Argentina); Anjali Sharma (CSIR-National Physical Laboratory, India)

15:20   **Bridging Knowledge Gaps in Metrology: a Requirement Elicitation Use Case for DCC**
         Anjali Sharma (CSIR-National Physical Laboratory, India); Niharika Bhatia (Vellore Institute of Technology, India)

15:40   **Communities of Practice in Metrology**
         Blair Hall (Measurement Standards Laboratory of New Zealand, New Zealand)

16:00   **Provenance Information in Metrological Traceability: Application and Modeling**
         Ryan M White (National Research Council Canada, Canada & NRC, Canada); Julia Neumann (Physikalisch-Technische Bundesanstalt, Germany); Jean-Laurent Hippolyte (National Physical Laboratory, United Kingdom); Blair Hall (Measurement Standards Laboratory of New Zealand, New Zealand); Thiago Menegotto (Instituto Nacional de Metrologia, Qualidade e Tecnologia, Canada)

15:00 - 16:20	*Room SA3 - First Floor*
	Session 6.2 - Enabling smart grid technologies for the digitalization of electrical power systems
	Chairs: Alfredo Vaccaro, *University of Sannio, Italy*
	Silvia Iuliano, *University of Sannio, Italy*

15:00   **On-Line Frequency Forecasting Using Convolutional Neural Networks**
Théo Chacou Bertoldi (Polytech Clermont, Campus des Cézeaux, Aubière, France); Viktoriya Mostova, Silvia Iuliano and Alfredo Vaccaro (University of Sannio, Italy)

15:20   **Metrological Characterization of a Vehicle's Charging Profile for Smart Charging Applications**
Chiara Franzoni, Antony Vasile, Davide Astolfi, Dmitrii Vasenin, Alessandro Musatti, Marco Pasetti and Stefano Rinaldi (University of Brescia, Italy)

15:40   **A Comprehensive Methodology Based on SCADA Data Analysis for Diagnosing Static Errors Affecting Wind Turbine Performance**
Davide Astolfi (Università di Brescia, Italy); Silvia Iuliano (University of Sannio, Italy); Antony Vasile (University of Brescia, Italy); Alessandro Canali (University of Perugia, Italy); Marco Pasetti (University of Brescia, Italy); Francesco Castellani (University of Perugia, Italy); Alfredo Vaccaro (University of Sannio, Italy)

16:00   **Partitioning Algorithm for Integrating Electric Vehicles into Residential Renewable Energy Communities**
Manuela Minetti, Andrea Bonfiglio, Maria Martino and Renato Procopio (University of Genova, Italy)

16:20 - 16:40	*Complesso Sant'Agostino - Ground Floor*
	COFFEE BREAK

16:40 - 18:00	*Auditorium Sant'Agostino*
	Session 7.1 - Pathways to digital transformation - PART I
	Chairs: Jon Bartholomew, *Emirates Metrology Institute*
	Blair Hall, *Measurement Standards Laboratory of New Zealand*
	Nikita Zviagin, *D.I. Mendeleyev Institute for Metrology*

16:40   **Pathways to Digitalisation at the Measurement Standards Laboratory of New Zealand**
Blair Hall and Annette Koo (Measurement Standards Laboratory of New Zealand, New Zealand)

17:00   **"SASO Uncertainty Machine" - Advanced Pythonic ML Algorithm for Estimating Uncertainty in General Calibration Services at Saudi Standards, Metrology, and Quality Organization-SASO-KSA**
Saad Bin qoud (SASO-NMCC, Saudi Arabia); Ahmed Elmataraway (A. Matarawey, Saudi Arabia); Ahmed El-Matarawey (NIS, Saudi Arabia & SASO, Saudi Arabia)

17:20   **The DX Schema as a Modular Concept for Metrological Certificates and Reports**
Justin Sebastian Jagieniak, Shan Lin, Moritz Jordan, Muhammed-Ali Demir and Lutz Doering (Physikalisch-Technische Bundesanstalt, Germany); Thomas Engel (Siemens AG, USA); Wiebke Heeren, Jan Henry Loewe, Shanna Schönhals and Siegfried Hackel (Physikalisch-Technische Bundesanstalt, Germany)

17:40   **Metrological AI Reliability Verification**
Volker Zeuner and Gulian Couvreur (Federal Institute of Metrology METAS, Switzerland)

20:00	*La Rossella Restaurant*
	GALA DINNER

SHUTTLE SERVICE
A shuttle service will be provided for conference participants. The meeting point is at **19:45** in **Via del Pomerio 3**, in front of "Centro Clinico Morgagni" - 300 m from the Traiano Arch.

08:30 - 15:00	*Complesso Sant'Agostino - Ground Floor* **REGISTRATIONS**

09:30 - 11:30	*Auditorium Sant'Agostino* **Session 8.1 - Digital Transformation of the Quality Infrastructure - PART I** **Chairs:** Jens Niederhausen, *Physikalisch-Technische Bundesanstalt,* *Germany* Catharina Kulka-Peschke, *Physikalisch-Technische Bundesanstalt, Germany* Alexander Kammeyer, *Physikalisch-Technische Bundesanstalt, Germany*

09:30 **Knowledge Management Foundations in the Design of the IPEM-SP Quality Infrastructure Portal: Strategies and Challenges**
Robson Santos da Silva (Technological Research Institute of São Paulo, Brazil); Roberto M Araujo, Filho (Universidade do Estado do Rio Grande do Norte, Brazil); Marcos Helenono Guerson de Oliveira Junior; Eduardo Mario Dias and Maria Lídia Rebello Pinho Dias Scoton (Universidade de São Paulo, Brazil)

09:50 **Digital Transformation for the United States Air Force Metrology and Calibration Program**
Jeremy Latsko, Michael S Brockway, Salvatore Capra and Evan Elliott (United States Air Force Metrology and Calibration, USA)

10:10 **Measurement Data and Information of Non-Automatic Weighing Instruments as Structured Data**
Tatyana Sheveleva and Gisa Foyer (Physikalisch-Technische Bundesanstalt, Germany)

10:30 **Digitalized Third-Party Validation for Calibration Service: a System Design Example**
Hiroshi Watanabe, Yoshitaka Shimizu, Katsuhiro Shirono and Toshiyuki Fujimoto (National Institute of Advanced Industrial Science and Technology, Japan)

10:50 **Digitalization of Calibration Workflow at National Institute of Metrology Thailand (NIMT)**
Sunantiya Parana, Nititorn Kenyota, Naruesorn Nanna, Praiya Thongluang, Narin Chanthawong and Jariya Buajarern (National Institute of Metrology, Thailand)

11:10 **"SASO Proficiency Test Machine" - Advanced Pythonic AI Algorithms for Automating and Validating ISO 13528 & ISO 5725-2 at Saudi Standards, Metrology, and Quality Organization- SASO-KSA**
Ahmed El-Matarawey, Saad Bin qoud, Fahad A. Almuhlaki and Rayan A AlYousefi (SASO-NMCC, Saudi Arabia)

09:30 - 11:10   *Room SA3 - First Floor*
Session 8.2 - Pathways to digital transformation - PART II
Chairs: Jon Bartholomew, *Emirates Metrology Institute*
Blair Hall, *Measurement Standards Laboratory of New Zealand*
Nikita Zviagin, *D.I. Mendeleyev Institute for Metrology*

09:30 **A Timing Accuracy Assessment System Prototype for Multiple NTP Servers**
Deepak Sharma, Divya Singh Yadav, Preeti Kandpal, Bharath Vattikonda, Ashish Agarwal (CSIR - National Physical Laboratory & Academy of Scientific and Innovative Research, India)

09:50 **The Regional Metrology Organisations Coordination Working Group of the CIPM FORUM on Metrology and Digitalization. Helping Emerging NMIs on Their Path to Digital Transformation**
Nikita D Zviagin (D.I. Mendeleyev Institute for Metrology, Russia)

10:10 **Data Quality Characteristics for Improved Metrology in Sensor Networks**
Mads Johansen (FORCE Technology, Denmark); Anupam Prasad Vedurmudi (Physikalisch-Technische Bundesanstalt, Germany); Martha Arbayani Zaidan (University of Helsinki, Finland); Milos Davidovic (Vinca Institute of Nuclear Sciences, Serbia); Gertjan Kok (VSL Dutch Metrology Institute, The Netherlands); Maitane Iturrate-Garcia (Federal Institute of Metrology METAS, Switzerland); Shahin Tabandeh (VTT-MIKES, Finland)

10:30 **Research on Digital Methods for Testing and Calibration Schemes**
Xinmeng Liu, Yulin Qi and Weiqun Cui (National Institute of Metrology, China)

10:50 **A Modular Windows-Based Intelligent API for Traceable Drone Positioning Using UWB-OptiTrack Fusion and AI-Based Residual Learning**
Ihtisham Ul Haq, Luigi D'Alfonso, Giuseppe Fedele and Francesco Lamonaca (University of Calabria, Italy)

11:30 - 11:50   *Complesso Sant'Agostino - Ground Floor*
COFFEE BREAK

11:50 - 12:50	*Auditorium Sant'Agostino* **PLENARY SESSION - KEYNOTE SPEAKER** **Chair**: Ioan Tudosa, *University of Sannio, Italy*

Foundational Concepts of Measurement
in the Context of a Formal Ontology

Luca Mari, *Università Cattaneo - LIUC, Italy*

12:50 - 14:00	*Complesso Sant'Agostino - Ground Floor* **LUNCH**

14:00 - 16:00	*Auditorium Sant'Agostino* **Session 9.1 - Digital Transformation of the Quality Infrastructure - PART II** **Chairs:** Jens Niederhausen, *Physikalisch-Technische Bundesanstalt, Germany* Catharina Kulka-Peschke, *Physikalisch-Technische Bundesanstalt, Germany* Alexander Kammeyer, *Physikalisch-Technische Bundesanstalt, Germany*

14:00 **Swiss Quality Infrastructure in Transition**
Peter Blattner, Oscar De Feo and Fabiano Assi (Federal Institute of Metrology METAS, Switzerland)

14:20 **Advancing Digital Quality Infrastructure: Transforming Laboratory Processes for Enhanced Efficiency and Reliability**
Anna Maria Elert, Lena Meyer, Nanine Brunner and Michael Melzer (Bundesanstalt für Materialforschung und -prüfung, Germany); Claudia Koch (BAM Federal Institute for Materials Research and Testing & Berlin Institute of Technology, Germany)

14:40 **Towards an Inclusive and Agile Implementation Roadmap for a Digital Quality Infrastructure**
Jens Niederhausen (Physikalisch-Technische Bundesanstalt, Germany)

15:00 **National Metrology Laboratory of the Philippines Digital Calibration Certificate: DigiCert**
Ahdrian Camilo Gernale (Department of Science and Technology, Philippines & Asian Institute of Management, Philippines); Roj Gian D. Gorospe, Mark Josep C Nicasio and Nathaniel Ken A. Aquino (University of Santo Tomas, Philippines)

15:20 **Development of Frontend Interface for Digital Calibration Certificate for AC High Current Source Parameters**
Paramita Guha (CSIR-National Physical Laboratory Delhi India, India & AcSIR, India); Arun Ram RT (Scientist, Nigeria); Manish Kumar Tamrakar and Shri Krishan (Technical Officer, India); Priyanka Jain (Scientist, Nigeria)

15:40 **The Digital Reference Material Document: from Paper Certificates to Interoperable Data Objects in Digital Quality Infrastructure**
Matthias Prellwitz, Claudia Koch, Silke Richter, Johannes van de Kreeke, Michael Melzer and Mehran Monavari (Bundesanstalt für Materialforschung und -prüfung, Germany)

14:00 - 15:00	*Room SA3 - First Floor*
	Session 9.2 - General Session - PART V
	Chairs: Francesco Picariello, *Universitas Mercatorum, Italy*
	Luca De Vito, *University of Sannio, Italy*

14:00 **Using FAIR Principles and Data Quality Assessment to Enhance the Reliability of Digital Twins for Subsea Asset's Integrity Monitoring**
Miguel Burg Demay, Luiz Eduardo De Farias, Gustavo Donatelli and Andre Luiz Meira De Oliveira (Certi, Brazil)

14:20 **An Overview of Metrology Knowledge Storage: Taxonomies, Ontologies and Controlled Vocabularies**
Clifford Brown, Julia Neumann and Tomasz Sołtysiński (Physikalisch-Technische Bundesanstalt, Germany)

14:40 **Lightweight Passive Monitoring for Soft Anomaly Classification in Wired Networks on Resource Constrained Microcontrollers**
Prabin Dhakal (Institute of Engineering, Nepal); Francesco Picariello (Universitas Mercatorum, Italy); Basanta Joshi and Nanda Bikram Adhikari (Institute of Engineering, Nepal)

15:00 - 16:00	*Room SA3 - First Floor*
	IMEKO TC-6 Board Meeting

16:00 - 16:20	*Complesso Sant'Agostino - Ground Floor*
	COFFEE BREAK

16:20 - 16:40	*Auditorium Sant'Agostino*
	CLOSING AND AWARD CEREMONY