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Editorial

Roman Schwartz
CIML President

Looking forward

As we reach the end of 2017, I would like first to look back over what has undoubtedly been another very successful year for our Organization. I would like to again express my sincere thanks to our host country Colombia which did an excellent job in organizing both the OIML Seminar on the new Certification System, and also the 52nd CIML Meeting itself. I also wish to thank the BIML staff who made the CIML meeting a real success.

We made many important decisions, such as the replacement of the Basic and MAA Certificate Systems by the new OIML-CS which came into force on 1 January 2018 (see page 46). We decided to further improve B 6, the Technical Directives, by planning a revision to enable more effective project group work. We are now making better use of the available online facilities, and the OIML website is being constantly improved. One of the reasons for this better use of the website is the program of convener training activities carried out in 2017; based on this initial positive experience, further training activities are planned for 2018. It is important that by effective project group work we keep OIML Recommendations and Documents up to date, and adapt them continuously to new technologies.

Concerning CEEMS, the Advisory Group is now established and B 19 has been published. A joint project of the CEEMS AG with the BIPM is the revision of D 1 *Considerations for a Law on Metrology* and in the future we envisage even closer cooperation with the BIPM, especially in capacity building and QI ("Quality Infrastructure") activities.

Concerning the New SI, it is expected that in 2018 the CGPM will follow the CIPM recommendation to revise the current SI so that it will be based on seven fundamental constants, to come into force in 2019. This will be a key step for metrology, although the impact on practical measurements will be minimal or unnoticeable for users at all.

In Colombia there was a very smooth handover of the CIML Presidency after seven very successful years of Presidency by Peter Mason, who was made CIML Member of Honor in recognition of his service to the Organization. CIML Past President Alan Johnston was also made Member of Honor, and this will become effective in 2018.

In Cartagena, Yukinobu Miki took over as Acting First Vice-President until the vacancy can be filled by a new First Vice-President to be elected at the 2018 CIML meeting.

BIML Director Stephen Patoray has announced that he will retire at the end of 2018; a call for candidates has been published and a Selection Committee has been established with a view to finding the right candidate to be appointed at the 2018 CIML meeting. And on the subject of the Bureau Staff, we are pleased to welcome Paul Dixon into his role as BIML Assistant Director, meaning that the BIML Team is now once again complete.

As your new CIML President I thank all CIML Members for your confidence and very encouraging support, which is a real motivation for me to serve the Organization and its Members as best as I can for the upcoming six years. I am confident that our Organization is well prepared to meet the needs of our Members and the challenges we will certainly be facing. I hope you share my optimism and look forward with me to 2018 and the following years.

I personally look forward to seeing you all in the week of 8 October 2018 at our 53rd CIML meeting in Hamburg! ■

AUSTRALIA

The challenge of determining the economic value of metrology

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Abstract

The Australian Government is embarking on a comprehensive review of Australia's measurement laws. The aim is to modernise the framework including a shift towards a more principles-based approach. Initial analysis has raised the important question of how to quantify the economic benefit of metrology to Australia. In this paper, we focus on this question by undertaking a review of the existing economic analysis and providing an update on our current work.

The economic analysis conducted in this area has to date been limited. As a result, some of the figures relied on to quantify the economic benefit of metrology have been extrapolated beyond their original intended analysis. Some other figures are derived from studies on the general benefits of standardisation and may not capture the full scope and benefits of metrology. What value is placed on benefits such as social benefits, scientific benefits and the fundamental notion that a "modern society could not function without a systematic way of acquiring measurement data" [1].

This presents us with the challenge of how to determine the value of metrology to Australia's economy. It is important to be able to measure the value and quantitatively express the benefits of having and maintaining a legislative framework to support Australia's measurement system. It is also vital to conducting cost-benefit analysis in the area of metrology, in particular for regulated areas including trade measurement.

1 Introduction

The Australian Government is embarking upon a once in a generation review to reform Australia's measurement legislation.

When the *National Measurement Act 1960* (Cth) was first enacted one of the main drivers was to bring about the use of the metric system of measurement into Australia. Since then our country's national measurement framework has evolved to a level in which it underpins measurements that we rely upon in our daily lives; including time measurement to support high-speed global communication and satellite navigation, fuel dispensers, electricity meters, trade measurement, food quality, sports and forensic drug testing, preparation and characterisation of DNA reference materials and measurement of nanoparticles in products such as sunscreens.

While there has not been a systemic failure of Australia's national measurement system, the legislative framework is complex, overly prescriptive and outdated. To ensure that Australia's measurement framework is equipped for the future, there is a need for a more efficient legislative and policy framework to support strategic measurement capabilities and processes that will enhance business and consumer confidence, scientific advancement and provide a strong effective system that is trusted and accepted both domestically and internationally.

Whilst measurement which draws on appropriate scientific and technical expertise is central to the effective functioning of a modern economy, preliminary analysis of the review of Australia's national measurement legislation has led to asking an important question regarding how to appropriately quantify the economic benefit of metrology to Australia. The currently available analysis focuses mainly on the quantifiable benefits that a robust metrology system brings to the economy, such as the percentage of Gross Domestic Product / Gross National Product attributed to measurement in trade. What this type of analysis fails to capture are the public good arguments that result from metrology in supporting various functions in the health, environment, social, and safety sectors. The benefits of metrology in these sectors are much harder to quantify, but failing to include these benefits in an analysis of the overall economic benefit of metrology to Australia falls short of painting a complete picture of the true value of metrology.

2 Review of the framework

Although Australia's measurement system has been constantly evolving, the current legislation which underpins the system has never been reviewed to examine the appropriateness of the entire legislative and policy framework. Changes in technology, industry and consumers call for a major rethinking of Australia's national measurement legislative framework to ensure it continues to deliver benefits which support the many sectors of the Australian economy. The review aims to align the framework with current best practice thinking, involving a move towards a more modern principles-based approach.

One of the main drivers for the review is to reshape Australia's national measurement legislative framework to better allow for innovation and productivity through greater efficiencies, while maintaining confidence in metrology for Australia as well as internationally. In order to examine what benefits the adoption of a more modern, flexible legislative framework could bring to the economy, a key consideration is to determine the current economic value of metrology to Australia to enable the Australian Government to better position measurement to provide additional benefits to the economy, now and into the future. Although professional metrologists and measurement experts may be quick to point to some key examples highlighting the importance of metrology, such as in the importance of accurate, reliable measurement to provide confidence in the claims of innovative products and services, determining the economic value it provides is trickier to quantify.

A reliable quantification of the economic value of metrology provides a basis for the determination of the appropriate level of government investment. This investment supports necessary infrastructure to maintain a functional metrology system. Infrastructure includes measurement standards and scientific equipment, highly qualified workforce, research, logistics, and accreditation [2]. A robust metrological infrastructure creates a significant cost for government. The rationale for public funding and government involvement is dependent upon establishing a case that the public good benefits justify expenditure of public funding [3]. The review will need to analyse areas that require continued spending and involvement for government and areas where savings can be made without compromising the integrity of the system.

3 The value of metrology

Certain benefits that metrology affords to the economy can be quantifiable through calculating figures such as the percentage Gross Domestic Product / Gross National Product of goods traded on the basis of measurement [4]. Although these types of studies identify the importance of metrology to society and the economy, the quantifiable indicator of benefits generated by metrology is missing [5]. These trade based economic benefits are not the only benefits that metrology offers to the Australian economy; there are also economic benefits associated with measurement accuracy in research, innovation and productivity. The metrology framework plays a vital role in supporting industry sectors, such as health, environment, safety, and social well-being that provide a public good. The value of metrology in its role to support measurements in these sectors is much harder to quantify than it is when looking at trade transactions. The issue of placing a value on the entire metrological framework to the Australian economy is that a large portion of its value is in the public good role that it plays in innovative research and the development of new technology by universities, industry, and government, as well as the role it plays in ensuring safety and social benefits through the enforcement of laws and regulation involving technical measurement. If a value cannot be placed on the supporting role that metrology plays, then any analysis of the benefit of metrology to the economy will fall short of highlighting its true value.

4 Modern approaches

The question of how to evaluate the economic value of metrology is one that has been considered many times before. A number of studies have been conducted focusing on the economic importance of both legal metrology and the wider scope of metrology. These studies will not be discussed in any great detail here; valuable analyses of the current studies can be found in articles by Bruno Amado Rodrigues Filho and Rodrigo Franco Gonçalves [5], John Birch [4], and Peter Swann [3]. In summary their focus is on analysing the worth involved in measurements that are able to place a quantifiable value on the benefit of metrology to certain aspects of the economy e.g. trade, import/export, tax and excise. They also identify studies conducted in a number of countries that highlight the important role metrology plays in both the economy and society. A number of these studies have successfully identified the important benefits that legal metrology offers the economy, such as, reduced disputation costs, fraud prevention, consumer protection, and providing a level playing field for business. They have also discussed the various benefits of legal metrology to society including scientific development, environmental protection, improved health measures, education, and reduction of deaths and injuries through health and safety applications. While these discussions draw our attention to the benefits of metrology beyond those involving financial transactions, the missing component of these studies is a quantitative assessment of the benefits that arise.

In an analysis of the economic benefit of metrology, it is important to look to international studies, however, the metrological framework and how it is regulated will be unique to each particular country. Australia's position differs from the approach adopted by most other countries. The National Measurement Institute of Australia (NMIA) has responsibility for all aspects of metrology, including both scientific and legal metrology. NMIA is a division within the Australian Government Department of Industry, Innovation and Science. Some Australian studies, including a research paper from the Office of the Chief Economist [6], have examined the economic impact of metrology, however, these studies did not seek to assign a qualitative indicator to the wider benefits generated by metrology to the Australian economy and society.

5 The problem

It is clear from the current literature regarding the economic value of metrology that what is missing from these studies is an attempt to assign a quantitative figure to the benefits that metrology affords to the economy and society, outside of proxy figures which identify the financial value involved in measurements. The problem that this presents when attempting to place a value on the benefits of metrology to Australia as part of the review of Australia's national measurement legislation, is that any current model relied upon to calculate this value will not be sufficient to capture the full value of metrology to Australia. Although these models provide a limited quantitative analysis of the economic benefit of metrology they still provide a useful figure to justify continued expenditure on maintaining Australia's measurement framework. The review presents an opportunity to consider a full analysis of the economic value of metrology to Australia and possibly capture some of the less quantifiable aspects of metrology's benefit to the economy and society.

Currently, there does not appear to have been any work done in the Australian context regarding quantifying the public good benefits that metrology affords. Some analysis has been carried out in Australia looking into how safety enforcement requirements that utilise measuring instruments, such as radar speed devices and breathalysers, has been shown to significantly reduce the number of accidental death and injuries in Australia [7]. While this type of analysis is likely to lend itself to being able to produce a quantitative figure based on the economic saving resulting from such a decrease, there are a number of other areas where metrology provides a social or economic benefit that have not been subjected to such analysis. Public good aspects of metrology in Australia will be much more difficult to quantify and yet they are equally as important to include in an analysis of the value of metrology as part of the measurement law review. It is important that analysis focuses on both the direct value, and the indirect/derivative value measurement has to the economy. The true challenge for the review will be to find a way to either quantify these benefits of metrology to the Australian economy, or convey their importance in a meaningful way that affords it the same weight as the quantitative economic analysis of measurement transactions.

It is accepted that the economic value of metrology is difficult to quantify as it underpins so many sectors of the economy. Australia's reliance on a robust metrological framework to support the economy and promote a harmonious society is no different to most other economies. In conducting the review of the national measurement legislation, it would be useful to have a full understanding of the economic value of metrology to Australia. This information could be useful when examining options for change to the current legislative framework in terms of the cost or benefit to Australia that would result. One way to look at the problem presented may be to consider the economic and societal cost of inaccurate measurements. The analysis could consider what the impact to the Australian economy would be where a reliable metrological framework is not maintained, or becomes outdated; what would be the flow on effect to various sectors of the economy and society, and what would be the likely costs associated with it?

6 Working towards a solution

Studies in Australia, the USA and Canada have estimated that the total value of trade transactions involving measurement (including pre-packaged goods and utility metering) accounts for at least 60 % of Gross National Income [8]. Based on these estimates, the total value of trade transactions involving measurement in Australia in 2014–15 was more than $750 billion. This figure may be problematic for the review as the benefit is determined based on the financial value involved in measurements. Because of this, were additional analysis to be conducted, it would need to be more robust and seek to take into consideration the benefit of metrology beyond where measurement is involved in financial transactions. What could we do better or include in the analysis to get to a more accurate figure for the value of trade metrology? What value do you assign the benefit derived from 'equity in trade'?

In the context of the review of Australia's entire national measurement legislation, an economic analysis of metrology will be most useful where it is able to capture the public good benefits of metrology along with the purely fiscal calculations. This will create a much more complete picture of the economic value of metrology to Australia than that presented by analysis in the past. Ideally, any analysis conducted would strive to produce a quantitative value on the benefits of accurate measurement in sectors such as health, safety, social, environmental and energy. It may be useful to consider some of these assessments in a somewhat reverse engineered fashion, by looking at the potential cost associated with inaccurate measurement rather than trying to quantify the benefit of accurate measurement.

Some work could be done to value measurement in the health sector through analysis of research and development of innovative health solutions and technologies that rely on measurement, and looking at the potential cost associated with inaccurate measurement of pharmaceuticals and the administering of medication, including a consideration of the likely increase in death or serious health complications that could result. Similarly, in the environmental sector, it may be possible to conduct an examination of the potential cost of rectifying damage to the environment associated with inaccurate measurement of pollutants, pesticides, toxic substances and greenhouse gas emissions. Resource control is another environmental area that has been looked at in other studies that could help to build a picture of metrology's value in supporting the environment [9]. A major public policy issue is the future impacts of climate change. Although metrologists have only been marginally involved in the development of climate change public policy, greater involvement of metrology could provide increased trust and confidence in the measurements of global temperature.

Fiscal benefits associated with decreases in death and serious injury as a result of speed radar and breath analysers have been looked at in the past in Australia and similar analysis could be conducted regarding other examples of safety regulation through the use of measurement, for example weighing of transport vehicles by Australian state and territory regulators, and verified gross mass requirements for shipping containers by the Australian Maritime Safety Authority. The aerospace and transportation industry in Australia is another area that appears to not have had a thorough analysis of the benefits of metrology, and yet the costs associated with inaccurate measurement in these sectors would potentially be huge including possible loss of life or serious injury.

Electricity prices are continuing to increase in Australia and are a significant financial cost for households and businesses. Accurate measurement of electrical energy usage ensures equity in trade for consumers. It also supports transparency for generators, distributors and retailers competing in the National Electricity Market. Phone, internet and mobile communication is another rapidly growing sector. Digital measurement of data is not currently within the remit of Australia's measurement legislation. The benefits of accurate measurement in this sector could include reduced transaction costs associated with network usage caused by billing disputes over bandwidth, data limits or data speeds. Any future analysis of the value of metrology to Australia's economy will need to focus on trying to capture these types of benefits.

A significant consideration for the review of Australia's national measurement legislation is whether an examination of the economic value of metrology to Australia is limited to legal metrology or whether it should also include an analysis capturing the benefits of scientific metrology as well. Some of the studies referenced in this article appear to narrow the value of metrology by making a distinction between legal and scientific metrology. As the review will examine all aspects of Australia's national metrological framework, a distinction should not be made to limit the scope of benefits to a specific metrological field. The analysis for the review of Australia's measurement framework will need to be undertaken to examine the overall benefit metrology has to the economy in areas such as innovation, scientific development, productivity, health and well-being to determine the economic and social value metrology provides to Australia.

7 Conclusion

There are many challenges associated with attempting to place a quantitative value on metrology to the Australian economy, many of which have been highlighted in both international and domestic studies and research papers on the topic. Despite these challenges, the question of how to reach this quantitative value continues to be asked and that is because it is well recognised that metrology provides substantial benefits to the economy and society. While some modelling has been able to value aspects of a metrological system in terms of the economic benefit it provides, these figures are not always enough to account for the total value of metrology in terms of its benefit to the economy and society. There are many benefits provided by metrology that are difficult to account for using a purely quantitative assessment, and yet there is a desire to account for these benefits in a quantitative way as part of the review of Australia's national measurement legislation. If time and effort are to be spent conducting an analysis of the economic value of metrology to Australia, then the desire would be to attempt to account for all aspects of metrology in as much of a quantitative fashion as possible. While there are still likely to be limitations to this analysis it would be valuable for the NMIA to have a complete picture of the value of metrology to the economy and society that can be used to inform the review of the legislation as well as future analysis of metrological activities. ■

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CLOUD

Digital transformation of legal metrology - The European Metrology Cloud

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Abstract

To foster the digital transformation in legal metrology, Germany's National Metrology Institute (PTB) has initiated the development of a coordinated European digital quality infrastructure for innovative products and services, called the "*European Metrology Cloud*". Its foundation lies in a trustworthy metrological core platform in each Member State, designed to support and streamline regulatory processes by joining existing infrastructures and databases and to provide a single-point-of-contact for all stakeholders. Within this digital quality infrastructure, reference architectures, i.e. innovative measuring instruments, as well as technology- and data-driven digital services for legal metrology will be provided. The early outcomes of this initiative will be demonstrators to serve as blueprints for the individual national platform to attract further stakeholders and services to be integrated. These first results could be used to support or even initiate processes to "future-proof" national and European legislation. These national platforms can later be combined via a coordinating platform established and maintained by a board of Member States' representatives, authorities and industrial stakeholders. With these objectives, the initiative fosters the digital single market envisioned by the European Commission.

1 Introduction

Innovation is essential to European competitiveness in the global economy. The drivers of the digital transformation are the increasingly globalized market place, the ever-increasing drive for efficiency and the rapidly developing consumer demands. New growth opportunities therefore come from providing new products and services, from technological breakthroughs, new processes and business models, non-technological innovation and innovation in the services sector [COM2017].

The role of digital networks as an accelerator of development has been recognized globally, and due to their critical importance to the three pillars of development – economic development, social inclusion and environmental protection – the task of making the Internet universal and affordable was approved as a target of the Sustainable Development Goals, echoing the objective already elaborated by the United Nation's Broadband Commission for Sustainable Development [OECD2017]. At this still early stage, legal metrology may have a unique opportunity to help usher in the Internet of Things (IoT) an enabling environment that both promotes its many benefits and addresses the challenges.

The European Commission sees an enormous economic benefit in a digital single market. Hence, the Commission has issued a Digital Single Market Strategy for Europe to push the most essential aspects such as Cloud Computing, Big Data and Platforms [COM2014/442], [COM2015/192], [COM2016/288]. Seizing the chances of digitalization outlined by the European Commission could resolve existing obstacles for innovation in the sector of legal metrology.

The New Approach of the European Commission [COM2016/C272] sets up a Quality Infrastructure where measuring instruments and related legal processes are embedded. A Quality Infrastructure is generally understood to be the totality of the institutional framework required to establish and implement standardization, metrology, accreditation and conformity assessment services necessary to provide evidence that products and services meet defined requirements, be it demanded by authorities or the market place.

It is estimated that there are 850 million measuring instruments in the EU market which are governed by European directives of this New Approach (e.g. 2014/31/EU and 2014/32/EU). In most industrialized countries, legally relevant measurements are responsible for a share of 4 % to 6 % of the European Gross Domestic Product, equivalent to 660 – 990 billion € per year.

Today, measuring instrument sensors are often fully developed within the scope of the required measurement accuracy. New business and service models will therefore address individual customer requirements which are determined based on user data and data collected in the field. Consequently, the need to offer data-based services and business models – for example, based on big data processing schemes – will increase. Unfortunately, it is felt by the European manufacturers' associations that the implemented processes within the quality infrastructure hamper the use of technological breakthroughs providing new products, the exploitation of the technological potential

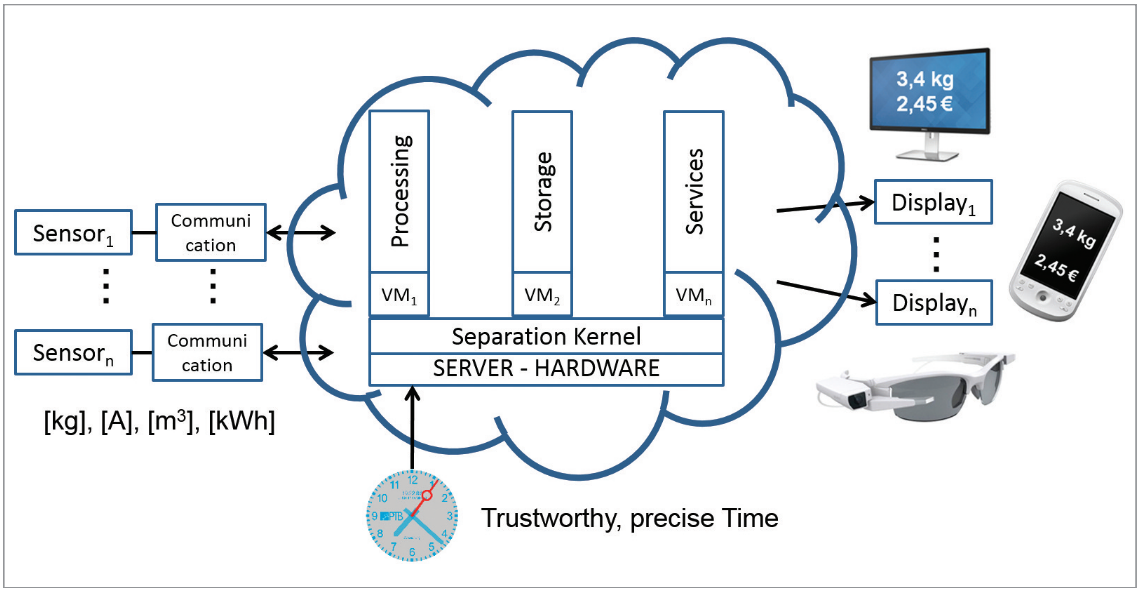

Figure 1: Instrument with distributed and virtualized components and data based services

to streamline the processes, and to develop new data based business models [IT2017], [PC2017].

Exemplarily, the manufacturers' associations envision marketing concepts based on innovations which are driven by technologies that have matured significantly over the past ten years. Hence the transition from an instrument with locally concentrated parts towards a distributed hardware and cloud-located stored data, data based services and virtualized processing software (see Figure 1). This approach is backed by the manufacturers' associations in Europe who increasingly frequently ask for legally acceptable architectures for such technologies, whenever they see a possible economic advantage.

The objectives of the European initiative described here aim to address these needs by setting up a digital quality infrastructure to improve the coordination in Europe by technology- and data-driven legal metrology services – the *"European Metrology Cloud"* – whilst guaranteeing transparency appropriate for conformity assessment and market surveillance in an increasingly globalized economy (see Figure 2).

2 Legal metrology and its economic footprint

Legal metrology establishes confidence in the correctness of measurements and the protection of users of measuring instruments and their customers. Correct and traceable measuring instruments can be used for a variety of measurement tasks. Those responding to reasons of public interest, public health, safety and order, protection of the environment and the consumer, of levying taxes and duties and of fair trading, which directly and indirectly affect the daily life of citizens in many ways, may require the use of legally controlled measuring instruments.

To support the intelligibility of the need of the initiative, a brief description of legal metrology and its economic footprint is given below.

In legal metrology, a restricted community exchanges sensitive information regarding regulated measuring instruments within legally guided processes to guaranty confidence in the correctness and traceability of the measurements and to protect the customer and the user. The stakeholders in legal metrology consist of the users and manufacturers of the measuring

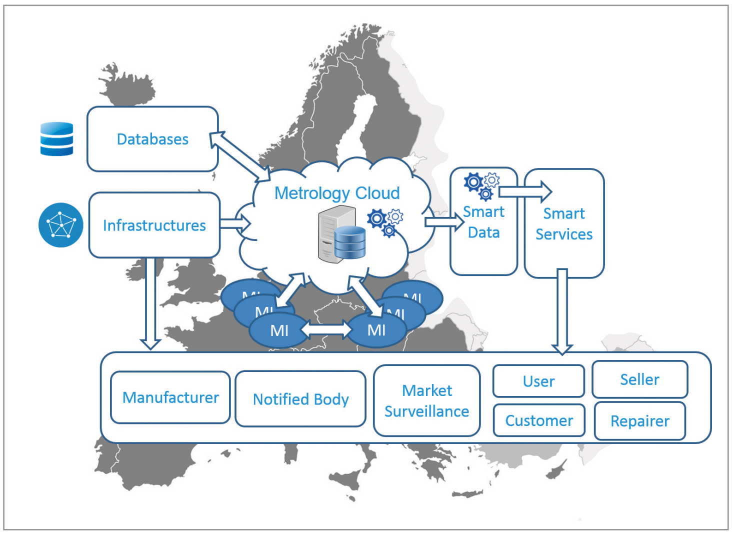

Figure 2: The "European Metrology Cloud" – A digital quality infrastructure for Europe (MI: measuring instrument)

instruments, the national Notified Bodies – often a National Metrology Institute (NMI) – and the national authorities responsible for market surveillance and verification/inspection of the instruments in the market. The responsibilities and rights of these stakeholders are regulated by European Directives within the New Approach [COM2016/C272] which set up a quality infrastructure for products, such as 2014/31/EU and 2014/32/EU, and Regulations such as 765/2008 and Decision 768/2008/EC.

The legal framework defines a quality infrastructure which supervises the integration of new products in the market and also encompasses the product design and the subsequent production, the placing on the market and finally the use of the product. This supervision is shared by national Notified Bodies, market surveillance authorities and verification authorities.

Notified Bodies assess the conformity of the design and the production to the essential requirements, whereas the market and user surveillance supervise the placing on the market and the correct use of the instruments. The verification and inspection authorities are tasked with the re-verification and inspection of the instrument, respectively. In this way, a chain of trust is established, stretching from the development phase via production to the instrument in use (see Figure 3).

The **14 classes of measuring instruments** which are governed by the Directives include water meters, gas meters and volume conversion devices, active electrical energy meters, thermal energy meters, measuring systems for the continuous and dynamic measurement of quantities other than water, weighing instruments, taximeters, material measures, dimensional measuring instruments, exhaust gas analyzers and none-automatic weighing instruments. The laws of the Member States add further instrument classes, such as measuring instruments for public traffic, radiation protection, "intelligent" or "smart" metering and temperature to name but a few.

The European regulations apply to 345 million units of measuring instruments that are sold annually in the European market [COM2010]. In 2010, the annual turnover of the sector was estimated at € 7 billion [COM2010]. In several Member States, the number of measuring instruments sums up to 150 different types, e.g. in Germany. Based on each Member State's contribution to the gross domestic product (GDP) [WP2017] an estimate of 850 million measuring instruments in the EU market can be made. The largest share is attributable to the area of utility meters such as electricity, gas, water and heat meters, weighing instruments, and measuring instruments for measuring the volume of mineral oil. In most industrialized countries, legally relevant measurements are responsible for a share of 4 % to 6 % of the European GDP [DP2015] (660 – 990 billion € per year).

The Notified Bodies carry out conformity assessment of a measuring instruments and grant type approval certificates when appropriate. There are 120 such notified bodies listed in the EU database [COM/NANDO]. One of Germany's Notified Bodies, the PTB, issued approximately 600 certificates for measuring instruments covered by 2014/31/EU and 2014/32/EU in 2016. Based on the GDP it can be estimated that 2400 certificates were issued in the European Union by the Notified Bodies in 2016. After putting a measuring instrument into use, the market surveillance and verification authorities are responsible for surveying their correct use, repair and reverification. There are 205 market surveillance institutions working on this task in Europe [COM/MS]. According to the number of verifications carried out in Germany in 2014 [AGME2014] (~1 million) it can be estimated that market surveillance involves 5 million verifications per year. More than 80 % of these are verifications after a repair. 900 European companies are active in the production of measuring instruments [COM2010] and many are partly active in related fields as well providing millions of jobs in Europe. They are organized in manufacturers' associations such as CECIP, CECOD, FARECOGAZ, AQUA, ESMIG, VDMA, etc.

Within the legal framework, a multitude of processes are defined and well established in a certain way, applying traditional communication paths. These processes range from the exchange of information between partners, such as the documentation of the

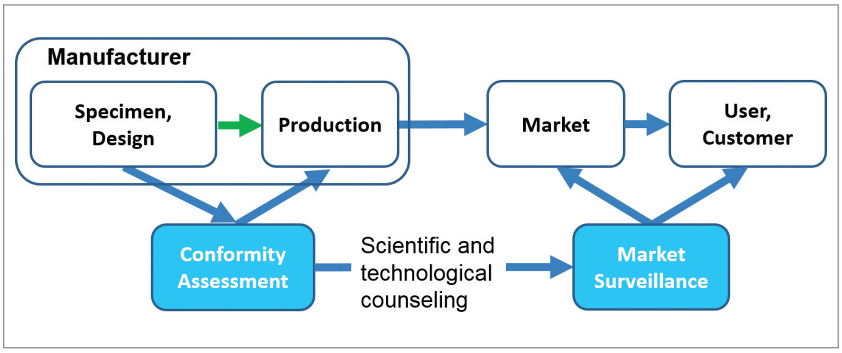

Figure 3: The part of the quality infrastructure regarding conformity assessment and market surveillance

instrument design provided by the manufacturer during the assessment of conformity at the notified body, between the market surveillance and the manufacturer when the instrument is put into use or during the re-verification phase between the manufacturer and the verification authorities after the repair of an instrument.

The interaction within these processes is currently not based on state of the art communication paths or coordinated via platforms. Furthermore, an obligation to collect specific data for the instruments for each role in this context is set up. The notified body maintains, for example, a database of the tests during conformity assessments and documentation of all the individual instruments carried out by them. This is highly sensitive information. Another example is the performance data of a measuring instrument. Manufacturers shall carry out sample testing of measuring instruments made available on the market, investigate and maintain a register of complaints of non-conforming measuring instruments and measuring instrument recalls, and shall keep distributors informed of any such monitoring. Data that the market surveillance authorities shall collect are, for example, the data necessary for the identification of non-compliant measuring instruments, the origin of the measuring instrument, the nature of the alleged non-compliance and the risk involved, the nature and duration of the national measures taken and the arguments put forward by the relevant economic operator.

Retrieving data from metrology databases is done on request in traditional ways based on queries carried out by the keeper of the database as an intermediator, and transferred back by this role to the requestor. Direct queries by an authorized partner to data provided by the partners are not yet possible. There are several processes in place where a large number of different partners are involved and their agreement is needed based on different actions which have to be carried out, before a final process can be initiated. A prominent example is the change, repair or update of legally relevant software. There are good prospects to streamline such a process if it is rendered digital via a platform.

3 Expression of stakeholders' needs

To keep this market segment growing the manufacturers' associations envision marketing concepts based on innovations which are driven by the ever-increasing demands of the globalized market and which are facilitated by technologies that have matured significantly [IT2017], [CP2017].

The manufacturers object that the processes implemented and set up by regulations and realized by the current analog quality infrastructure hamper the use of these technologies and the exploitation of their possibilities. Therefore, seizing the chances of digitalization could resolve existing obstacles for innovation within the analogue quality infrastructure.

The rapid change towards digital approaches is facilitated by the development of information technologies and global political initiatives which foster a data-driven digital market, e.g. by the G20 [OECD2017], the European Commission [COM2014/442] [COM2014/25] and nationally [BR2014]. These initiatives recommend to support innovative products and join existing infrastructures and databases via appropriate platforms.

Consequentially, to remove the barriers to innovations within legal metrology, it is planned to use state of the art digital technology to render processes digitally for the sake of streamlining, harmonizing and coordinating.

Since the required measurement accuracy of measuring instrument sensors is defined by law, its increase is no longer a business case. Contemporary business and service models therefore address individual customer requirements which are determined based on user and/or non-legal instrument data and will trigger the increased provision of data-based services. For the billions of measuring instruments used in the EU single market, data volumes are generated during their life cycle from the approval and market surveillance processes as well as from the service the manufacturer provides. The size of these data volumes suggests that "big data" solutions could be used to create smart services that can simplify the processes – and therefore the work – of all the parties involved. Especially the administrative data of the instrument could serve as one valuable database. Inevitably, conventional concentrated instrument will be replaced or amended towards a distributed hardware together with virtualized software parts and data based services. Such virtual measuring instruments allow data storage in a cloud infrastructure, combine those data with other data sources, offer measuring and processing software in the cloud as "Software as a Service" (SaaS) and provide access to the instrument or its parts via communication networks. On this basis, new technological and data-driven services are possible. For these distributed instruments, the manufacturers' associations in Europe ask for legally acceptable solutions [IT2017], [PC2017].

Therefore, our proposal for a European virtual quality infrastructure is based on the possibilities state of the art information technologies offer, incorporating the potentialities of the existing distributed infrastructures and databases of the stakeholders, and aiming to improve the coordination in Europe by technology- and data-driven legal metrology services provided via an appropriate platform.

4 Objectives of the initiative

The four main objectives of the initiative which form the guiding frame for the work to be done are described below.

4.1 Objective 1: The trustworthy metrological core platform

The central aim of the initiative is to develop the trustworthy metrology "core" platform (TMC-platform) for the European Metrology Cloud (see Figure 4).

This platform will serve to implement digital concepts for the coordination, concentration, simplification, harmonization and quality assurance of metrological services for the Member States and all parties involved. To this end the platform consists of elementary modules which allow sharing of the existing databases and infrastructures. It guarantees interoperability, an adaptable level of trust and security and provides trustworthy metrological administration as a service. In this way, the platform allows further services to be incorporated such as "plug-in modules" which use the elementary elements.

This central, trustworthy national element is required for the joining of existing infrastructures and databases already in use by the stakeholders in the Member States. Due to their role and work over the last decades the **National Metrology Institutes**, i.e. the Notified Bodies, have built up considerable confidence and trust in their work and an inherent good reputation. The certificates issued and the services provided by these institutions are considered a sign of quality – in several cases worldwide. Consequentially, the National Metrology Institutes are the adequate **impartial partner** in the field of legal metrology to host such a trustworthy metrological platform as an **"anchor of confidence"** and provide metrological administration. The trustworthy metrological administration of services, configurations and monitoring of activities running on the platform fills a gap, since the role of an administrator is not known in legal metrology regulations (see Figure 5).

If different infrastructures are joint and data are exchanged, then the question of standardization arises. The current internet application domain has avoided the dominance of a very limited number of private or public parties. Its "hourglass model" with minimal, rigorous standards and protocols and maximum freedom of implementation has major advantages. It was strongly advised by the Commission High Level Expert Group on the European Open Science Cloud [COM/EOSC2016] to follow a similar approach to implement the European Open Science Cloud (EOSC) [COM/EOSC]. This will allow open and common implementation and will thus avoid costly and time-consuming exercises to decide who has the best solutions. Instead, it will allow participation from all stakeholders. All providers, public and private, can start implementing prototype applications for the sharing of data and services according to the minimal standards and the minimal rules of engagement. For that purpose, platform independent and open platform communication interoperability standards already broadly applied, such as the Open Platform OPC UA [OPCP2017] [BSI/OPC/2017], will be considered for the secure and reliable exchange of data to ensure the seamless flow of information among devices from multiple vendors.

The standards derived from the mandate M/441 to CEN, CENELEC and ETSI in the field of measuring instruments for the development of an open architecture for utility meters involving communication protocols enabling interoperability and the Smart Grid Mandate M/490 issued by the European Commission and EFTA to

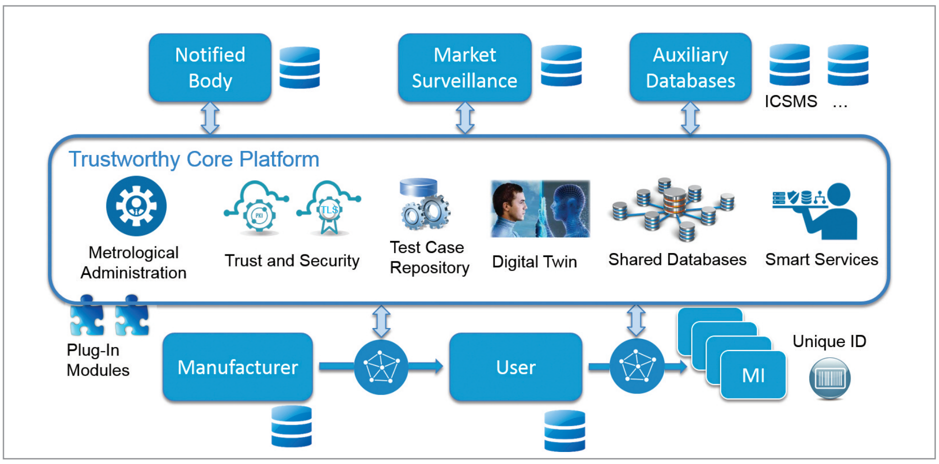

Figure 4: The concept of the trustworthy metrological core platform.
Plug-in modules could be for example e-certificates for calibration, conformity or e-verification markings, etc.

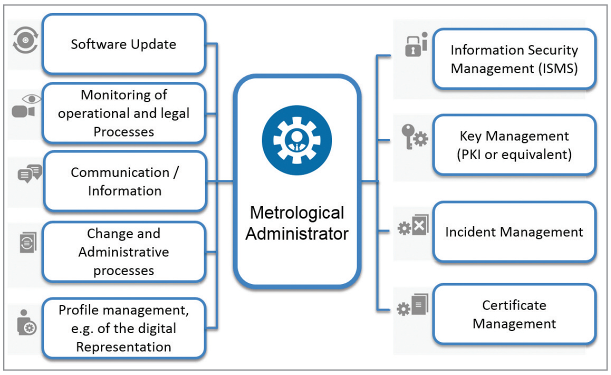

Figure 5: Functions to be fulfilled by the metrological administrator

develop a framework in the smart grid field will be considered in this approach [M/441] [M/490]. Additionally, the Regulation (EU) No 910/2014 [COM2014/910] of the European Parliament and of the Council on electronic identification and trust services for electronic transactions in the internal market will be considered and the results from our former EMRP projects ENG04 *SmartGrids* and ENG63 *GridSens* will be incorporated in this initiative [ENG04], [ENG63]. For trustworthy authentication, existing approaches (public-key-infrastructure (PKI)) as well as new concepts based on utilizing, for example, quantum-key-distribution (QKD), and non-hierarchical approaches taking physical non-clonable functions (PUFs) and the Blockchain paradigm into consideration will be investigated.

Based on essential use cases – defined in objectives 3 and 4 – the requirements for the interoperability of the platforms need to be defined, concepts to share confidential information between a subset of partners need to be developed and the feasibility of the functioning of each elementary platform module under experimental and real conditions should be proven.

The digital representation of the measuring instrument – the Digital Twin – from objective 3, will be the central communicative element for the different infrastructures, partners and for each type of measuring instrument and will therefore define the basic requirements to be realized.

Since part of the quality infrastructure set up by European legislation is under the sovereignty of the Member States, e.g. verification of the measurement in use, the national realizations will differ. These differences will be identified and a common technological approach will be set up. In that way, the platform developed in this project can serve as a blueprint for the individual national platforms. These platforms can later be combined via a coordinating platform established and maintained by a board of Member States and industrial stakeholders.

4.2 Objective 2: Reference architectures

The next aim is to provide and distribute knowledge via broadly applicable general *reference architectures* specifically for new and complex technologies fitting the needs of all stakeholders. The IT-infrastructure of measuring systems of the future will grow in size as well as complexity and encompass several new basic technologies according to the technology stack of a IoT system (see Figure 6). Legal metrology needs to cope with the separate technologies of this IoT stack.

For these basic technologies, general reference architectures will be developed and tested. These architectures make full use of the future European digital quality infrastructure. These innovative technologies open up new opportunities but also pose risks to the security of measuring instruments and radically change how society interacts with them. Therefore, the reference architectures will undergo an adequate risk assessment [ME2105] as required by Directives (2014/32/EU) and (2014/31/EU).

The main challenges for the general reference architectures are to encompass the fulfillment of the essential requirements, a verification method which provides easy inspection of the meter in the market and exploration of contemporary risks and threats for measuring instruments via an adequate risk analysis. To make a general reference architectures applicable for a specific class of instruments, e.g. for weighing instruments, heat meters, fuel dispensers, etc., it must fulfill additional instrument-specific requirements and needs tailoring to the individual risk class (see Figure 7).

The risk analysis, which considers contemporary threats and guarantees comparability throughout Europe, will be made available and hence would also

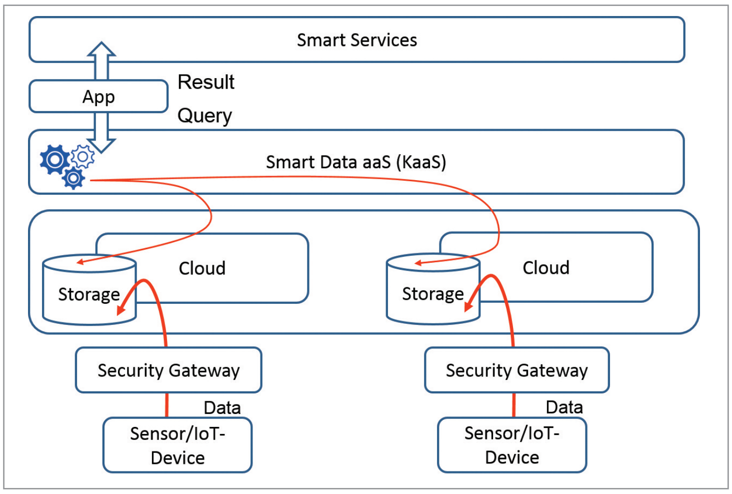

Figure 6: The basic technology stack of an IoT system. KaaS: Knowledge as a Service

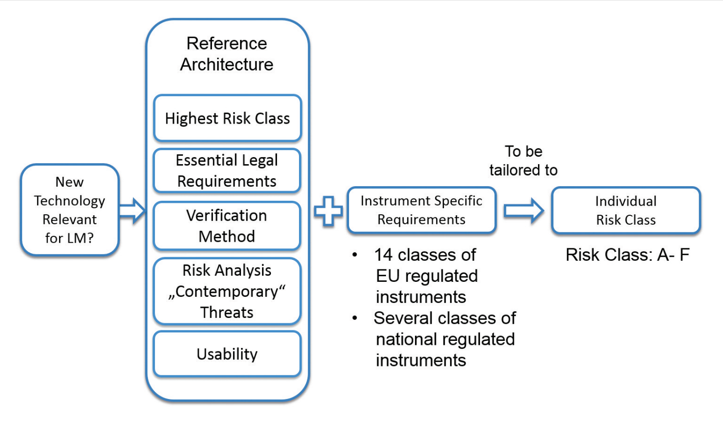

Figure 7: Requirements on a general reference architecture and the required additional steps for a specific class of instruments. LM: legal metrology

increase the competence of all partners involved. An agreed list of attack vectors, i.e. a scheme setting out how threats could be realized, is needed to guarantee comparability of the analysis between the manufacturers and the notified bodies. All of these aspects should be integrated into the conformity assessment procedure.

The process of conformity assessment and market surveillance will be optimized by the research carried out in prototyping these architectures, on the risks involved and on how instruments can be verified in the field. The knowledge gained will help to mitigate the risks during these processes for future measuring instruments and will improve the competence of all the partners involved.

4.3 Objective 3: Technology-driven metrological support services

There are several processes defined by the European legislation coordinating the interaction of a large variety of partners in legal metrology. There are good prospects that many of them could be – at least – partly transformed in the digital domain. For instance, results could be made available in a central platform leading to broader surveillance of meters, better planning of the processes and services and therefore leading to less down time of the instrument for the user.

From these legal processes, for streamlining through digital support we have chosen those that the consortium considers to be the most beneficial to changing, regarding the organization of market surveillance and verification, the service of notified bodies and manufacturers, as well as the needs of the users of measuring instruments.

The chosen usage cases build on each other and consequentially the solution for one will support the subsequent ones. Usage cases for **repair of a measuring instrument and its subsequent verification**, based on digital representations, might allow the future **maintenance of software** in the instruments.

The development of a digital representation of the measuring instrument is vital for the realization of these usage cases (see Figure 8).

This **digital representation** is a hierarchical database which should contain administrative data, information about processes, collects data, evaluates data, disseminates data and initiates actions if certain conditions are fulfilled (for example smart data services such as Smart Contracts, i.e. the legally binding condition dependent on decision making, as proposed in objective 4). To this end, such a **digital twin** should contain information on the type of instrument and, in a substructure, information concerning that particular instrument. It will also encompass authorization profiles, a log file and digital sensor or system model of the instrument. This representation will implement the selective sharing of information between authorized partners already established in the analogue world and needs to be developed and tested within the new core platform with special usage cases. The challenges for digital "**support of repair**" and "**support of verification**" as well as the "**streamlining of software maintenance**" will be considered. This should include the repair by the service technician, remote diagnosis of the repair, indication and information of the verification authority, as well as initial remote testing and subsequent evaluation by the authority and planning of the local test of the physical sensor within the proposed trustworthy core platform. A further concept of streamlining by digital methods will be explored for the benefit of all stakeholders, focusing on the remote testing module of the logical part of the digital representation of the instrument.

A selection of types of requests or tests to support verification and inspection will be (in order of

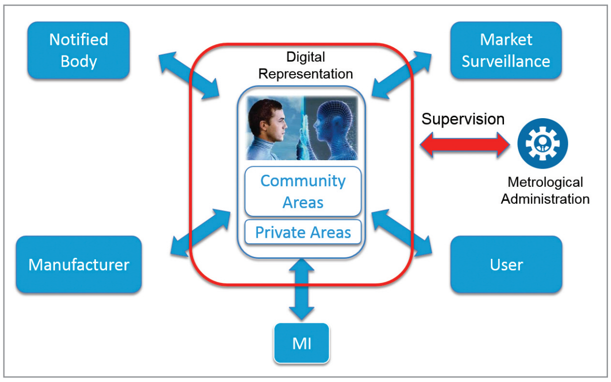

Figure 8: The digital representation of the measurement instrument – the digital twin – as the central communication and administrative element

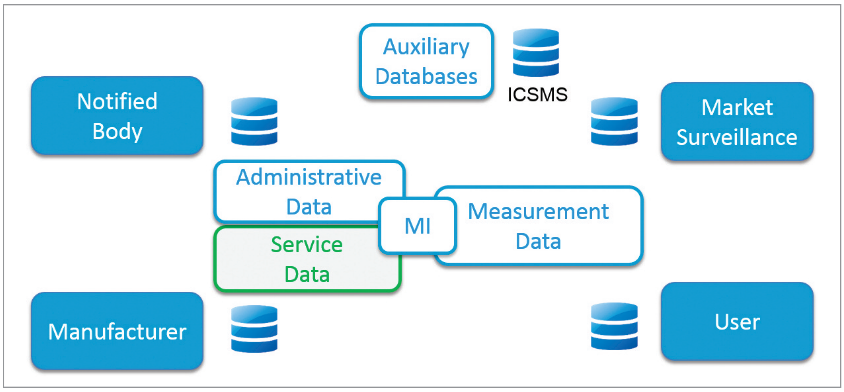

Figure 9: Major data sources available from the stakeholders and the measuring instrument (MI) which could be part of the metrological data lake.
ICSMS: information and communication system for the pan-European market surveillance. Auxiliary pan-European and national Databases

complexity) the following: Requests of protocol files or log files, initiation of runtime integrity tests of the whole system or individual system modules or the whole file systems, results of the permanent condition of monitoring the instruments, the application of fixed test cases for the individual logical modules and finally specifically test data generated during runtime by the logical system model.

4.4 Objective 4: Data-driven metrological support services

The aim is to develop data-based services for legal metrology, a theoretical approach taking advantage of the available data sources created by all stakeholders. For the billions of measuring instruments used on the EU single market, data volumes are generated during the complete life cycle of these instruments from their approval and market surveillance processes as well as from the service the manufacturer provides. These data can be distinguished in the main categories: measurement data, administrative data and service data (see Figure 9). Service data represent data which are, for example, collected by the manufacturers to coordinate their maintenance services in order to guaranty a constant quality level.

The way in which existing services could be streamlined or new services and processes could be derived using merged data from different sources will be investigated. The focus of the data collecting process will especially rely on data provided from the administrative and service data, since these data hold the potential to make the existing processes even more efficient or could be elevated to be accepted within or add value to legal metrology.

To investigate the potential of combined data from different sources, a **metrological data lake** should be established. After identifying the essential questions to be answered by the data lake, appropriate methods should be identified to transfer these questions to the "machine" to interpret answers into smart data concepts. To this end, contemporary methods such as data mining, information retrieval and machine learning will be applied and investigated to extract knowledge to propose the potential creation of smart data services.

Concurrently, we will focus on those services that all stakeholders consider to be the most beneficial to be supported digitally. These are the usage of **service data as added value** for the market surveillance and the introduction of smart data concepts in legal metrology, for example **Smart contracts**. Such smart contracting, i.e. the initiation of a process based on the fulfillment of conditions or the availability of information, will also help to simplify and speed up several processes where several partners are involved.

How the information originated from the market can be incorporated into the risk assessment method proposed by WELMEC WG7 is an open question. But both the experiences from manufacturers of measuring instruments, who are obliged to collect such information, and from the market surveillance and their own national databases will aid a European incident database that will potentially be used via the trustworthy metrology core platform, to **close the risk assessment loop** between design and the market and provide useful new information to all stakeholders.

In order to ensure the efficient exchange of information among authorities in the EU, an online platform (Information and Communication System on Market Surveillance, ICSMS) has been established. This platform helps market surveillance authorities exchange information, but also serves purposes of consumer information. It offers the public information about exceeded limit values and non-conformity with substance prohibitions. In addition, consumers can use the platform's search tool to research the national authorities responsible for market surveillance based on product type and location. Such databases and platforms provided on the national and European levels should be included as well.

5 Expected impact

This initiative enables and promotes collaborative work in the most demanding fields of legal metrology going beyond the state of the art. It will strengthen the mutual cooperation of European NMIs, leading to a coordinated digital European metrology infrastructure increasing cohesion within Europe. The reference architectures which will be developed within the course of the initiative will offer the European Notified Bodies solutions which are in line with the legal framework and provide market surveillance with easy verification methods to support their task without the need of in depth expertise in the method. It will impact on the development of conformity assessment done by notified bodies and NMIs which carry out type approval, on authorities responsible for market surveillance or verification of instruments in use through the provision of harmonized digital services. This will significantly influence the way manufacturers, market surveillance authorities and notified bodies interact, and establishes a harmonization of procedures on a higher technological level setting up a unified quality standard.

On a broad scope, the initiative will strengthen the collaboration of European NMIs and will increase their competitiveness with NMIs outside Europe. In the area of metrological IT, knowledge transfer between NMIs will support the building of capacity regarding new technologies. Secondly, market surveillance and verification authorities will also gain improved services from the platform which will avoid high costs and associated downtime associated with the verification and in-service control of the instruments abroad. It will also increase the market surveillance's verification capabilities. Furthermore, the European industry may use the results of the research as support when new measuring instruments and measuring systems are to be designed.

The industrial project partners or collaborators are the most direct and immediate up-takers. They will incorporate the outcome in their current and future work, spreading it to their customers and users. The initiative is designed such that the relevant standardization committees for software in legal metrology (WELMEC WG 7 *Software* and OIML TC 5/SC 2 *Software*) will be informed about its progress. In that way, these committees will be actively involved in recommending further steps or investigations aiming for more beneficial results for all partners. Furthermore, this project actively promotes the circulation of the following fundamental European and international guidance documents for software and ICT: WELMEC 7.2:2015 *Software Guide* and OIML D 31:2008 *General requirements for software controlled measuring instruments*. These harmonized standards will be amended with the help of the findings of the project. By doing so, beneficial concepts and findings will be made available internationally. The OECD [OECD2017] also recommends that governments should consider updating laws to address factors that unnecessarily make working through online platforms less attractive, the lack of clarity in certain regulations, tax issues that emerge with the proliferation of small revenues earned via platforms, and consumer and privacy protection of online participants. Therefore, the outcomes of this project will be used to demonstrate that new concepts are in line with the aims of protection of the new approach and should be used to initiate processes to future proof legislation and to reduce governmental burdens.

One focus of legal metrology is to protect consumers and instrument users. The possibilities new technologies offer allow novel concepts for measuring instruments which the manufacturers intend to apply. Contemporary measuring instruments are in most cases "concentrated" systems comprising all of their features at the measuring site or close by. The development of measuring instruments, in view of the emerging technologies, steers towards a "dissociated" instrument, where parts are made available by virtualization. The base technologies and concepts for this change have matured in a way which requires more than an intuitive understanding to have confidence in their correct functionality. The growth of digital security risks to economic and social activities, including risks to the security of data assets, as well as concerns that privacy and personal data protection are being violated, reinforces the importance of lack of trust in digital technologies and activities as another barrier to adoption and use of digital technologies by firms, households and across society.

These concerns will only become stronger with the introduction of newer, more advanced technologies and processes (e.g. cloud computing, data analytics, IoT) that will in turn raise additional challenges – most notably related to safety and liability. Therefore, to establish confidence in the correctness of measurements, there must be methods in place which guarantee an adequate level of security the consumer can trust in. At the same time, institutions, i.e. the notified bodies and NMIs, need to be able to guarantee this level. Only by establishing such methods, can confidence and acceptance of new technologies in the market be guaranteed. The initiative addresses this challenge, e.g. with the reference architectures.

At the same time, digital technologies are creating new opportunities for skills development. Seizing these opportunities requires a process of institutional learning, where actors in the field of legal metrology are given sufficient scope to experiment with new tools and systematic assessment of outcomes leads to the selection of the most effective practices. This project will deliver such possibilities. Barriers to access these new technologies will be identified and addressed throughout the course of the initiative.

6 The initial consortium

The consortium engages all relevant stakeholder groups that are active in legal metrology on the European level. Therefore, the initial consortium – coordinated by the PTB – was formed by a number of NMIs that are deeply involved in conformity assessment and certification of measuring instruments subject to legal control as a notified body and/or as a verification and inspection authority: Germany (PTB), France (LNE), UK (NPL), Switzerland (METAS), Sweden (RISE), Czech Republic (CMI), Austria (BEV-PTP), Spain (CEM), and Portugal (IPQ). Furthermore, these institutions and other collaborators (Ireland (NSAI), The Netherlands (Agentshap Telecom)) are also active as market surveillance authorities and verification bodies contributing their expertise from measuring instruments in use.

The practical experiences of industries developing measuring instruments were also considered. Five European manufacturers' associations representing a relevant amount and spectrum of measuring instruments in Europe, AQUA, CECIP, CECOD, FARECOGAZ and VDMA will provide their expertise and will guarantee that the solutions developed in this project are on a general level, so that whole classes of instruments will benefit from them.

The participation of individual manufacturers such as Sartorius, Diehl Metering, Bizerba, Espera-Werke, Itron and Gilbarco Veeder-Root will guarantee that demonstrators for different instrument classes will be developed.

The scientific challenges which arise with the objectives of the initiative need competent partners which complement the expertise in the area of security and data science. Therefore, the chair "Security in Telecommunications" (SECT) and the Berlin Big Data Center (BBDC), both from Technical University of Berlin, Germany, are taking part in the initiative. The BBDC pools expertise in scalable data management, data analytics, and big data application, conducts fundamental research to develop novel and automatically scalable technologies capable of performing "deep analysis" of "big data". The SECT is part of the Telekom Innovation Laboratories, an institute of TU Berlin which closely collaborates with Deutsche Telekom AG. Research topics of SECT include virtualization technology, mobile communication standards, invasive and non-invasive circuit analysis and fault injection methods, cloud security, and physically non-clonable functions.

Furthermore, TU Berlin, the Faculty for Electrical Engineering and Computer Science, Institute of Software Engineering and Theoretical Computer Science and the PTB have established the position of a Junior Professorship for the field of "Secure and trustworthy network connected system architectures". The position includes leading a newly established junior research group at the PTB and will be filled by the recruitment of a highly-motivated scientist by early 2018. The working field will be the development and implementation of excellent and highly innovative premarket research in the field of secure and trustworthy ICT-systems in legal metrology. The commercial as well as the social need for a contemporary applicability of novel technological approaches will be taken into account. The Junior Professorship is associated with the SECT group of Prof. Dr. J.-P. Seifert at TU Berlin.

It will be the combined effort of the partners with technical and scientific excellence in all aspects of this initiative that will generate powerful synergies and lead to the successful conclusion of this initiative.

7 Complementary European approaches

Due to current developments on the European level, the *European Open Science Cloud* (EOSC) [COM/EOSC], it seems appropriate to address the question of how our approach could learn from this activity.

There is a rapidly growing, world-wide consensus in the scientific community, among science funders and policy makers that the transition to truly data-driven and open science can only be achieved when we collectively build a globally interoperable research infrastructure. According to the EOSC report [COM/EOSC2016] this should be a 'federated, globally accessible environment where researchers, innovators, companies and citizens can publish, find and re-use each other's data and tools for research, innovation and educational purposes'.

Keeping in mind that in legal metrology, a restricted community exchanges sensitive information regarding regulated measuring instruments within legally guided processes to guarantee confidence in the correctness and traceability of the measurements and to protect the customer. It becomes obvious that the aims in the *European Metrology Cloud* (EMC) approach and the EOSC approach diverge.

Nonetheless, both concepts are based on a similar foundation: use existing infrastructures and databases and join them via an appropriate platform. By providing innovative products which fully benefit from these merged elements via this platform, the EMC goes beyond this similarity. Furthermore, the standardization approach according to the 'hourglass model' [COM/EOSC2016] with minimal, rigorous standards and protocols and maximum freedom of implementation is inherent in both concepts. It will allow all stakeholders to start implementing prototype applications for the sharing of data and services and for the secure and reliable exchange of data to ensure the seamless flow of information among devices from multiple vendors.

Therefore, we will follow the EOSC initiative and consider, where appropriate, their findings in the European Metrology Cloud. ■

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MARKET SURVEILLANCE

Using diagnostics in market surveillance

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Abstract

A growing number of measuring instruments are fitted with features that monitor the instrument's health. In oil and gas metering, these so-called diagnostics can be found in almost all new Coriolis mass flow meters, ultrasonic flow meters, gas chromatographs, etc. With the exception of some, the majority of the diagnostic functions have no direct link with legal metrology. However, their use in legal metrology could be worth considering.

Introduction

Measuring instruments come in many shapes and sizes and so do the companies supplying them, but diagnostics being added to instruments, is an unstoppable trend. The main reason for this trend is that there is value in this type of information. While this requires some extra insight in the operation of the instrument and its diagnostics, there is something to be learned from it. To name only a few advantages, a user of measuring instruments can use diagnostics to look deeper into his process and a supplier can perform troubleshooting more easily than in the past. At the last edition of the European Flow Measurement Workshop, end users raised the question whether these diagnostics could impact calibration intervals. And since this information is available, why not including diagnostics in market surveillance?

It is all about confidence

Legal metrology is about confidence. The purpose of testing and certification is to provide confidence in measurement to all parties involved. The extent of confidence is related to measurement accuracy – or maximum permissible errors – but also concerns data integrity. All parties involved want to know whether the instrument is performing within legal tolerances and if the presented measurement information is compromised or not. These questions apply not only during assessment of such instruments during type approval and initial verification, but over the entire lifetime of the instrument. Diagnostics features are typically active continuously, or intermittently, whenever the instrument is switched ON, offering a continuous check on the performance of the metering system.

Below, potential uses of diagnostics information in market surveillance will be presented. The main purpose of the presentation is twofold: to create awareness and to open up the discussion for possible future follow-up.

Introduction to diagnostics

Looking at OIML Recommendations, a familiar term is "checking facilities". For electronics, one example of such checking facility is a watchdog arrangement. This arrangement checks the electronics' health, which is why a technology oriented person would probably categorise it under diagnostics. Watchdogs perform fairly general checks, but some diagnostics perform very specific ones. One might only perform checks on a certain voltage, or a signal to noise ratio. Others perform checks that are more related to the measurement process itself.

In multi-path ultrasonic flow meters for instance, the shape of the flow profile can be checked. When it comes to measurement accuracy, ideally the flow profile is symmetrical and hardly changes over time. Conversely, if it does change (suddenly) it could indicate that the upstream conditions have changed. A possible reason for this could be that something got caught in the upstream flow conditioner. No matter what the exact reason is, it is cause for concern, since measurement accuracy might be compromised.

The operation of Coriolis mass flow meters relies on the vibrational properties of the measurement tube(s). If, for some reason, the measurement tubes become corroded or eroded, the vibrational properties will change. Consequently, also the measurement characteristics of that meter will change.

Diagnostics and market surveillance

What can the value of diagnostics information be in legal metrology? In the examples given above, clearly measurement accuracy might be affected. However, what if nothing has changed? This too can be valuable information, especially when considering that we are all striving for measurements to be reliable.

A common way to sub-divide market surveillance on a measuring instrument is:

- conformity check;
- functional check;
- pass/fail decision.

The conformity check starts by checking the integrity of (mechanical) seals. If these are in proper order, spot checks may be performed on other items, but generally speaking, one would then assume the instrument to be in conformity to type and "touched" only by those allowed to do so. Although slightly depending on a nation's policy, the main portion of the functional check usually is re-calibrating the instrument, or performing a calibration to check that the instrument is still operating within legal requirements. Lastly, if all is well, the inspection officer will decide to allow the instrument to be used for another (predetermined) period of time.

Performing (re-)calibrations on instruments in the field can be challenging. Particularly when looking at the oil and gas industry, options are not only limited, but also complicated. At this moment in time, high-pressure natural gas measurement is a field where on-site calibrations are complex processes and require going off-line. For some industrial liquid metering applications, mobile provers can be applied, but easy is never the first word that comes to mind. In some cases therefore, meters are sent to calibration laboratories and re-installed into their applications upon return.

Happily skipping the debate on which approach is more or less perfect, here is where diagnostics might be considered in legal metrology. Let us assume for starters that "our" market surveillance officer is perfectly knowledgeable about the instrument, its diagnostics and the process it is running in. Let us also assume that the diagnostics too are perfect, meaning they cover any eventuality and are functioning correctly. If that idealised picture is true and the diagnostics say all is well, performing a (re-)calibration would not be necessary in order to obtain confidence in the measurement.

Without becoming too philosophical, 100 % perfection does not exist. However, by nature legal metrology is not about 100 % confidence either. One example of the latter is the well-accepted statistical verification of large numbers of instruments in the utility world. Here, there is always a small chance of under-performing individuals slipping through the mazes of the regime. That said, the question arises of confidence levels in relation to diagnostics. Let us make a few more assumptions before continuing:

- not every market surveillance officer shares the same level of knowhow;
- not every instrument is fitted with top quality diagnostics;
- it is impossible to predict, and therefore diagnose, all events that might occur in the field;
- because of the previous, it is impossible to test for all field eventualities.

Especially in relation to the last bullet above, note that OIML Recommendations have a philosophy on checking facilities to prevent the need for infinite testing. Having suitable and well-functioning checking facilities offers enough confidence to reduce the number of tests to a finite and manageable number.

Confidence in diagnostics

So far, we have mentioned Coriolis mass flow meters and ultrasonic flow meters. Taking a broader perspective one could say these are both flow meters. However, when taking a closer look one can also say that one Coriolis meter is not the same as another. The point of these statements is that it takes insight to determine which diagnostic information offers added value and which does not.

During the type approval process, test engineers learn quite a lot about the instrument they are assessing. Most notably they learn the factors the instrument is sensitive and/or insensitive to. Because diagnostic features on high sensitivity factors have a high added value, a test engineer should be able to determine – in a, for now, subjective manner – how well that particular diagnostic feature can provide additional confidence in instrument performance.

In short, the above line of thought is reason for suggesting that diagnostic features tested in conjunction with type approval could be used at other stages in the legal metrology regime, including market surveillance.

Coming back to the example where the flow profile, as "seen" by the ultrasonic flow meter suddenly changed due to a partial blockage of the upstream flow conditioner, being able to detect changes (instead of just absolute values) significantly adds to the value of diagnostics. Detecting changes requires at least one of two things: either logging relevant parameters over time, or (automatically) detecting changes. One could even foresee a future where such activities occur remotely. Imagine measuring instruments being connected to the internet, enabling users, suppliers and legal metrology authorities to read values from the instrument. Ultimately, this could allow remote market surveillance.

The previous paragraph may have a high "crystal ball" content, but that too would enlarge the confidence in diagnostics. After all, market surveillance authorities would then have access to the instrument and its diagnostics any time they desire.

Foreseeable challenges

Suppliers of measuring instruments will always attempt, and rightfully so, to differentiate their product from that of their competitors. When it comes to diagnostics, some will therefore decide to either offer as many features as they possibly can, or – at the other end of the scale – as little as possible, in order to save cost. In other cases suppliers will apply diagnostics to the parameters they consider important. Ultimately, this will result in a sheer endless range of variations in the diagnostic features on offer. Moreover, this will change over time at a rate of change possible in any particular measurement technology. This makes it almost impossible for all those involved in legal metrology to keep up with. At the same time, it would not make sense to completely ignore the benefits that this technology could bring. It would therefore make sense to start thinking about listing, for each measurement principle, the diagnostic features we would like to see incorporated in measuring instruments. Naturally, these should be those that provide a high level of added value, in other words, those that have a major impact on the operation of this type of instrument. The challenge does not stop at agreeing on which diagnostics features are crucial, as opinions will likely diverge. We should also consider the level of testing needed to provide adequate levels of confidence.

It is not without reason that multiple parties have been mentioned: users, suppliers and legal metrology authorities (both type approval and market surveillance). Each of these parties has specific knowhow that can contribute to the future use and value of diagnostics. Conversely, this also means there is role for (representatives of) each of those in the discussions on diagnostics and their use. The differences of interest of the various parties involved will obviously have an impact on reaching unanimity.

Suggestions for the future

The main point of this article is for all stakeholders to start thinking about the use of diagnostics, if they have not already started to do so. The reason for this is that there is something to be gained for all those involved. The user potentially has better information and fewer on-site disruptions. The supplier has a product that better fits his client's needs. Metrology authorities have more and easier ways to provide confidence in measurements.

At the upcoming European Flow Measurement Workshop, to be held from 16 to 19 April 2018 in Barcelona, this topic will be addressed and discussions will be started on how to perform tests on diagnostics, and which ones. The umbrella of confidence in measurement benefits society as a whole. ■

6th European Flow Measurement Workshop

16–19 April 2018, Barcelona, Spain

The use of diagnostics is an unstoppable trend. At the upcoming European Flow Measurement Workshop in April 2018, with the theme 'Staying in Control', diagnostics will be high on the agenda. We invite end users, manufacturers, metrology institutes and authorities to share their views on this topic.

Over recent years, the European Flow Measurement Workshop has grown to become a major platform for end users, manufacturers and institutes on the newest developments in flow measurement. In the last edition of the Workshop we were *Setting the Standard*. The next step for all the parties involved is to make sure these efforts are consolidated and continually reinforced, by careful measurement and interpretation of flow parameters.

VSL, CEESI, NMi Certin and Enagás cordially invite you to participate in the 6th European Flow Measurement Workshop. Together we can make sure that we will be staying in control.
www.efmws.eu

NEW SI

Reasons for, concerns about and prospects of the new International System of Units (SI)

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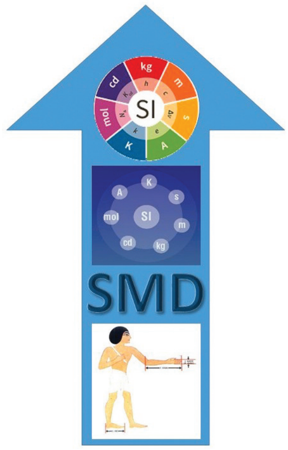

Figure 1: Evolution of the systems of units of measurement

Introduction

One of the most important expressions in metrology is:

$$Q = \{Q\}[Q]$$

This equation indicates that the value of a quantity Q is generally expressed as the product of a number $\{Q\}$ multiplied by a unit of measurement $[Q]$.

In essence, the unit is just a particular value of the relevant quantity, taken as a reference. Therefore, in order to establish a system of units we need to establish first of all a system of quantities and a set of equations that define their interrelationships.

Figure 1 depicts the evolution of the systems of units of measurement throughout the history of human civilization. As they developed, they formed groups and gave rise to a practical system of units that all Metre Convention member countries could adopt, known today as the International System of Units (**SI**), established and defined in 1960 by the 11th General Conference on Weights and Measures (CGPM).

The International System of Units is not static; on the contrary, it evolves according to the growing demands of measurement requirements and the field of knowledge and reflects the best measuring practices of each period of history [1].

The units of measurement must be selected in such a way that they are available to everyone, constant in time and space, and easy to realize with great accuracy. The text of the definitions of units of measurement has included several variants, shown in Figure 2.

As a rule, the definition of a unit of measurement shows how it can be physically realized in practice, known as '*mise en pratique*'. It is carefully drafted, in such a way that it is unique and provides a sound technical basis with a view to measuring with maximum accuracy and reproducibility. However, the realization of the unit of measurement is a procedure through which we can use the definition to establish the value $\{Q\}$ and associated uncertainty of a Q quantity of the same type as the $[Q]$ unit.

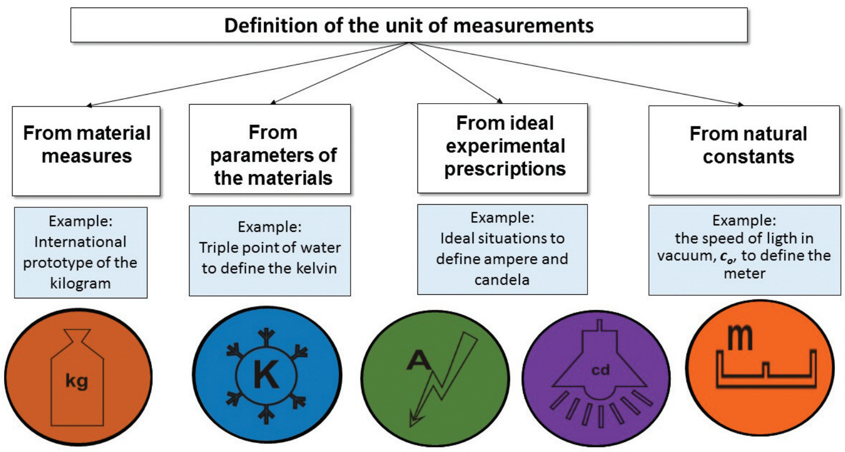

Figure 2: Different approaches to the definition of units of measurement

In practice, despite the fact that the current definitions provide several ways to realize the units, the experimental possibilities are restrained by the specific conditions established by the definition itself, and in the end the accuracy of realization depends above all else on the accuracy of reproduction of the said conditions.

The CGPM considers that the redefinition of SI units, scheduled for 2018, is an important step in bringing the practical realization of units closer to their associated fundamental constants and that this is a significant event to all countries in general and to the metrological community in particular [2].

This article concerning scientific dissemination intends to inform all those interested about the CGPM's efforts to develop the new SI and the reasons behind the promotion of the use of its seven base fundamental constants, as well as about the reply of the International Bureau of Weights and Measures (BIPM) to some of the most frequent questions asked by users regarding the new SI meaning and applicability and its impact on their daily life.

Development

Both the evolution of the definitions of SI units and the selection of the fundamental constants that we can use are a logical outcome of mankind's scientific and technological development.

The three main characteristics of the SI according to the proposed changes are:

a) Seven fundamental or natural constants, the accurate numerical values of which are assigned when the values of the constants are expressed in their corresponding SI units in order to build the whole scale of the system of units;

b) Formal definitions of the seven SI base units and their symbols;

c) Twenty-two SI coherent derived units with special names and symbols, related to each other as described above on the basis of the current SI system.

In Figure 3, the inner circle shows the fundamental constants selected for the new SI, namely:

- the ground state hyperfine splitting frequency of the ^{133}Cs atom, $\Delta\nu_{Cs}$,
- the speed of light in vacuum, c,
- the Planck constant, h,
- the elementary charge, e,
- the Boltzmann constant, k,
- the Avogadro number, N_A
- the luminous efficacy K_{cd} of monochromatic radiation of frequency 540 × 10^{12} Hz

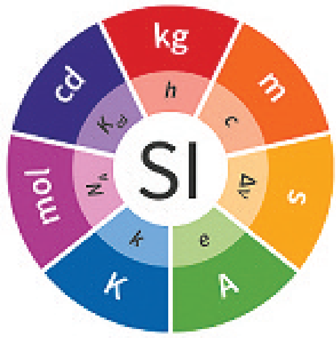

Figure 3: SI base units and associated fundamental constants. Source: www.bipm.org

Figure 4 shows the relationship between the fundamental constants and the SI base units [3]. Knowing this relationship is not only important to design experiements for the practical realization of the units, but also to understand the internal links among the base units and the importance of making a proper selection of the fundamental constants to be taken as the base of the units of the system.

Table 1 contains information that allows the differences between the definitions of units of measurements of both SI systems to be identified. The third column shows the new definitions found in the draft SI Brochure [4], to be officially published once it is approved by the 26th CGPM.

Values assigned to fundamental constants do not have an uncertainty associated with them, and since it is important to preserve the continuity of the International System of Units even if its units have a new definition, under the new SI the said fundamental constants have fixed values deemed to be consistent with the current definitions, insofar as the progress of science and knowledge makes it possible.

The kilogram is the only base unit of the current SI system that is still defined by a material artifact; the international prototype of the mass quantity, kept at the BIPM in Sèvres, France, is a platinum-iridium cylinder with a mass of 1 kg manufactured more than 125 years ago. Despite the existence of six official copies and another two prototypes for special applications, it is the only international standard kept in a single location, which poses the danger of damage or loss. In fact, it already shows signs of deterioration in time, and various experiments have confirmed not only IPK's mass loss, but also the existence of major differences between the IPK and its official copies and special prototypes [7]. On the other hand, other base units such as the ampere and the mole depend on the value of the kilogram, and this unit's association with the Planck constant will also have influence on the kelvin. These are all important reasons that a new definition was in order for the base unit

Figure 4: Relationship between the base units and the fundamental constants. Source: www.ptb.de

kilogram, which in turn has influence on the redefinition of the ampere, the mole and the kelvin.

In the case of the mole, the metre and the candela, the proposed change would provide a single form of drafting of all the definitions for the base units.

BIPM activity

The decisions that will be made about the redefinition of units of measurement and the reorganization of the SI system stem from the efforts of working groups established within the CGPM, which have long been in charge of clarifying the major conceptual aspects to be taken into account for the creation of the new SI and coordinating the action plans of the National Metrology Institutes (NMI) and other entities responsible for experimental work. These groups also analyzed the practical obstacles to be overcome, the choices to be considered in order to make proposals, and the evaluation of common positions.

A draft resolution has been prepared that will be submitted to the 26th CGPM for approval in 2018.

As a result of its activity, the BIPM will present the following proposed redefinitions of the SI to the CGPM:

The International System of Units, SI, is that in which:

- the transition frequency between two hyperfine levels of the ground state of the caesium 133 atom, n_{Cs}, is 9 192 631 770 Hz;
- the speed of light in vacuum, c, is 299 792 458 m/s;
- the Planck constant, h, is 6,626 070 040 $\times 10^{-34}$ J s;
- the elementary charge, e, is 1,602 176 620 8 $\times 10^{-19}$ C;
- the Boltzmann constant, k, is 1,380 648 52 $\times 10^{-23}$ J/K;
- the Avogadro constant, N_A, is 6,022 140 857 $\times 10^{23}$ mol^{-1};
- the luminous efficacy of monochromatic radiation of frequency 540 $\times 10^{12}$ hertz, K_{cd}, is 683 lm/W.

Another important line of work at the BIPM is related to training, promotion of the change, and scientific-technical popularization.

Concerns about the new SI

The announcement of the new SI system has caused various concerns. For most of the member countries of the Metre Convention, the implementation of the current system has involved a great deal of effort in terms of training, modification of their technical infrastructure and realization of the units of measurement.

The upcoming change is so radical that many scientists and users of measurement results are quite worried. The BIPM's working groups and its Consultative Committee for Units (CCU) have registered and answered a high number of questions, including:

- Would it not be better to use as a reference for the definition of the kilogram the mass of an atom, for instance, Carbon-12, rather than the Planck constant, h?
- How could the proposed changes affect the possibilities to realize and use the new definitions?
- Is the Avogadro constant truly a fundamental constant and the quantity amount of substance something more than a resource to count entities?
- Which form is better to present the SI: the one that uses base and derived units or the one based on fundamental constants?
- Will the seven base units change under the new SI?

Table 1: Evolution of the definitions of units of measurements toward the new SI

Name of unit	Current definition [5, 6]	Proposed definition [4]
metre	The metre is the length of the path travelled by light in vacuum during a time interval of 1/299 792 458 of a second. *(17th CGPM, 1983, Resolution 1)*	The metre, symbol **m**, is the SI unit of length. It is defined by taking the fixed numerical value of the speed of light in vacuum to be exactly equal to 299 792 458 when expressed in the unit $m \cdot s^{-1}$.
kilogram	The kilogram is the unit of mass; it is equal to the mass of the international prototype of the kilogram (IPK). *(3rd CGPM, 1901)*	The kilogram, symbol **kg**, is the SI unit of mass. It is defined by taking the fixed numerical value of the Planck constant to be exactly equal to 6,626 070 040 × 10^{-34} when expressed in the unit $kg \cdot s^{-1} \cdot m^2$ kg, which is equal to J·s.
second	The second is the duration of 9 192 631 770 periods of the radiation corresponding to the transition between the two hyperfine levels of the ground state of the caesium 133 atom." *(13th CGPM, 1968, Resolution 1)*	The second, symbol **s**, is the SI unit of time. It is defined by taking the fixed numerical value of the caesium frequency $\Delta\nu_{Cs}$, the unperturbed ground-state hyperfine transition frequency of the caesium 133 atom, to be exactly equal to 9 192 631 770 when expressed in the unit s^{-1}, which is equal to Hz.
ampere	The ampere is that constant current which, if maintained in two straight parallel conductors of infinite length, of negligible circular cross-section, and placed 1 metre apart in vacuum, would produce between these conductors a force equal to 2 × 10^{-7} newton per metre of length. *(9th CGPM, 1948, Resolution 7)*	The ampere, symbol **A**, is the SI unit of electric current. It is defined by taking the fixed numerical value of the elementary charge to be exactly equal to 1,602 176 620 8×10^{-19} when expressed in the unit As, which is equal to C.
kelvin	The kelvin is the fraction 1/273,16 of the thermodynamic temperature of the triple point of water. *(13th CGPM, 1968, Resolution 3)*	The kelvin, symbol **K**, is the SI unit of thermodynamic temperature. It is defined by taking the fixed numerical value of the Boltzmann constant to be exactly equal to 1,380 658 52×10^{-23} when expressed in the unit $s^{-2} \cdot m^2 \cdot kg \cdot K^{-1}$, which is equal to J K^{-1}.
mole	1. The mole is the amount of substance of a system which contains as many elementary entities as there are atoms in 0.012 kilogram of carbon 12; its symbol is 'mol'. 2. When the mole is used, the elementary entities must be specified and may be atoms, molecules, ions, electrons, other particles, or specified groups of such particles." *(14th CGPM, 1971, Resolution 3) CR, 78)*	The mole, symbol **mol**, is the SI unit of amount of substance of a specified elementary entity, which may be an atom, molecule, ion, electron, any other particle or a specified group of such particles. It is defined by taking the fixed numerical value of the Avogadro constant to be exactly equal to 6,022 140 857×10^{23} when expressed in the unit mol^{-1}.
candela	The candela is the luminous intensity, in a given direction, of a source that emits monochromatic radiation of frequency 540×10^{12} Hz and that has a radiant intensity in that direction of 683 watt per steradian. *(16th CGPM, 1979, Resolution 3)*	The candela, symbol **cd**, is the SI unit of luminous intensity in any given direction. It is defined by taking the fixed numerical value of the luminous efficacy of monochromatic radiation of frequency 540×10^{12} Hz to be exactly equal to 683 when expressed in the unit $s^3 \cdot m^{-2} \cdot kg^{-1} \cdot cd \cdot sr$, or $cd \cdot sr \cdot W^{-1}$, which is equal to $lm \cdot W^{-1}$.

- Are the twenty-two coherent derived units with special names and symbols going to change?
- What about the definitions of second, **s**, metre, **m**, and candela, **cd**?
- Will we still be able to check the consistency of physics if we fix the values of all the fundamental constants?
- Will I get my standard of mass, or my thermometer, already calibrated under the new SI in the same way as I do now?

The BIPM's website provides thorough answers to these concerns, but in light of their significance we highlight below the most important aspects:

- Under the new SI, the base units and base quantities will remain unchanged, except that they will be associated with the fundamental constants. Likewise, the twenty-two coherent derived units with their special names and symbols will be kept.
- The definitions of the second, s, metre, m, and candela, cd, will not change, but the way they are expressed will be revised to make them consistent in line with the new definitions for the kilogram, kg, ampere, A, kelvin, K, and mole, mol.
- When the units are redefined, a numerical value will be assigned only to a small number of the fundamental constants and to the combinations therein, not to all of those constants. The effect will be a change in the definitions of the units, but not of the physical equations and, therefore, the researchers will still be able to check those equations for consistency.
- The new standards will be used for the calibration of measuring instruments, but it will still be possible to hire the usual provider's calibration services. The NMI in each country will establish its own realization of the unit using the new definition, either by constructing an appropriate apparatus locally or by any other method that proves to be convenient to guarantee traceability to the definition of the unit of measurement. In the specific case of mass standards, it will still be able to have them calibrated by the BIPM, since the BIPM intends to maintain traceability to the definition of the kilogram through a weighted mean of all available realizations.

Prospects

In any country, the implementation of a unit of measurement entails:

- recognizing the definition approved by the CGPM for that unit;
- realizing the unit of measurement and maintaining the corresponding standard;
- undertaking its dissemination.

The responsibility for all these activities must fall on the NMI with a view to making reliable, safe and comparable measurements wherever they are needed.

At international level

In order to promote the new SI, the BIPM is planning to assist its member countries with the identification and development of important tools, taking into account the characteristics of the different users. The BIPM holds, among others, the scientific secretariat in the meetings of the CCU and the Active Groups engaged in the discussion of possible changes to the SI, as well as in the meetings of the International Committee for Weights and Measures (CIPM) and the CGPM. Consequently, the BIPM is closely related to the stages of discussion about the said changes.

The main existing source of information is the BIPM's website. Efforts are now underway so that the 9th edition of the SI Brochure and a set of instructions are published as soon as the new SI is adopted, so that these and other documents will contribute to the best possible understanding of the definitions of units together with a description of the units of measurement based on the primary methods. To this end, one of the BIPM's current experimental tasks involves three important projects related to the possible redefinition of the kilogram, not to mention other projects undertaken by several NMIs linked to the realization of the units and the dissemination of knowledge about this topic [8, 9, 10, 11, 12].

At national level

As far as Cuba is concerned, the redefinition of the units of measurement, scheduled for the year 2018, should help mobilize the innovative capacity of the whole Cuban metrological system, from the NMI to the calibration laboratories in industries, service organizations and research centers.

Cuban scientific metrologists are faced with great challenges, some of which are already being dealt with. For instance, the National Metrology Institute has set in motion a number of projects to establish standards of the units of measurement using primary methods in the physical quantities temperature and liquid density;

specialists are being trained on experimental methods related to the redefinition of the kilogram using silicon spheres, whereas they are doing research on the state of the art regarding the use of the Kibble (Watt) balance for similar purposes, as well as on the quantum Hall and Josephson effects for the realization of electrical units.

The new definitions pave the way for further possibilities concerning the realization of units of measurement using the physical equations that link the fundamental constants with the measurands, which will make it possible for the *mises en pratique* to also engage the capacities currently available in universities and other basic scientific research centers.

Nevertheless, in order to guarantee metrological traceability of measurement results, and taking into account our country's economic and financial situation, industrial development and priorities, in certain physical quantities we will keep calibrating our national standards with respect to the primary national standards of other countries and, in the case of mass, we expect to continue using a standard kilogram in the form of an E_1 class material measure.

Finally, there is no question that the way is clear for the new SI, based on the fundamental constants and with new definitions of units of measurement, not only to realize the units anywhere and at any time but also to make increasingly accurate measurements, because we will be able to choose any equation of physics associating a physical constant with the quantity that we wish to measure. Its approval will have a great impact on the scientific, technical and industrial fields and mark the beginning of a new era of acquisition and strengthening of knowledge within the metrological community and the manufacturing industry of highly accurate measuring equipment and systems both for metrological applications and special uses in high-tech industrial sectors.

However, it is imperative that all scientific metrologists should become involved so that they can make the users of measurement results aware of the technical effects of the proposed change, according to their ways and means of dissemination of units of measurement. This will be a unique opportunity to improve our knowledge about the SI, promote metrology in general, and advise our citizens on the importance of accurate measurements in their everyday life [13].

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OIML Systems

Basic and MAA Certificates registered 2017.09–2017.11

Information: www.oiml.org section "OIML Systems"

The OIML Basic Certificate System

The *OIML Basic Certificate System for Measuring Instruments* was introduced in 1991 to facilitate administrative procedures and lower the costs associated with the international trade of measuring instruments subject to legal requirements. The System, which was initially called "OIML Certificate System", is now called the "OIML Basic Certificate System". The aim is for "OIML Basic Certificates of Conformity" to be clearly distinguished from "OIML MAA Certificates".

The System provides the possibility for manufacturers to obtain an OIML Basic Certificate and an OIML Basic Evaluation Report (called "Test Report" in the appropriate OIML Recommendations) indicating that a given instrument type complies with the requirements of the relevant OIML International Recommendation.

An OIML Recommendation can automatically be included within the System as soon as all the parts - including the Evaluation Report Format - have been published. Consequently, OIML Issuing Authorities may issue OIML Certificates for the relevant category from the date on which the Evaluation Report Format was published; this date is now given in the column entitled "Uploaded" on the Publications Page.

Other information on the System, particularly concerning the rules and conditions for the application, issue, and use of OIML Certificates, may be found in OIML Publication B 3 *OIML Basic Certificate System for OIML Type Evaluation of Measuring Instruments* (Edition 2011) which may be downloaded from the Publications page of the OIML web site. ■

The OIML MAA

In addition to the Basic System, the OIML has developed a *Mutual Acceptance Arrangement* (MAA) which is related to OIML Type Evaluations. This Arrangement - and its framework - are defined in OIML B 10 (Edition 2011) *Framework for a Mutual Acceptance Arrangement on OIML Type Evaluations*.

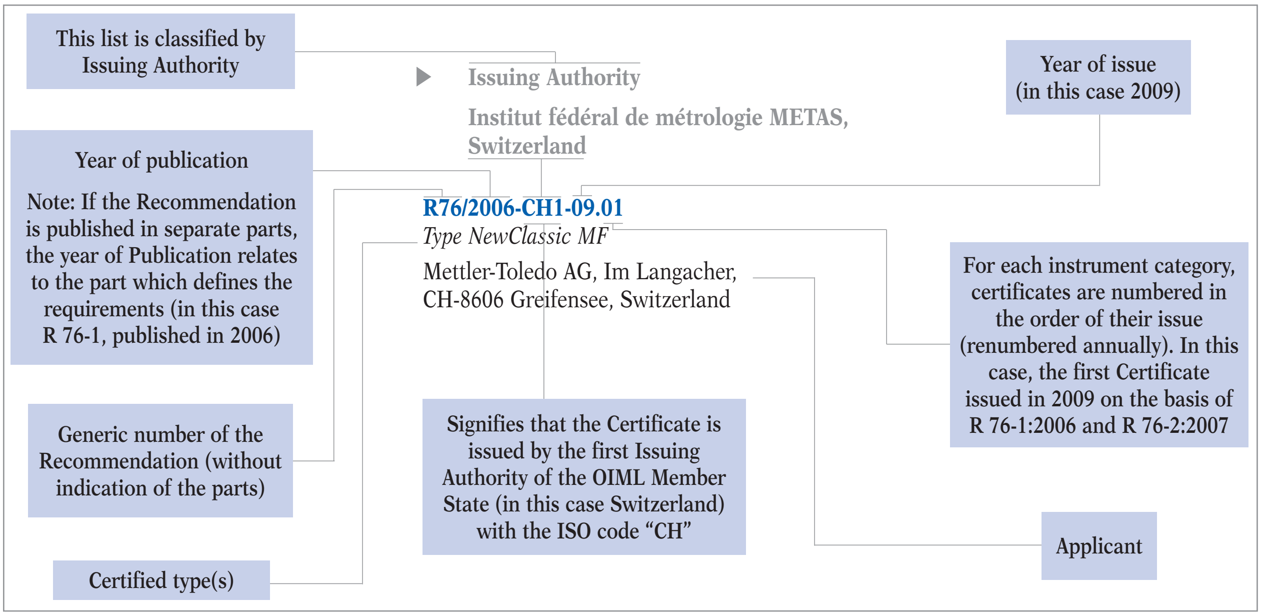
The OIML MAA is an additional tool to the OIML Basic Certificate System in particular to increase the existing mutual confidence through the System. It is still a voluntary system but with the following specific aspects:

- increase in confidence by setting up an evaluation of the Testing Laboratories involved in type testing,
- assistance to Member States who do not have their own test facilities,
- possibility to take into account (in a Declaration of Mutual Confidence, or DoMC) additional national requirements (to those of the relevant OIML Recommendation).

The aim of the MAA is for the participants to accept and utilize MAA Evaluation Reports validated by an OIML MAA Certificate of Conformity. To this end, participants in the MAA are either Issuing Participants or Utilizing Participants.

For manufacturers, it avoids duplication of tests for type approval in different countries.

Participants (Issuing and Utilizing) declare their participation by signing a Declaration of Mutual Confidence (Signed DoMCs). ■



INSTRUMENT CATEGORY
CATÉGORIE D'INSTRUMENT

Taximeters
Taximètres

R 21 (2007)

Issuing Authority / *Autorité de délivrance*

Laboratoire National de Métrologie et d'Essais,
Certification Instruments de Mesure, France

R021/2007-FR2-2017.03
Taximeter INTERFACOM TX 40
Interfacom S.A., Carrer del Perú 104,
ES-08018 Barcelona, Spain

Issuing Authority / *Autorité de délivrance*

NMRO Certification Services (NMRO),
United Kingdom

R021/2007-GB1-2017.03
Type: M1 STD
Italtax S.r.l., Via dell'Industria 16,
IT-62017 Porto Recanati (MC), Italy

INSTRUMENT CATEGORY
CATÉGORIE D'INSTRUMENT

Water meters intended for the metering of cold potable water and hot water
Compteurs d'eau pour le mesurage de l'eau potable froide et de l'eau chaude

R 49 (2006)

Issuing Authority / *Autorité de délivrance*

FORCE Certification A/S,
Denmark

R049/2006-DK2-2010.01 (MAA)
Water meter, electro magnetic flowmeter - Type: MAG5100W DN50-150 with MAG8000CT
Siemens A/S Flow Instruments, Nordborgvej,
DK-6430 Nordborg, Denmark

Issuing Authority / *Autorité de délivrance*

NMi Certin B.V.,
The Netherlands

R049/2006-NL1-2013.01 Rev. 10
Water meter - Type: OPTIFLUX x300C; OPTIFLUX x000F + IFC300y
Krohne Altometer, Kerkeplaat 12,
NL-3313 LC Dordrecht, Netherlands

INSTRUMENT CATEGORY
CATÉGORIE D'INSTRUMENT

Water meters for cold potable water and hot water
Compteurs d'eau potable froide et d'eau chaude

R 49 (2013)

Issuing Authority / *Autorité de délivrance*

Czech Metrology Institute (CMI),
Czech Republic

R049/2013-CZ1-2016.04 Rev. 1
Water meter - Type: MAGX2
Arkon Flow Systems, s.r.o., Berkova 534/92,
CZ-612 00 Brno, Czech Republic

R049/2013-CZ1-2017.04
Water meter - Type: wADDAD
Advanced Electronics Company, Ltd., P.O. Box 909916,
Riyadh 11623, Saudi Arabia

Issuing Authority / *Autorité de délivrance*

International Metrology Cooperation Office,
National Metrology Institute of Japan
(NMIJ) National Institute of Advanced Industrial
Science and Technology (AIST), Japan

R049/2013-JP1-2017.01
Electromagnetic water meter, SX/Q300 series
Aichi Tokei Denki Co., Ltd., No.2-70, Chitose 1-Chome,
456-8691 Nagoya, Japan

▶ Issuing Authority / *Autorité de délivrance*

NMi Certin B.V.,
The Netherlands

R049/2013-NL1-2015.01 Rev. 2
Ultrasonic water meter - Type: E-Series
Badger Meter Europa GmbH, Nurtinger Strasse 76, DE-72639 Neuffen, Germany

R049/2013-NL1-2016.02 Rev. 1
Electromagnetic water meter - Type: M2000
Badger Meter Europa GmbH, Nurtinger Strasse 76, DE-72639 Neuffen, Germany

▶ Issuing Authority / *Autorité de délivrance*

NMRO Certification Services (NMRO),
United Kingdom

R049/2013-GB1-2017.02
Family of cold-water meters, designated Sonata, utilising an ultrasonic measuring element
Arat Ltd., Dalia - Ramot Menashe, POB19239 Dalia, Israel

R049/2013-GB1-2017.03
Family of cold-water meters, designated CZ5000, utilising an ultrasonic measuring element
Contazara S.A, Carretera Castellon km 5.5, ES-50720 Sarragosse, Spain

▶ Issuing Authority / *Autorité de délivrance*

Slovak Legal Metrology (Banska Bystrica),
Slovakia

R049/2013-SK1-2016.02 Rev. 1
Mechanical single-jet dry dial water meter type for metering of cold and hot water - Type: SD-B, SD-B1, SD-BP- SD-BP1
Ningbo Aimei Meter Manufacture Co., Ltd., 68 West Town Road, Shangtian Town, CN-315511 Zhejiang, P.R. China

R049/2013-SK1-2017.02
Family of mechanical volumetric (rotary piston) water meters for metering of cold and hot water - Type: PD-A. . ., PD-AP. . .
Ningbo Aimei Meter Manufacture Co., Ltd., 68 West Town Road, Shangtian Town, CN-315511 Zhejiang, P.R. China

INSTRUMENT CATEGORY
CATÉGORIE D'INSTRUMENT

Automatic catchweighing instruments
Instruments de pesage trieurs-étiqueteurs à fonctionnement automatique

R 51 (2006)

▶ Issuing Authority / *Autorité de délivrance*

NMi Certin B.V.,
The Netherlands

R051/2006-NL1-2017.05
Automatic catchweighing instrument - Type: AW-5600, AW-5600CPR
Teraoka Seiko Co. Ltd., 5-13-12, Kugahara, Ohta-ku, JP-146-8580 Tokyo, Japan

▶ Issuing Authority / *Autorité de délivrance*

NMRO Certification Services (NMRO),
United Kingdom

R051/2006-GB1-2009.05 Rev. 4
D3 and T3 Checkweighers
Prisma Industriale S.R.L., Via la Bionda 17, IT-43036 Fidenza (PR), Italy

R051/2006-GB1-2017.02 Rev. 1
CWS Loadpin
Strainstall UK Limited, 9-10 Mariners Way, Cowes PO31 8PD, United Kingdom

R051/2006-GB1-2017.03 Rev. 1
CWS (diaphragm load cell based)
Strainstall UK Limited, 9-10 Mariners Way, Cowes PO31 8PD, United Kingdom

R051/2006-GB1-2017.04
Type: DACS-GN-SE012 and DACS-GN-SE050
Ishida Europe Ltd., 11 Kettles Wood Drive, Woodgate Business Park, Birmingham B32 3DB, United Kingdom

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INSTRUMENT CATEGORY
CATÉGORIE D'INSTRUMENT

Metrological regulation for load cells (applicable to analog and/or digital load cells)
Réglementation métrologique des cellules de pesée (applicable aux cellules de pesée à affichage analogique et/ou numérique)

R 60 (2000)

▶ Issuing Authority / *Autorité de délivrance*

International Metrology Cooperation Office, National Metrology Institute of Japan (NMIJ) National Institute of Advanced Industrial Science and Technology (AIST), Japan

R060/2000-JP1-2012.04 Rev. 2 (MAA)
Compression load cell - Type: CC010-10T-C3, CC010-20T-C3, CC010-30T-C3, CC010-50T-C3
MinebeaMitsumi Inc., 1-1-1 Katase Fujisawa-shi, JP-251-853 Kanagawa-ken, Japan

▶ Issuing Authority / *Autorité de délivrance*

NMi Certin B.V., The Netherlands

R060/2000-NL1-2013.08 Rev. 1 (MAA)
Compression load cell, with strain gauges, equipped with electronics -Type: WBK-D
CAS Corporation, #262, Geurugogae-ro, Gwangjeok-myeon, Gyenonggi-do, Korea (R.)

R060/2000-NL1-2016.01 (MAA)
Bending beam load cell, with strain gauges - Type: 280 and 380W
Vishay Precision Group - Transducers, 26 Harokmim St., 5885849 Holon, Israel

R060/2000-NL1-2016.33 (MAA)
Compression load cell, with strain gauges - Type: PR6212
Sartorius Mechatronics T&H GmbH, Meiendorfer Strasse 205, DE-22145 Hamburg, Germany

R060/2000-NL1-2017.08 (MAA)
Bending beam load cell, with strain gauges, equipped with electronics - Type: FIT/5. . .FIT5
Hottinger Baldwin Messtechnik GmbH, Im Tiefen See 45, DE-64293 Darmstadt, Germany

R060/2000-NL1-2017.55 (MAA)
Bending beam load cell, with strain gauges - Type: M110 or PR79, M110T or PR79T
MinebeaMitsumi Inc., 1-1-1 Katase Fujisawa-shi, JP-251-853 Kanagawa-ken, Japan

R060/2000-NL1-2017.57 (MAA)
Compression load cell, with strain gauges - Type: PR6203
Minebea Intec GmbH, Meiendorfer Strasse 205 A, D-22145 Hamburg, Germany

R060/2000-NL1-2017.57 Rev. 1 (MAA)
Compression load cell, with strain gauges - Type: PR6203
Minebea Intec GmbH, Meiendorfer Strasse 205 A, D-22145 Hamburg, Germany

R060/2000-NL1-2017.58
Compression load cell, with strain gauges, equipped with electronics -Type: RC3D
Flintec UK Ltd., W4/5 Capital Point, Capital Business Park, Cardiff CF3 2PW, United Kingdom

R060/2000-NL1-2017.59 (MAA)
Bending beam load cell, with strain gauges - Type: M28i
Moorange Electronics Mfg (Shanghai) Co., Ltd., No. 336m Haiqiao Road, Huinan Town, Pudong District, 201301 Shanghai, P.R. China

R060/2000-NL1-2017.60 (MAA)
Compression load cell, with strain gauges - Type: M36, M36i
Moorange Electronics Mfg (Shanghai) Co., Ltd., No. 336m Haiqiao Road, Huinan Town, Pudong District, 201301 Shanghai, P.R. China

R060/2000-NL1-2017.61 (MAA)
Shear beam load cell, with strain gauges, equipped with electronics - Type: LP7110
Locosc Ningbo Precision Technology Co. Ltd., No. 137 Zhenyong Road, Yongjing, CN-31502 Ningbo, P.R. China

R060/2000-NL1-2017.62 (MAA)
Shear beam load cell, with strain gauges - Type: LHX-1
Huzhou Liheng Electronic Technology Co. Ltd, No. 69 Hengda Road, Qianyuan Town, 313216 Zhejiang, P.R. China

R060/2000-NL1-2017.63 (MAA)
Tension load cell, with strain gauges - Type: PR6246
Minebea Intec GmbH, Meiendorfer Strasse 205 A, D-22145 Hamburg, Germany

R060/2000-NL1-2017.64 (MAA)
Single point load cell, with strain gauge - Type: M090 or PR58
MinebeaMitsumi Inc., 1-1-1 Katase Fujisawa-shi, JP-251-853 Kanagawa-ken, Japan

R060/2000-NL1-2017.65 (MAA)
Shear beam load cell, with strain gauges - Type: SBT
Dini Argeo Srl, Via Della Fisica, 20, IT-41042 Spezzano di Fiorano (MO), Italy

R060/2000-NL1-2017.66 (MAA)
Shear beam load cell, with strain gauges - Type: RL35063S
Rice Lake Weighing Systems, 230 West Coleman Street, 54868 Rice Lake, Wisconsin, United States

R060/2000-NL1-2017.67 (MAA)
Bending beam load cell, with strain gauges - Type: L6G
Zhonghang Electronic Measuring Instruments Co. Ltd. (ZEMIC), Xinyuan Road, The North Zone of EDZ, Hanzhong, P.O. Box 2, CN-723000 Hanzhong - ShaanXi, P.R. China

R060/2000-NL1-2017.67 Rev. 1 (MAA)
Single point load cell, with strain gauge - Type: M090 or PR58
Zhonghang Electronic Measuring Instruments Co. Ltd. (ZEMIC), Xinyuan Road, The North Zone of EDZ, Hanzhong, P.O. Box 2, CN-723000 Hanzhong - ShaanXi, P.R. China

► **Issuing Authority / *Autorité de délivrance***
NMRO Certification Services (NMRO), United Kingdom

R060/2000-GB1-2017.14 Rev. 1
HSB (stainless steel) HAB (alloy steel)
Cardinal Scale Manufacturing Co., 203 East Daugherty Street, P.O. Box 151, 64870 Webb City, Missouri, United States

R060/2000-GB1-2017.17 (MAA)
Type: SCBD50 digital load cell
Cardinal Scale Manufacturing Co., 203 East Daugherty Street, P.O. Box 151, 64870 Webb City, Missouri, United States

R060/2000-GB1-2017.18 (MAA)
DV Series digital load cell
Cardinal Scale Manufacturing Co., 203 East Daugherty Street, P.O. Box 151, 64870 Webb City, Missouri, United States

► **Issuing Authority / *Autorité de délivrance***
Physikalisch-Technische Bundesanstalt (PTB), Germany

R060/2000-DE1-2017.15 (MAA)
Load Cell - Type: PR 6241
Minebea Intec GmbH, Meiendorfer Strasse 205 A, D-22145 Hamburg, Germany

► **Issuing Authority / *Autorité de délivrance***
SP Technical Research Institute of Sweden, Sweden

R060/2000-SE1-2017.01
Digital load cell - Type: 0120
Brosa AG., Dr.-Dlein-Strasse 1, D-88069 Tettnang, Germany

R060/2000-SE1-2017.01 Rev. 1
Digital load cell - Type: 0120
Brosa AG., Dr.-Dlein-Strasse 1, D-88069 Tettnang, Germany

INSTRUMENT CATEGORY
CATÉGORIE D'INSTRUMENT

Automatic gravimetric filling instruments
Doseuses pondérales à fonctionnement automatique

R 61 (2004)

► **Issuing Authority / *Autorité de délivrance***
Dansk Elektronik, Lys & Akustik (DELTA), Denmark

R061/2004-DK3-2017.01
Automatic gravimetric filling instrument - Type: BX13
Baykon Endustriel Kontrol Sistemleri San ve Tic A.S., Tuzla Kimya Sanayicileri OSB, Organic Caddessi 31, 34956 Istanbul, Turkey

INSTRUMENT CATEGORY
CATÉGORIE D'INSTRUMENT

Nonautomatic weighing instruments
Instruments de pesage à fonctionnement non automatique

R 76-1 (1992), R 76-2 (1993)

- Issuing Authority / *Autorité de délivrance*

  NMRO Certification Services (NMRO), United Kingdom

R076/1992-GB1-2009.10 Rev. 3 (MAA)
AD PLUS and AD PLUS Series, AP PLUS (and variants) and AD PLUS Models, non-automatic weighing instruments
CAS Corporation, #262, Geurugogae-ro, Gwangjeok-myeon, Gyenonggi-do, Korea (R.)

R076/1992-GB1-2013.01 Rev. 2 (MAA)
Type: PR Plus Series
CAS Corporation, #262, Geurugogae-ro, Gwangjeok-myeon, Gyenonggi-do, Korea (R.)

INSTRUMENT CATEGORY
CATÉGORIE D'INSTRUMENT

Non-automatic weighing instruments
Instruments de pesage à fonctionnement non automatique

R 76-1 (2006), R 76-2 (2007)

- Issuing Authority / *Autorité de délivrance*

  Dansk Elektronik, Lys & Akustik (DELTA), Denmark

R076/2006-DK3-2014.09 Rev. 1
Non-automatic weighing instrument - Type: BX21 / BX22
Baykon Endustriel Kontrol Sistemleri San ve Tic A.S., Tuzla Kimya Sanayicileri OSB, Organic Caddessi 31, 34956 Istanbul, Turkey

R076/2006-DK3-2017.01 Rev. 1
Non-automatic weighing instrument - Type: PWT
Nanjing Toms Weighing Instruments Co., Ltd., No. 77 Baoushan Rd, Qilin Town, Jiangsu, P.R. China

R076/2006-DK3-2017.08
Non-automatic weighing instrument - Type: PT610 / PT620 / PT630
PT Limited, 2/7 Marken Place, Glenfield, Auckland, New Zealand

R076/2006-DK3-2017.09
Non-automatic weighing instrument - Type: VGM / VGC / VGW / VGP / VDM / VDC / VDW / VDP / VOM / VOC / VOW / VOP
Universal Weight Electronics, 4 Floor, No. 53, Baoxing Road, Xindian District, New Taipei 231, Chinese Taipei

R076/2006-DK3-2017.10
Non-automatic weighing instrument - Type: BX10 / BX11/ BX13 / BX14
Baykon Endustriel Kontrol Sistemleri San ve Tic A.S., Tuzla Kimya Sanayicileri OSB, Organic Caddessi 31, 34956 Istanbul, Turkey

R076/2006-DK3-2017.11
Non-automatic weighing instrument - Type: BX23 / BX24 / BX25 / BX26
Baykon Endustriel Kontrol Sistemleri San ve Tic A.S., Tuzla Kimya Sanayicileri OSB, Organic Caddessi 31, 34956 Istanbul, Turkey

R076/2006-DK3-2017.12
Non-automatic weighing instrument - Type: BX65 / BX66
Baykon Endustriel Kontrol Sistemleri San ve Tic A.S., Tuzla Kimya Sanayicileri OSB, Organic Caddessi 31, 34956 Istanbul, Turkey

R076/2006-DK3-2017.13 (MAA)
Non-automatic weighing indicator - Type: M2400-P03
Marel hf, Hofdabakka 9, IS-112 Reykjavik, Iceland

R076/2006-DK3-2017.15
Non-automatic weighing instrument - Type: ASP / ATP / AHP / AHPS / AHW / AHC / QSP / QTP / QHW / QHC / FX / FX-p
Tscale Electronic Mfg (Kunshan) Co., Ltd., No. 99 Shunchang Road, Zhoushi, Jiangsu, P.R. China

R076/2006-DK3-2017.16
Non-automatic weighing instrument - Type: IHB600 / IHB6000 / NHB600 / NHB6000/ EHB600 / EHB 6000
Tscale Electronic Mfg (Kunshan) Co., Ltd., No. 99 Shunchang Road, Zhoushi, Jiangsu, P.R. China

R076/2006-DK3-2017.17
Non-automatic weighing instrument - Type: M101 / M105 / M301 / M303 / M307 / M501 / M503 / M701
Tscale Electronic Mfg (Kunshan) Co., Ltd., No. 99 Shunchang Road, Zhoushi, Jiangsu, P.R. China

R076/2006-DK3-2017.18
Non-automatic weighing instrument - Type: SV1x
Scanvaegt Systems A/S, Johann Gutenbergs Vej 5-9, DK-8200 Aarhus N, Denmark

R076/2006-DK3-2017.19
Non-automatic price-computing weighing instrument - Type: S200
Elicom Electronic - Geoviev KD, 5th Saedienie sq., 7500 Silsitra, Bulgaria

R076/2006-DK3-2017.20
Non-automatic weighing instrument - Type: FT-111 / FT-611 / FT-112 / FT-612
Flintec GmbH, Bemannsbruch 9, DE-74909 Meckesheim, Germany

R076/2006-DK3-2017.21
Non-automatic price-computing weighing instrument - Type: PT807 / PT 810
PT Limited, 2/7 Marken Place, Glenfield, Auckland, New Zealand

R076/2006-DK3-2017.22
Non-automatic weighing instrument - Type: ZTP / ZSP / ZHW-2 / ZHW-7 / ZHW-20 / ZHC / WTP / WSP / USP / UTP / UHP / UHPS / UTW-2 / UTW-7 / UTW-20 / UTC
Tscale Electronic Mfg (Kunshan) Co., Ltd, No. 99 Shunchang Road, Zhoushi, Jiangsu, P.R. China

R076/2006-DK3-2017.23
Non-automatic weighing instrument - Type: L10 / L15 / PE7 / P10 / P10a / P10b / P10e / PE10a / PE10b / PE10e / PL10 / P15a / P15b / P15c / P18
Tscale Electronic Mfg (Kunshan) Co., Ltd, No. 99 Shunchang Road, Zhoushi, Jiangsu, P.R. China

► **Issuing Authority / *Autorité de délivrance***

Institut fédéral de métrologie METAS, Switzerland

R076/2006-CH1-2016.01 Rev. 1 (MAA)
Non-automatic analytical precision weighing instrument - Type: ME. . . T
Mettler-Toledo GmbH, Im Langacher 44, PO Box MT-100, CH-8606 Greifensee, Switzerland

► **Issuing Authority / *Autorité de délivrance***

International Metrology Cooperation Office, National Metrology Institute of Japan (NMIJ) National Institute of Advanced Industrial Science and Technology (AIST), Japan

R076/2006-JP1-2017.01 (MAA)
Non-automatic weighing instrument - Type: HV-C/HV-CP Series
A&D Company Ltd., 3-23-14 Higashi-Ikebukuro, Toshima-Ku, JP-170-001 Tokyo, Japan

► **Issuing Authority / *Autorité de délivrance***

NMi Certin B.V., The Netherlands

R076/2006-NL1-2012.28 Rev. 2 (MAA)
Non-automatic weighing instrument - Type: PS1X. . . Series
Xiamen Pinnacle Electrical Co., Ltd., 4F, Guangxia Building, North High-Tech Zone, CN-Fujian, P.R. China

R076/2006-NL1-2013.13 Rev. 2 (MAA)
Non-automatic weighing instrument - Type: OS2 series.
Xiamen Pinnacle Electrical Co., Ltd., 4F, Guangxia Building, North High-Tech Zone, CN-Fujian, P.R. China

R076/2006-NL1-2017.06 (MAA)
Indicator - Type: DPS5600i - DPS5600Mi
Teraoka Seiko Co. Ltd., 5-13-12, Kugahara, Ohta-ku, 146-8580, Tokyo, Japan

R076/2006-NL1-2017.17 Rev. 1 (MAA)
Non-automatic weighing instrument - Type: RLS1000, RLS1100, RLS1000A, RLS1100A, RLS1000B, RLS1100B
Xiamen Rongta Technology Co., Ltd., 3F/E Building, Gaoqi Industrial Area, Gaoqi Beisan Road, Dianqian Huli Xiamen City, P.R. China

R076/2006-NL1-2017.19 (MAA)
Non-automatic weighing instrument - Type: S51, S71
Ohaus Corporation, 7, Campus Drive, Suite 310, NJ 0705 Parsippany, United States

R076/2006-NL1-2017.36 (MAA)
Non-automatic weighing instrument - Type: DIX-2001
Teraoka Seiko Co. Ltd., 5-13-12, Kugahara, Ohta-ku, 146-8580, Tokyo, Japan

R076/2006-NL1-2017.48 (MAA)
Non-automatic weighing instrument - Type: Serie 390
Precisa Gravimetrics A.G., Moosmattstrasse 32, CH-8953 Dietikon, Switzerland

R076/2006-NL1-2017.49
Non-automatic weighing instrument - Type: SM-5000, SM-5300, SM-5300L (EV), SM-5300H, SM-5400, SM-5500, SM-5500H, SM-5500M
Digi Singapore PTE Ltd., 4 Leng Kee Road, #05-03/04/05 & 11, SIS Building, 159088 Singapore

R076/2006-NL1-2017.50 (MAA)
Non-automatic weighing instrument - Type: Maxi Move
ArjoHuntleigh AB, Hans Michelsensgatan 10, SE-211 20 Malmö, Sweden

R076/2006-NL1-2017.51 (MAA)
Non-automatic weighing instrument - Type: Quaestor. . .
Ohaus Corporation, 7, Campus Drive, Suite 310, NJ 0705 Parsippany, United States

R076/2006-NL1-2017.52 (MAA)
Indicator - Type: D39-E
Keli Electric Manufacturing (Ningbo) Co., Ltd., N° 199 Changxing Road, Jiangbei District, CN-315033 Ningbo, P.R. China

R076/2006-NL1-2017.53 (MAA)
Indicator - Type: 500, 500-SW and D-900 Series
Dibal S.A., Astintze Kalea 24, Pol. Ind. Neinver, ES-48160 Derio - Vizcaya, Spain

R076/2006-NL1-2017.55 (MAA)
Non-automatic weighing instrument - Type: DPS-560
Teraoka Seiko Co., Ltd., 13-12 Kugahara, 5-Chome, Ohta-ku, JP-146-858 Tokyo, Japan

R076/2006-NL1-2017.56 (MAA)
Non-automatic weighing instrument - Type: WM-ITC. . .
Bizerba GmbH & Co. KG, Wilhelm-Kraut-Strasse 65, DE-72336 Balingen, Germany

R076/2006-NL1-2017.57 (MAA)
Non-automatic weighing instrument - Type: DPS-5600, DPS-5600M
Teraoka Seiko Co. Ltd., 5-13-12, Kugahara, Ohta-ku, 146-8580 Tokyo, Japan

R076/2006-NL1-2017.58 (MAA)
Non-automatic weighing instrument - Type: AW-5600, AW-5600CP, AW-5600CPR, AW-5600FX
Teraoka Seiko Co. Ltd., 5-13-12, Kugahara, Ohta-ku, 146-8580 Tokyo, Japan

R076/2006-NL1-2017.59
Non-automatic weighing instrument - Type: SWS-5600
Teraoka Seiko Co. Ltd., 5-13-12, Kugahara, Ohta-ku, 146-8580 Tokyo, Japan

R076/2006-NL1-2017.60 (MAA)
Terminal / Indicator - Type: ICS4. . . (x). ICS6. . .
Mettler-Toledo (Albstadt) GmbH, Unter dem Malesfelden 34, DE-72458 Albstadt, Germany

R076/2006-NL1-2017.61
Non-automatic weighing instrument - Type: SM-5000, SM-5300, SM-5300 L xx. SM-5300H, SM-5400, SM-5500, SM-5500H,SM-5500M
Digi Singapore PTE Ltd., 4 Leng Kee Road, #05-03/04/05 & 11, SIS Building, 159088 Singapore

R076/2006-NL1-2017.62 (MAA)
Non-automatic weighing instrument - Type: RM-5801. ., RM-5900. .
Shanghai Teraoka Electronic Co. Ltd., Ting Lin Industry Development Zone, Jin Shan District, CN-201505 Shanghai, P.R. China

▶ **Issuing Authority / *Autorité de délivrance***
NMRO Certification Services (NMRO), United Kingdom

R076/2006-GB1-2015.05 Rev. 1 (MAA)
Magellan 9300i or 9400i scanner/scale
Datalogic ADC, Inc, 959 Terry Street, 97402 Eugene, OR, United States

R076/2006-GB1-2016.03 Rev. 1 (MAA)
Type: ZM505, ZM510, ZM605, ZM615 Series
Avery Weigh-Tronix, Foundry Lane, Smethwick B66 2LP, United Kingdom

R076/2006-GB1-2017.10 (MAA)
Type: ZK840
Avery Weigh-Tronix, Foundry Lane, Smethwick B66 2LP, United Kingdom

R076/2006-GB1-2017.17 (MAA)
ABS-960+Baggage scale
Atrax Group (NZ) Ltd, 390 A Church Street, Penrose, Auckland, New Zealand

R076/2006-GB1-2017.18 (MAA)
Type: CI-200 Series
CAS Corporation, #262, Geurugogae-ro, Gwangjeok-myeon, Gyenonggi-do, Korea (R.)

Issuing Authority / *Autorité de délivrance*

Physikalisch-Technische Bundesanstalt (PTB), Germany

R076/2006-DE1-2015.01 Rev. 1
Weighing module - Type: MPGI. . ./MPXI. . .
Mettler-Toledo GmbH, Im Langacher 44, PO Box MT-100, CH-8606 Greifensee, Switzerland

R076/2006-DE1-2016.01 Rev. 1 (MAA)
Non-automatic price-computing weighing instrument for direct sales to the public - Type: MC . . .
Bizerba GmbH & Co. KG, Wilhelm-Kraut-Strasse 65, DE-72336 Balingen, Germany

R076/2006-DE1-2017.02 (MAA)
Weighing module - Type: ISED
Minebea Intec Bovenden GmbH & Co. KG, Leinental 2, DE-37120 Bovenden, Germany

R076/2006-DE1-2017.03 (MAA)
Non-automatic electromechanical weighing instrument without lever system - Type: MSY
Sartorius Lab Instruments GmbH & Co., Otto-Brenner-Str. 20., DE-37079 Gottingen, Germany

R076/2006-DE1-2017.04
Non-automatic weighing instrument - Type: COS03A, COS03B, FLS01A - FLS01G
Seca GmbH & Co. kg., Hammer Steindamm 9-25, DE-22089 Hamburg, Germany

Issuing Authority / *Autorité de délivrance*

State Agency for Metrology and Technical Surveillance, Bulgaria

R076/2006-BG1-2013.17 Rev. 1 (MAA)
Indicator - Type: CI-200D, CI-201D, CI-200SD, CI-200SCD, CI-201SD.
CAS Corporation, #262, Geurugogae-ro, Gwangjeok-myeon, Gyenonggi-do, Korea (R.)

INSTRUMENT CATEGORY
CATÉGORIE D'INSTRUMENT

Automatic level gauges for fixed storage tanks
Jaugeurs automatiques pour les réservoirs de stockage fixes

R 85 (2008)

Issuing Authority / *Autorité de délivrance*

Czech Metrology Institute (CMI), Czech Republic

R085/2008-CZ1-2012.01 Rev. 1
Automatic level gauge - Type: OptiLevel HLS 2010 (probe) / OptiLevel Supply (console / LS. Barrier)
Hectronic GmbH, Allmendstrasse 15, D-79848 Bonndorf, Germany

Issuing Authority / *Autorité de délivrance*

NMi Certin B.V., The Netherlands

R085/2008-NL1-2017.06
Automatic level gauge for measuring the level of liquid in stationary storage tanks - Type: (see certificate)
Enraf B.V., Delftechpark 39, NL-2628 XJ Delft, Netherlands

INSTRUMENT CATEGORY
CATÉGORIE D'INSTRUMENT

Discontinuous totalizing automatic weighing instruments
Instruments de pesage totalisateurs discontinus à fonctionnement automatique

R 107 (2007)

Issuing Authority / *Autorité de délivrance*

Dansk Elektronik, Lys & Akustik (DELTA), Denmark

R107/2007-DK3-2017.01
Discontinuous totalizing automatic weighing instrument - Type: BX14
Baykon Endustriel Kontrol Sistemleri San ve Tic A.S., Tuzla Kimya Sanayicileri OSB, Organic Caddessi 31, 34956 Istanbul, Turkey

INSTRUMENT CATEGORY
CATÉGORIE D'INSTRUMENT

Fuel dispensers for motor vehicles
Distributeurs de carburant pour véhicules à moteur

R 117 (1995) + R 118 (1995)

Issuing Authority / *Autorité de délivrance*

International Metrology Cooperation Office,
National Metrology Institute of Japan
(NMIJ) National Institute of Advanced Industrial
Science and Technology (AIST), Japan

R117/1995-JP1-2016.01 Rev. 1
Fuel dispenser for motor vehicles,
Tatsuno Sunny-GL series
Tatsuno Corporation, 3-2-6, Mita, Minato-ku,
JP-108-8520 Tokyo, Japan

INSTRUMENT CATEGORY
CATÉGORIE D'INSTRUMENT

Dynamic measuring systems for liquids other than water
Ensembles de mesurage dynamique de liquides autres que l'eau

R 117 (2007) + R 118 (1995)

Issuing Authority / *Autorité de délivrance*

Russian Research Institute for Metrological Service
(VNIIMS)

R117/2007-RU1-2017.04
Fuel Dispenser Horizon Series - Type: (See certificate)
Gilbarco China Co. Ltd., No. 15 Jianshexijie,
Pinggu District, CN-101200 Beijing, P.R. China

Issuing Authority / *Autorité de délivrance*

International Metrology Cooperation Office,
National Metrology Institute of Japan
(NMIJ) National Institute of Advanced Industrial
Science and Technology (AIST), Japan

R117/2007-JP1-2017.01 Rev. 1
Fuel dispenser for motor vehicles,
Tatsuno Sunny-GL series
Tatsuno Corporation, 3-2-6, Mita, Minato-ku,
JP-108-8520 Tokyo, Japan

Issuing Authority / *Autorité de délivrance*

NMi Certin B.V.,
The Netherlands

R117/2007-NL1-2016.01 Rev. 1
Fuel dispenser - Type: Quantium XXXX
Tokheim Sofitam Applications S.A.S.,
Immeuble Le Cezanne, Paris Nord 31-35,
Allee des Impressionnistes,
FR-95912 Roissy Ch de Gaulle Cedex, France

R117/2007-NL1-2017.04
Measurement transducer -
Type: Promass Q 300 DNxxx, Promass Q 500 DNxxx
Endress + Hauser Flowtec AG, Kagenstrasse 7,
CH-4153 Reinach BL 1, Switzerland

Issuing Authority / *Autorité de délivrance*

NMRO Certification Services (NMRO),
United Kingdom

R117/2007-GB1-2017.03
EM6 Electronic calculator and indicator
Metermatic, Angus Crescent, Longmeadow Business
Estate East, Johannesburg, Gauteng, South Africa

R117/2007-GB1-2017.04
Liquids other than water dispenser, Sprint.
Gilbarco Veeder Root, Crompton Close,
Basildon SS14 3B, United Kingdom

INSTRUMENT CATEGORY
CATÉGORIE D'INSTRUMENT

Multi-dimensional measuring instruments
Instruments de mesure multidimensionnels

R 129 (2000)

Issuing Authority / *Autorité de délivrance*

Laboratoire National de Métrologie et d'Essais,
Certification Instruments de Mesure, France

R129/2000-FR2-2017.01 Rev. 0
Tridimensional measuring instrument AutoCube 8200-1
Honeywell Sensing and Productivity Solutions,
9680 Old Bailes Road, SC 29707 Fort Mill,
United States

R129/2000-FR2-2017.01 Rev. 2
Tridimensional measuring instrument AutoCube 8200-1
Honeywell Sensing and Productivity Solutions, 9680 Old Bailes Road, SC 29707 Fort Mill, United States

▶ Issuing Authority / *Autorité de délivrance*
NMi Certin B.V., The Netherlands

R129/2000-NL1-2017.02
Multi-dimensional measuring instrument - Type: VIPAC-D2-BNPS, VIPAC-D2-CNPS, BNPS-Vxx.yyy.zzz-S12, CNPS-Vxx.yyy.zzz-S12.
Vitronic Dr.-Ing. Stein Bildverarbeitungssysteme GmbH, Hasengartenstrasse 14, DE-65189 Wiesbaden, Germany

R129/2000-NL1-2017.03
Multi-dimensional measuring instrument - Type: VIPAC-D2-BNPS, VIPAC-D2-CNPS, BNPS-Vxx.yyy.zzz-S12, CNPS-Vxx.yyy.zzz-S12.
Vitronic Dr.-Ing. Stein Bildverarbeitungssysteme GmbH, Hasengartenstrasse 14, DE-65189 Wiesbaden, Germany

INSTRUMENT CATEGORY
CATÉGORIE D'INSTRUMENT

Automatic instruments for weighing road vehicles in motion and measuring axle loads
Instruments à fonctionnement automatique pour le pesage des véhicules routiers en mouvement et le mesurage des charges à l'essieu

R 134 (2006)

▶ Issuing Authority / *Autorité de délivrance*
Institut fédéral de métrologie METAS, Switzerland

R134/2006-CH1-2017.01
Automatic instruments for weighing road vehicles in motion and measuring axle loads - Type: WIM-DSP 32 I TMCS-U
Traffic Data Systems GmbH, Notkestrasse 13, DE-22607 Hamburg, Germany

INSTRUMENT CATEGORY
CATÉGORIE D'INSTRUMENT

Gas meters
Compteurs de gaz

R 137 (2012)

▶ Issuing Authority / *Autorité de délivrance*
NMi Certin B.V., The Netherlands

R137/2012-NL1-2015.09 Rev. 3
Ultrasonic Gas Meter - Type: 3414 / 3415 / 3416 / 3417 Senior Sonic
Emerson Automation Solutions, 11100 Brittmoore Park Drive, TX 77041 Houston, United States

R137/2012-NL1-2017.03
Ultrasonic Gas Meter - Type: Q.Sonic
Elster GmbH, Steinern Strasse 19-21, DE-55252 Mainz-Kastel, Germany

R137/2012-NL1-2017.07
Ultrasonic gas meter
Flow Meter Group B.V., Menisstraat 5c, NL-7091ZZ Dinxperlo, Netherlands

R137/2012-NL1-2017.08
Diaphragm gas meter - Type: DSM GxR
Daesung Measuring Co., Ltd., 662 kyungin-ro, Guro-gu, 152-888 Seoul, Korea (R.)

R137/2012-NL1-2017.08 Rev. 1
Diaphragm gas meter - Type: DSM GxR
Daesung Measuring Co., Ltd., 662 kyungin-ro, Guro-gu, 152-888 Seoul, Korea (R.)

R137/2012-NL1-2017.08 Rev. 2
Diaphragm gas meter - Type: DSM GxR
Daesung Measuring Co., Ltd., 5, Taebong 1-gil, Hogye-myeon, 36931 Korea (R.)

R137/2012-NL1-2017.09
Thermal mass meter - Type: x485xxx
MeteRsit, Viale dell'Industria 31, IT-35129 Padova, Italy

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INSTRUMENT CATEGORY
CATÉGORIE D'INSTRUMENT

Gas measuring systems
Ensembles de mesurage de gaz

R 139 (2014)

Database of all
OIML Certificates:

www.oiml.org/en/certificates/registered-certificates

▶ Issuing Authority / *Autorité de délivrance*

NMi Certin B.V.,
The Netherlands

R139/2014-NL1-2017.02 Rev. 1
Measuring device (Coriolis), for the measurement of Compressed Natural Gas (GNC)

Emerson Process Management Flow B.V., Neonstraat 1, NL-6718 WX, Ede, Netherlands

R139/2014-NL1-2017.03
CNG dispenser, as either a single stage system or as a multi-stage system - Type: E30 CNG "x" "xx"

Cetil Dispensing Technology, S.L., C/Pelaya 37, Poligono Industrial Rio de Janeiro, ES-28110 Algete (Madrid), Spain

ANNOUNCEMENT

XIV Moscow International Innovation Forum and Exhibition:

Accurate measurements – the basis of quality and safety

15–17 May, 2018

S.S. Golubev (CIML Member, Russian Federation),
A. Yu. Kuzin, I.G. Zimin, A.B. Puchkov

In the age of economic globalization, the development of specialization and cooperation as well the demand for high-technology products requires conformity assessment at all stages of their life cycle, and scientific and technological progress requires assurance of measurement uniformity in an individual country or on an international scale.

Almost any physical characteristics can be measured today regardless of the range of their variations.

In the Russian Federation billions of measurements are carried out every day, and for more than 4 million people these are part of their profession. Measurements make up to 10–15 % of all social labor costs, 50–70 % of them being in the electronics and precision industry. In modern electronic systems up to 60–80 % of costs are made up of materials, components and end product parameter measurements. Living in the world of measurements, we take the results of measurements around us for granted at home, at work, in other surroundings. The role of measurements in modern society cannot be overestimated.

On May 20, 1875, at a specially convened diplomatic conference, the Metre Convention (Convention du Mètre) was signed by Government special envoys from 17 states, including Russia. In the wake of Metre Convention the following associated organizations were set up: the General Conference on Weights and Measures (CGPM) as a supreme authority, and the International Committee for Weights and Measures (CIPM) as a working body acting between CGPM sessions, which exercise guidance and supervision over the International Bureau of Weights and Measures (BIPM).

In October 1999, on the eve of the 125th anniversary of the adoption of the Metre Convention, the 88th session of the CIPM accepted a proposal of Dr. Kozo Iizuka (Japan) and Prof. Dr. Lev Isaev (Russian Federation) to introduce World Metrology Day on May 20. The CIPM's decision was supported by the XXI CGPM.

The most important and effective tools of information promotion and distribution are conferences and exhibitions, where advanced concepts of measurement techniques, cutting-edge instruments and equipment are demonstrated; discussions, meetings, presentations, training sessions, master classes, webcasts, etc.

The exhibition/congress project of the Ministry of Industry and Trade of the Russian Federation (Minpromtorg of Russia) and the Federal Agency on Technical Regulating and Metrology (Rosstandart) together with Weststroiexpo exhibition company decided to build an international communication platform and promote cooperation in the Russian Measurement System with the aim of meeting the requirements of the country and of society for high-precision measurements.

The need for such a project was recognized some 15 years ago and the project was initially called "Metrology". However, the first exhibition in 2005 showed the conceptual fallacy of such a format. A new concept was developed based on the premise that metrology is not a goal but a tool to ensure the safety and quality of products and services. This concept formed the basis of the event which was realized in the above mentioned format. Such an approach encouraged more active participation in the event of both instrument makers and companies specializing in product promotion on the Russian and international markets.

The experience of organizing the events within the Forum, dedicated to World Metrology Day, and most significantly the evident benefits for economic growth, led to the adoption by the Government of the Russian Federation of special Order No. 541-p, of April 5, 2014, on the annual holding of an international innovative forum and exhibition "Accurate Measurements: the Basis of Quality and Safety" in Moscow's VDNKh (All-Russia Exhibition Centre). And the first such forum following that order was the 10th Jubilee International Innovative Forum and Exhibition (May 20–22, 2014), held under the motto “Measurements and the Global Energy Challenges” (the mottos for World Metrology Day are traditionally proposed by the OIML and the BIPM and are accompanied by messages from their Directors).

A detailed professional business program of the first All-Russian Congress of Metrologists and Instrument Makers (2016) aimed at sharing information with interested groups, enterprises and organizations (forum and exhibition participants) was developed, based on a survey conducted by the Metrology Department of Rosstandart together with the VNIIMS (All-Russian Scientific and Research Institute for Metrological Service).

In 2016 and 2017 the “Strategy for assurance of measurement uniformity in the Russian Federation until 2025” (approved by the Government Resolution No.737-p dated April 19, 2017) was discussed within the scope of All-Russian Congress of Metrologists and Instrument Makers.

The Strategy is based on the understanding that the System of measurement uniformity assurance is part of the state infrastructure ensuring the production of material wealth.

It is a good tradition that the forums are attended by representatives from the BIPM, the OIML, as well as representatives of the Interstate Council for Standardization, Metrology and Certification (EASC) of the Commonwealth of Independent States, the Chamber of Commerce and Industry, etc.

More than 350 companies from 11 countries took part in the Exhibition and Forum organized in 2017. The program of the Second Congress of Metrologists and Instrument Makers included the discussion of regulatory issues and legal metrology aspects, with more than 85 reports presented. The Forum was attended by more than 8000 specialists.

The exhibit materials were provided by the forum key partners the Russian Federation Federal Agency for Scientific Organizations, Rostekhnadzor, Rostechnologies SC, Roskosmos SC, the Russian Railways JSC, ROSNANO JSC, the Russian Academy of Sciences, Metrological Service of Ministry of Internal Affairs, Skolkovo Foundation, Industrial Development Fund, Innovation Promotion Fund, etc.

The events of the congress/exhibition attracted many partners from Russian industry and the economy to discuss and share solutions to the regulatory, standardization and measurement uniformity assurance issues, which are highly important for all industries.

Fully realizing the importance of the event all the Russian metrology institutes, major centers for standardization and metrology as well as our international colleagues took part in the Forum.

The Forum is a unique opportunity to gather together the major producers and consumers of measuring instruments, testing and laboratory equipment in one place, as well as for making business contacts.

Participation in events such as the “Accurate Measurements the Basis of Quality and Safety” Forum and Exhibition is important because it helps establish common understanding between partners, and develops metrology and measurement uniformity assurance not only in Russia but also worldwide. This is because in the context of the global economy all technological solutions, including the area of measurement uniformity assurance, have an impact on all mankind and on economic progress and development all over the world, especially in countries whose high technology is a priority task in their economic development.

We invite everybody to participate in the celebration of World Metrology Day within the XIV Moscow International Innovation Forum and Exhibition “Accurate Measurements the Basis of Quality and Safety” which will be held on May 15–17, 2018 at VDNKH, Moscow.

Contact: Alexander Puchkov
Phone: +7 (495) 937-4023
E-mail: metrol@expoprom.ru
Address: www.expoprom.ru

References

1 Russian Federation Government Order No. 541-p of April 5, 2014

2 “The Strategy for Assurance of Measurement Uniformity in the Russian Federation until 2025” (Government Resolution No. 737-p of April 19, 2017)

3 http://www.metrol.expoprom.ru/en/

Sergey S. Golubev –
Deputy Head of the Federal Agency on Technical Regulating and Metrology,
Ph.D (Tech.)

Aleksandr Yu. Kuzin –
Director of FGUP VNIIMS, Prof.,
D.Sc. (Tech.)

Igor G. Zimin –
Director General of Weststroiexpo exhibition company,
Ph.D. (Economics)

Aleksandr B. Puchkov –
Director of “Accurate Measurements - the Basis of Quality and Safety” forum and exhibition,
Ph.D (Tech.)

25th Anniversary of the Russian Metrological Academy

Prof Dr. L. Isaev
CIML Member of Honor

In May 1992 the Russian Metrological Academy was set up in Saint-Petersburg at the D.I. Mendeleyev Institute of Metrology. Now the Academy comprises almost 400 Full Members, almost 500 Corresponding Members and more than 50 Foreign Honorary Members including some famous individuals from the OIML community:

- Dr. K. Iizuka, Mr. B. Athané, Prof. M. Kochsiek, Dr. S. Chappell, Prof. N. Zhagora, Mr. P. Mason,

and more than 60 Foreign Full Members including

- Nobel Prize winner Prof. K. von Klitzing, Prof. D. Kind, Dr. T.J. Quinn, Prof. P. Giacomo, Dr. R. Kaarls, Prof. J.J. Kovalevsky, Prof. E. O. Göbel, Prof. B. Inglis, Prof. J.R. Rumble, and Prof. Khristo Radev.

In June 2017 during the events in connection with the 175th anniversary of the D.I. Mendeleyev Institute of Metrology, we celebrated the 25th anniversary of the Metrological Academy at the XVIII Session. The Academy Presidency awarded two honorable distinctions (the Mendeleyev Decoration on a blue sash and the Big Gold Mendeleyev Medal accompanied by special Certificates) to several prominent Members of the Academy:

- Prof. Manfred Kochsiek who is very well known both in Russia and also worldwide,
- Prof. Vladimir Okrepilov, President of our Academy and Full Member of the Russian Academy of Sciences, and
- Prof. Vladimir Krutikov, COOMET President and former CIPM Member.

The awards to Professors M. Kochsiek and V. Krutikov were made by the President of the Russian Metrological Academy, and the award to Prof. V. Okrepilov was made by Vice-President Prof. Isaev.

During the Session of the Academy the President reported on activities of the Academy for the period 1992–2017, and co-reports were also given by the Vice-Presidents, Members of Presidency and the Directors of the NMIs. ■

Prof. M. Kochsiek (left) accepting his Award from Prof. V. Okrepilov (right) with Prof. L. Isaev (center)

Prof. L. Isaev (left) presenting an Award to Prof. V. Okrepilov

Prof. V. Krutikov (right) thanking Prof. V. Okrepilov (center) for the Award

OIML-CS

Launch of the OIML Certification System (OIML-CS)

Paul Dixon, BIML

Introduction

On 1 January 2018 a significant change to the certificate systems operated by OIML took place, with the existing OIML Basic Certificate System and the OIML Mutual Acceptance Arrangement (MAA) replaced by a new, single OIML Certification System (OIML-CS).

The new OIML-CS

The new OIML-CS is a system for issuing, registering and using OIML Certificates and associated OIML type evaluation reports for types of measuring instruments (including families of measuring instruments, modules, or families of modules), based on the requirements of OIML Recommendations. It is a single Certification System comprising two Schemes; Scheme A and Scheme B, which aims to facilitate, accelerate and harmonize the work of national and regional bodies that are responsible for type evaluation and approval of measuring instruments subject to legal metrological control.

The OIML-CS is a voluntary system and OIML Member States and Corresponding Members are free to participate or not. Participating in the OIML-CS, and signing the Declaration, commits in principle the signatories to abide by the rules of the OIML-CS.

A Framework (OIML B 18:2017 *Framework for the OIML-CS*) establishes these rules whereby signatories voluntarily accept and utilize OIML type evaluation reports, when associated with an OIML Certificate issued by an OIML Issuing Authority, for type approval or recognition in their national or regional metrological controls.

Decisions taken at the 52nd CIML Meeting

In the June 2017 edition of the Bulletin a report was provided on the outcome of the second provisional Management Committee (prMC) meeting that was held in Shanghai, P.R. China. The report included a number of recommendations and proposals regarding the implementation of the OIML-CS that were to be submitted to the 52nd CIML Meeting for approval.

At the 52nd CIML Meeting a number of key decisions were taken, including the appointment of the MC Chairperson (Mr. Cock Oosterman, NMi, Netherlands) and Deputy MC Chairperson (Mr. Bill Loizides, NMIA, Australia) and the appointment of the Board of Appeal Chairperson and Members. In addition, the CIML decided which measuring instrument categories would be included in the OIML-CS in Scheme A on 1 January 2018 and which would start in Scheme B, with the transition periods from Scheme B to Scheme A also defined.

OIML-CS Management Committee (MC)

It is proposed that the OIML-CS Management Committee (MC), which is responsible for the operation of the OIML-CS under the authority of the CIML, will meet on an annual basis, with the first MC meeting being held in Sydney, Australia on 21-22 March 2018. This meeting will provide an excellent opportunity for the MC members to meet and to make decisions on the approval of OIML Issuing Authorities and their Test Laboratories, as well as approving the Legal Metrology Experts and Management System Experts. It will also provide an excellent opportunity to discuss the initial implementation and operation of the OIML-CS, and to identify any improvements or changes that may be required, e.g. regarding the transition arrangements.

OIML Issuing Authorities, Utilizers and Associates

Participants in the OIML-CS are defined as OIML Issuing Authorities (and their associated Test Laboratories), Utilizers and Associates. OIML Issuing Authorities are conformity assessment bodies in OIML Member States that will be able to issue OIML Certificates and OIML type evaluation reports under Scheme A and Scheme B for a certain scope of measuring instruments and the applicable OIML

Recommendations. Each OIML Issuing Authority will have one or more Test Laboratories that is able to conduct the testing of the measuring instruments.

Utilizers are organizations in OIML Member States that are responsible for issuing national or regional type approvals, and they will define their scope for accepting and utilizing OIML Certificates and/or OIML type evaluation reports as the basis for issuing national or regional type approvals. Associates undertake the same function, but are from Corresponding Member Countries.

Experts

Management System Exerts are responsible for leading peer assessments and Legal Metrology Experts will participate in the accreditation assessments and peer assessments of potential OIML Issuing Authorities and Test Laboratories. A number of applications from potential experts have already been received and have been reviewed by the Review Committee, and a provisional list of experts is available on the OIML-CS webpages. However, it is important that there is a wide choice of experts to participate in assessments and so further applications are welcomed. Information on the role of the experts, and downloadable application forms, is available on the OIML-CS webpages.

OIML-CS webpages

A new, dedicated set of OIML-CS webpages has been established on the OIML website at https://www.oiml.org/en/oiml-cs

These pages provide detailed information on the OIML-CS, and will include specific information on the scope of the OIML Issuing Authorities and their Test Laboratories, the scope of acceptance of the Utilizers and Associates, and a searchable database of OIML Certificates. The webpages will be a valuable tool for all stakeholders in the OIML-CS.

Benefits of the OIML Certification System

The implementation of the new OIML-CS will provide benefits to the range of users of the system, supporting the harmonization of requirements for measuring instruments, keeping bureaucratic efforts to a minimum (especially for manufacturers), allowing easier international trade of measuring instruments and providing the environment where the worldwide mutual recognition of testing results represents the basic principle.

OIML Issuing Authorities (and their Test Laboratories) will benefit from the acceptance of certificates that they issue on an international level (in Utilizer and Associate countries) which will make them more attractive for manufacturers from around the world. They will have the choice of demonstrating competence by peer assessment or accreditation and working on the basis of internationally agreed requirements. All of this will lead to a higher degree of capacity utilization.

Utilizers and Associates will benefit from the ease of issuing national approvals where no test facilities are available and where national type evaluations and approvals are required. They will be able to rely on the work of OIML Issuing Authorities and Test Laboratories that have demonstrated competence as well as being able to rely on internationally agreed harmonized requirements. This will help to ensure that only measuring instruments enter their national market, where the quality has been proven.

Manufacturers of measuring instruments will benefit from compliance of their products with the harmonized requirements of the relevant OIML Recommendations, the avoidance of duplication of type approval tests in different countries resulting in reduced effort to obtain national approvals (saving time and money) and a shorter time-to-market period, thus giving easier access to the international market. ■

CS OIML Certification System

www.oiml.org/en/oiml-cs

For enquiries concerning the OIML-CS, please contact the OIML-CS Executive Secretary Mr. Paul Dixon (paul.dixon@oiml.org)

info

The OIML is pleased to welcome the following new

CIML Member

United Kingdom:
Mr. Richard Sanders

The OIML is recruiting a Director to lead the work of the International Bureau of Legal Metrology (BIML) in Paris

The OIML

The OIML is an intergovernmental treaty organization, established in 1955 in order to promote the global harmonization of legal metrology procedures that underpin and facilitate international trade.

Position of BIML Director

Reporting directly to the CIML and its President, you will be leading a small but highly motivated team which is committed to removing technical barriers to international trade and enhancing the economic and social wellbeing of countries throughout the world, in particular those with emerging metrology systems.

The successful applicant will possess relevant engineering or science qualifications with knowledge of legal metrology as well as financial management experience.

Applicants are invited to visit our web page for more information on the role requirements: https://www.oiml.org/en/structure/biml/jobs-and-opportunities.

The deadline for applications is 1 February 2018.

OIML meetings

February 2018

OIML TC 17/ SC 7/p 3

PG meeting to discuss the revision of OIML R 126:2012 *Evidential breath analyzers*

14-16 February 2018
GUM, Warsaw, Poland

OIML TC 8/SC 1

Progress review by the SC on all ongoing projects (Revisions of R 71, R 85 and R 125).

The Netherlands
Dates and venue not yet announced

March 2018

OIML TC 9/SC 2/p 9

PG meeting to discuss New Recommendation: Continuous totalizing automatic weighing instruments of the arched chute type

13-14 March 2018 (Tentative dates)
Teddington, UK

First OIML-CS Management Committee Meeting

Sydney, Australia
21-22 March 2018

October 2018

53rd CIML Meeting and Associated Events

8–12 October 2018
Hamburg, Germany

Committee Drafts

Received by the BIML, 2017.09 – 2017.12

Revision of R 139: Compressed gaseous fuel measuring systems for vehicles	2CD	TC 8/SC 7/p 7	2017-11-16

Call for papers

OIML Members
RLMOs
Liaison Institutions
Manufacturers' Associations
Consumers' & Users' Groups, etc.

- Technical articles on legal metrology related subjects
- Features on metrology in your country
- Accounts of Seminars, Meetings, Conferences
- Announcements of forthcoming events, etc.

The **OIML Bulletin** is a forum for the publication of technical papers and diverse articles addressing metrological advances in trade, health, the environment and safety - fields in which the credibility of measurement remains a challenging priority. The Editors of the Bulletin encourage the submission of articles covering topics such as national, regional and international activities in legal metrology and related fields, evaluation procedures, accreditation and certification, and measuring techniques and instrumentation. Authors are requested to submit:

- a titled, typed manuscript in Word or WordPerfect either on disk or (preferably) by e-mail;
- the paper originals of any relevant photos, illustrations, diagrams, etc.;
- a photograph of the author(s) suitable for publication together with full contact details: name, position, institution, address, telephone, fax and e-mail.

Note: Electronic images should be minimum 150 dpi, preferably 300 dpi.

Technical articles selected for publication will be remunerated at the rate of 23 € per printed page, provided that they have not already been published in other journals. The Editors reserve the right to edit contributions for style, space and linguistic reasons and author approval is always obtained prior to publication. The Editors decline responsibility for any claims made in articles, which are the sole responsibility of the authors concerned. Please send submissions to:

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