EURAMET DEVELOPING ITS NEW ROLE IN EUROPEAN METROLOGY

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Abstract – Driven by the aim to develop and execute a European Metrology Research Programme co-funded by the European Commission, the European National Metrology Institutes (NMIs) transformed their former cooperation in the framework of a Memorandum of Understanding and gave it a new legal basis. In January 2007 the "European Association of National Metrology Institutes" – EURAMET was established as a legal entity. Being a legal entity is a good basis also for addressing the challenges in the other areas of cooperation like the CIPM MRA and the support of the development of the national metrology infrastructure in emerging countries.

Keywords RMO, EURAMET, EMRP

1. INTRODUCTION

With the objective to provide fora for a better coordination of the work of the National Metrology Institutes (NMI) some two or three decades ago the establishment of Regional Metrology Organisations (RMO) started. Although the cooperation within the RMOs was informal and without binding obligations, it turned out to be extremely successful in order to bring metrologists within the region together, to provide mutual technical support and advise, to coordinate the provision of traceability to the SI units, to organise inter-comparisons and to cooperate in research and development projects (R&D).

In the framework of the upcoming globalisation and the various approaches for regional economical integration all over the world, the RMOs became the key players for the international recognition of the national measurement standards and the calibration and measurement capabilities (CMC) offered from the NMIs to industry and other users in their country. A Mutual Recognition Arrangement (CIPM MRA) was signed in 1999 by the directors of 38 NMIs and 2 international organisation [1]. In the meantime NMIs from 72 countries and 2 international organisations are participating in this arrangement.

But the cooperation within the CIPM MRA is not the only new challenge which the RMOs are facing. The importance of metrology is continuously growing: in the traditional fields of metrology industry is demanding wider measurement ranges and lower uncertainties, new fields of technology, like nano- or biotechnology, are developing and require metrology support, and in many areas which are not new by themselves, like chemistry or clinical analysis, traceable measurements are becoming more and more relevant. New or improved metrology techniques need to be developed, requiring additional resources for R&D, whereas the budgets of the NMIs as the key providers of R&D in metrology are generally not growing. One solution may be a more efficient use of the available resources by a closer cooperation and coordination of the research activities of the NMIs and searching for regional rather than national solutions.

But not only on the "top-level" of scientific metrology a closer cooperation is needed. The growing participation of emerging economies in the global markets goes along with the need for these countries to demonstrate the conformity of the products produced by their industry with standards and requirements of their customers. The establishment of a functioning and internationally recognised national quality infrastructure, with metrology forming an essential part of it, is crucial for these countries. The RMOs are recognising this responsibility, organising advisory support and the exchange of experience among their members and searching for a harmonised metrology infrastructure in their region.

In view of these grand challenges the European NMIs decided to give their cooperation a more formal basis. In January 2007 the "European Association of National Metrology Institutes – EURAMET e.V." was established as a registered non-profit association under German law. It substitutes the former collaboration of European NMIs in EUROMET, which was based on a Memorandum of Understanding.

The paper will outline how EURAMET within this new legal framework tries to give answers and find solutions to the actual challenges. As one of its major activities, the development of a European Metrology Research Programme (EMRP) and its implementation, co-funded by national resources and contributions of the European Union, will be described, which can possibly inspire other RMOs to look for similar ways of coordinating R&D in metrology in their region.

2. THE NEW LEGAL ENTITY EURAMET

2.1. Establishment of EURAMET e.V.

The European cooperation in scientific metrology and national measurement standards was successfully coordinated over almost 20 years by EUROMET, based on a Memorandum of Understanding (MoU). However, the intensity and the required commitments of the cooperation were increasing continuously over the years and new challenges were coming up which could not any longer be addressed satisfactorily in the loose form of cooperation of an MoU.

The prospect of a co-funding for a European Metrology Research Programme (EMRP) by the European Commission

(CEC), requiring a legal entity as a contractual partner of the CEC, was finally the trigger to enter in a process which led to the establishment of a new legal entity EURAMET e.V.

As not all members of the former EUROMET were participating in the EMRP, the alternative could have been a legal entity exclusively for the coordination of the EMRP, while maintaining EUROMET within the existing structures. Discussions among the EUROMET members, however, expressed the clear wish to maintain a single comprehensive body for the coordination of metrology in Europe and recognised the advantages of being a legal entity not only for research matters.

Supported by the CEC within an ERA-NET of the 6th Framework Programme called "iMERA", the structure and the basic legal documents for the new entity were elaborated.

On 11 January 2007 finally 26 of the 33 EUROMET member NMIs inaugurated EURAMET e.V. as a registered non-profit association under German law. The remaining EUROMET NMIs joint as Members in the course of the year (with only one exception, Cyprus, which is expected to join soon). The former Corresponding Applicants of EUROMET, the IRMM of the Joint Research Centre of the CEC, and a number of institutes holding national measurement standards further to the member NMIs joint EURAMET as Associates.

With that, the conditions for transferring all responsibilities form EUROMET to EURAMET were fulfilled, resulting finally in the termination of the EUROMET MoU due to 30 June 2007 and the continuation of the work within the framework of EURAMET.

2.2. The organisation of EURAMET e.V.

EURAMET counts with three types of membership, respectively formal relationship:

Member can be the NMI of a European country. Members have full participation rights in all EURAMET activities and voting right in the General Assembly. Only one member per country is possible.

Fig. 1. The NMIs of 32 European countries are Members of EURAMET, the NMIs of 4 South-East European countries and the IRMM are Associates.

Associates are NMIs applying for membership and former EUROMET members which are unable to join EURAMET due to legal reasons (the latter one is the case of the IRMM). If a country has additionally to the NMI further institutes holding national measurement standards, which are Designated Institutes [2] within the CIPM MRA, they may also become Associates. Associates have no voting right, but can participate in all technical activities of EURAMET.

Furthermore, EURAMET maintains permanent relationship to a couple of Liaison Organisations; regional and international organisations with activities related to metrology, like for example the other RMOs, the BIPM, or the EA.

The complete list of Members, Associates and Liaison Organisations can be found on the EURAMET website www.euramet.org

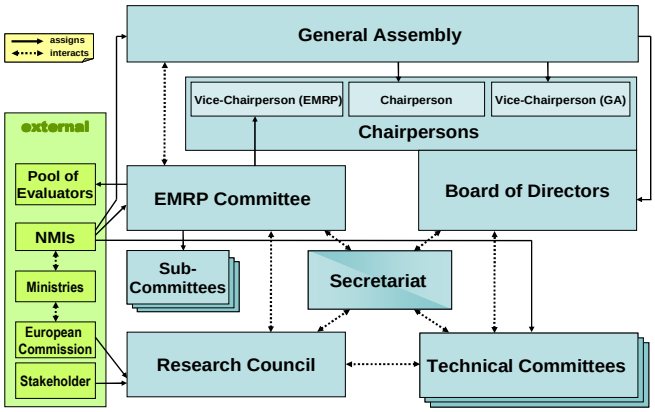

Fig.21. The organisational structure of EURAMET.

The organisation of EURAMET is shown in Fig. 2. The decision making body is the General Assembly (GA), were each member is represented by a Delegate. The GA approves the policy of EURAMET, fundamental organisational documents and the budget and elects the EURAMET officials.

The Chairperson is the legal representative of EURAMET and the overall responsible for all EURAMET activities. He or she is elected for a three year period. The Chairperson is supported by two Vice-Chairpersons, one responsible for the general EURAMET business, the other one for joint research matters (EMRP). In the governance of EURAMET the Chairpersons are supported by a Board of Directors (BoD), whose elected members should reflect the diversity of EURAMET in respect of geography, level of metrological development and metrological impact in Europe.

The technical work, including the organisation of research projects, traceability arrangements, consultancy between members, inter-comparisons, and all duties for the fulfilment of the CIPM MRA, is done in 12 Technical Committees (TC): ten of them for the different metrological fields and two horizontal TCs for Interdisciplinary Metrology and Quality matters.

EURAMET maintains a permanent Secretariat, giving administrative support in the operation of the association

and its bodies and organising the communication between members and EURAMET bodies.

A specific body for decision making in all EMRP matters is the EMRP-Committee. Only those members are represented which participate in the EMRP. In difference to the GA, where each member has one vote, decisions in the EMRP-Committee are based on weighted votes, which reflect the financial commitment of each member in the EMRP. The Research Council is an advisory board of stakeholdes form industry, research and politics, which provides advice on EURAMET on research matters..

3. EURAMET´S ROLE IN THE CIPM MRA

Almost 10 years after its signature, the CIPM MRA has passed through its implementation phase and entered into routine operation. More than 20 000 Calibration and Measurement Capabilities (CMC) from NMIs and other Designated Institutes (DI) all over the world are published [3], almost half of them coming from NMIs and DIs of EURAMET.

Metrology in the non traditional areas like chemistry, clinical analytics, metrology for health, but sometimes also in more traditional areas like ionising radiation is frequently not done in the NMIs, but in other specialised institutes. To mandate these institutes with the establishment of the national measurement standards in their area is an efficient way to complement the national metrology infrastructure. These institutes can participate in the CIPM MRA once they have been designated by their responsible national authority to the BIPM.

The practical measures which guarantee the reliability of the published CMCs, like inter-comparisons, review of the Quality Management Systems (QMS) supporting the CMCs and the review of the CMCs by themselves, have to be carried out by the RMOs. To do this work with the constantly increasing number of participating institutes is a challenge for the RMOs. It requires to develop procedures for a more efficient administration and legally binding rules between EURAMET and the participating institutes which guarantee sustainability and reliability also with this increased number of participants. The framework of a legal entity should facilitate this task, compared to the relatively loose cooperation within an MoU.

4. THE EUROPEAN METROLOGY RESEARCH PROGRAMME – EMRP

4.1. MERA and iMERA

In the era of global trade and strong competition metrology has become a factor of increasing importance for economic growth. Improving existing products or developing new products is putting higher and higher demands on measuring techniques and measuring equipment.

Both fundament and applied metrological research is needed to stay competitive in this global market by developing the measuring techniques needed for innovative products. In recognition of this necessity the NMIs of Europe are spending in the order of 200 M€ annually on research and development (R&D) related activities [4]. Supported through national metrology research programmes more than 2000 scientists and engineers are engaged in these activities.

An analysis of the European metrological infrastructure conducted by European NMIs and supported through the 5th European Framework programme within a project called MERA [4], came 2002 to the conclusion that the most promising way to improve the metrological infrastructure in Europe would be to move towards a better cooperation and even coordination of the national metrology research programmes.

To realise this idea 14 NMIs created in 2005 an ERA-NET supported through the CEC within the 6th Framework Programme. This ERA-NET iMERA [5] (“implementing the European Research Area in Metrology”) started in 2005 with the aim to create the necessary structures and procedures for the execution of a European Metrology Research Programme (EMRP) and to develop its scientific content.

With the establishment of EURAMET (see Sec. 2) and in particular the EMRP-Committee and the Research Council, the implementing structure had been successfully created.

4.2. The EMRP outline

As a second key activity of the iMERA-project a research programme, the “EMRP outline 2007” [6], has been established on the basis of 44 roadmaps developed by the TCs or Focus groups of EUROMET. It is structures into three activity areas:

1) Grand Challenges comprise multidisciplinary metrology research needed to meet key socio economic objectives in the fields health, energy, environment, and new technologies.

2) R&D for applied and fundamental metrology, which recognises the need to address R&D efforts across the traditional disciplines of metrology, including the precise determination of the fundamental constants and a possible redefinition of base units of the SI system.

3) Capacity building, KT and support activities, which comprises, among others, researcher fellowships for scientist.

4.3. iMERA Plus

Recognising the readiness of EURAMET to start a coordinated EMRP the CEC provided EURAMET with co-financing within an ERANET-Plus measure of the 7th Framework Programme. This iMERA-Plus programme happened to be the very first ERANET-Plus measure to be approved by the CEC.

According to the procedure described above, 21 Joint Research Projects (JRP) from selected topics of the EMRP-outline (“SI and Fundamental”, “Health”, “Length”, and “Electricity and Magnetism”) were approved by the EMRP-Committee for funding. The call procedure and the project list was presented to the Research Council which fully endorsed the approach. In December 2007 the project list was submitted to the CEC and approved [7]. The 21 JRPs

have started in the first half of 2008 being financed 1/3 by the CEC and 2/3 by national programmes with a total budget of nearly 65 M€.

4.4. The Joint Research Projects

In the iMERA-Plus programme the process for the elaboration and selection of the research projects to be carried out was based of two basic principles:

1) Excellence criteria

2) Coordination of best available research capabilities

In order to achieve the second principle, a two-stage approach was developed: A sub-programme of the EMRP was launched with a call for "Expression of Interest", where each NMI and DI which wanted to participate expressed its interest describing its specific capabilities and available resources. In a second step, proposals for JRPs were elaborated among the interested NMIs and DIs, where each participant brings in its outstanding capabilities.

These proposed JRPs were then subjected to the evaluation by a team of high-ranking evaluators. In a review conference where representatives of all proposed JRPs and the referees came together, a ranking list of the JRPs was elaborated, based exclusively on excellence criteria.

Thematically overlapping projects are avoided in this way, guaranteeing the optimum use of the available funds. The second positive effect is that the cooperation among the European NMIs and DIs is facilitated and a particular support to the metrological fields is provided where the individual institutes are strong, fomenting in this way the development of centres of excellence.

4.5. Article 169

The CEC has identified the EMRP as a candidate for a so called "Article 169" based research programme. This Article 169 allows the European Union (EU) to co-fund research programmes undertaken jointly by member states of the EU if this is approved by both the European Parliament and the European Council of Ministers (Co-decision). If all goes well a proposal by the CEC to Parliament and Council can be submitted by December 2008. The programme would have a total volume of 400M€ to be spent over a 7 year period and financed in equal parts by the CEC and the national programmes.

This would be a great step ahead for European metrology, as, according to the principles expressed by the CEC, scientific, management and financial integration of the programme would be achieved.

5. FACILITATING NACIONAL METROLOGY INFRASTRUCTURE DEVELOPMENT

Many of the members of EURAMET are from countries where the national quality infrastructure, forming metrology an essential part of it, is still under development. EURAMET sees one of its objectives to support these activities. Advisory support from the experienced NMIs on the one hand and sharing experiences and joint activities among the emerging NMIs on the other hand will increase the efficiency in this development process.

The NMIs from South-East Europe have started with this type of cooperation a few years ago and a couple of joint activities (trainings, workshop, inter-comparisons) are already carried out, supported within the framework of the Technical Cooperation of PTB, Germany.

Discussions within this South-East European NMIs concluded that it would be of benefit for EURAMET to open this cooperation for all members. This proposal was supported by the General Assembly and in Summer 2008 a Focus Group for "Facilitating National Metrology Infrastructure Development" was established. Its first meeting will be in November 2008 in Skopje, FYR Macedonia.

The objectives of the Focus Group are:

1) The promotion and the development of the metrology infrastructure in the countries of its members by an increased cooperation and collaboration to achieve concentration and a synergetic and efficient use of competences and resources.

2) The facilitation and acceleration of the integration of its member NMIs into EURAMET activities. It is not designed to create parallel structures within EURAMET but to accelerate the integration into existing structures and to bridge the gap between small and new NMIs to the leading NMIs.

3) Raising awareness about the development in metrology and quality infrastructure in the countries.

6. CONCLUSIONS AND OUTLOOK

The experience in the first year and a half operating the European RMO as a legal entity EURAMET was very positive. It facilitates the establishment of permanent structures in general. Maintaining an own budget for the basic operation, independent on third party funding, allows to react quickly to upcoming needs and to establish the optimum solutions. The possibility of establishing contracts with third parties, like the European Commission represents an enormous potential for achieving funding for the grand challenges for European Metrology. This has been very successfully initiated with a joint European Metrology Research Programme, co-funded by the European Commission within the ERA-NET-Plus programme.

The visibility of EURAMET to the stakeholder community and to the political decision makers has improved – EURAMET is more and mores addressed to give advice in policy matters and to participate in European fora on Quality-Infrastructure related matters.

It is considered that the legal entity is a good basis to address the present challenges: coordinated European research in Metrology, integrating more and more European institutes into the framework of the CIPM MRA, and to establish structures for an improved and sustainable knowledge transfer between the experienced and the emerging NMIs in Europe.

A great challenge for EURAMET will be to move towards a European metrology infrastructure. The essential elements are the NMIs of each country which form the interface between metrology at the highest scientific level

and the industry and other users of metrology in their society. They have the ability to address the specific needs of their country in an optimum way. The cooperation within the EMRP will on the other hand lead to the development of centres of excellence for the European industry where metrology support at the top level is needed. To integrate an increasing number of DIs is a great opportunity and challenge at the same time and it takes place as well in the framework of EMRP and in the CIPM MRA.

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