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## GLOBALISATION AND THE INTEGRATION OF THE EUROPEAN MEASUREMENT SYSTEMS: THE MERA PROJECT

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**Abstract** – Industry, trade and increasingly the quality of life depend on the ability to make leading edge measurements. However, within Europe the ability to deliver state-of-the-art measurement capability with the confidence necessary to underpin research, innovation and development, is dependent on the metrology infrastructure being able to meet ever-growing demands with resources that are not increasing at a comparable rate. A strategy has been developed within EUROMET to address these issues and this paper describes the MERA project, which will plan the implementation of the strategy.

Keywords: MERA, EUROMET, NMIs.

### 1. INTRODUCTION

Innovation in virtually all scientific and technological fields depends on the ability to make leading edge measurements. Much international trade depends upon effective, consistent measurements and the interoperability of manufactured components and metrological equivalence at the highest level underpins so called legal metrology. As globalisation becomes a reality, the drive for greater consistency from within the measurement infrastructure has therefore increased. The desire for "measured once accepted everywhere", the mantra for measurement in trade, is reflected in the huge efforts that have led to mutual recognition arrangements and multilateral agreements at the highest levels within the measurement, accreditation and trade communities. However the ability to deliver state-of-the-art measurement capability with the confidence necessary to underpin research, innovation, development and trade, is dependent on the metrology infrastructure being able to meet ever-growing demands with resources that are not increasing at a comparable rate. The drivers behind this pressure can be considered as threefold. Firstly new areas of technology are emerging that require metrological support, for example the desire to move nanotechnology from an interesting scientific phenomena to a new key industrial activity. Likewise measurement science is vital if the potential of the emerging biotechnology opportunities are to be exploited. Secondly there are areas of activity such as clinical medicine and food safety that are not in themselves new, but in which the impact and value of metrology are increasingly being recognised. Finally the traditional areas of industry whilst

not necessarily expanding, nor the metrology becoming more widespread, are becoming more complex and placing demands at the leading edge of metrology and measurement science that are ever more costly. One key approach to addressing this dilemma, that is to say the increasing demand with static resources, is to increase the level of cooperation in metrology, both in the research and development effort and in the delivery of the resulting measurement services. EUROMET, the European collaboration between the National Metrology Institutes (NMIs), already has an impressive record of cooperation, with the number of collaborative projects undertaken now numbering in the hundreds.

However to date collaboration has not gone as far as planning either R&D effort or delivery of the resulting measurement services at a strategic level. Over the past few years EUROMET has examined the challenge faced by European metrology and developed a view that a strategic approach is essential for the future. The EUROMET vision was embodied in a project proposal submitted to the European Commissions R&D Framework Programme in 2001. The proposal, addressing metrology in the context of the European Commission's vision for an integrated European Research Area, was selected for funding. The resulting project, "Planning the European Research Area in Metrology ("MERA")" is partly funded by the EC FP5 "GROWTH" Programme<sup>1</sup>, with the NMIs providing a significant input from their own resources.

MERA, in effect, is planning the implementation of the EUROMET strategy to address the issues faced by the highest level metrology community in Europe. The project involves developing the plans to optimise and increase significantly the impact of European metrology research and exploitation by strengthening the coherence of national and EU funded activities.

### 2. THE MERA PROJECT

The EUROMET strategy identifies the need to meet new demands from emerging areas like nanotechnology and biotechnology whilst still supporting traditional areas of work within a budget that is not increasing in real terms.

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<sup>1</sup> Contract G6MA-CT-2002-04012

Therefore increasing the impact from the available resources is essential for the future of European metrology and the wide range of users that benefit from it. In broad terms the MERA project lays the foundations for a coordinated approach to meeting these metrology needs in Europe by optimising impact.

The project commenced in September 2002 and will run for approximately 12 months. The project participants reflect the make up (at the time of the proposal submission) of the EUROMET Executive Committee, augmented by those NMIs not on the Committee but who were contributing to the strategic planning within EUROMET. The seven project partners are the National Metrology Institutes from:

- UK NPL (the coordinator)
- The Netherlands NMI-VSL
- Germany PTB
- Ireland NML-EI
- Sweden SP
- Czech Republic CMI
- Switzerland METAS – (who are participating with national funding only).

The partners are directly supported by a further four NMIs from:

- France BNM
- Denmark DFM
- Italy IMGCI
- Norway JV

who provide expertise and breadth to the project steering committee. However, all EUROMET countries and applicant countries are able to participate in, input to, and benefit from the project through the workshops and the analysis of national metrological priorities.

### 3. THE WORKPLAN

The project divides the work into ten main packages (Fig.1). These are:

- State-of-the-art review of relevant collaborative activity;
- Identification of future trends for metrology research;
- Metrology infrastructure scenarios and decision tool development allowing areas and degree of cooperation to be identified;
- National Metrology Institute Workshop – involving the NMIs from across Europe, addressing issues, elaborating scenarios and presenting models and research trends;
- National review of structures and priorities for collaboration taking due account of national industrial need and issues that hinder greater collaboration;
- A stakeholder consultation at European level to ascertain the end user perspective on potential structural changes in the metrology infrastructure;

- A consultation to ascertain the Newly Associated States (Accession Countries) perspective on potential structural changes in the metrology infrastructure;
- A summary of the findings from the national, stakeholder and Newly Associated States consultations;
- European Research Area Workshop – proposing metrology infrastructure options and research priorities, identifying actions to overcome hurdles;
- Foresight Report and dissemination – summarising and justifying the conclusions of the project, and providing recommendations and roadmap for selected scenarios.

The project is still on-going but has already made significant progress. An evaluation of the current collaboration in European metrology at NMI level has been conducted. Some 80 traceability arrangements are already in place between the NMIs whereby an NMI in one country does not hold a primary standard, but holds a national standard traceable to the primary realisation at another NMI.

Research collaboration remains the strongest element of cooperation, and the EC Framework Programme can clearly be seen historically as a key catalyst in the process. EC support brings not only funds, but also a formal and detailed work programme complete with defined responsibilities, deliverables and of course the discipline of a formal contract with a start and end date for the research activity. Many EUROMET projects are undertaken and completed without this formal EC support, however the risk of project “drift” is noticeably increased. The new EC Framework Programme, for the first time, does not include a dedicated measurement and testing activity, so the metrology community must face new challenges in integrating with wider research efforts.

The MERA foresight study has identified the key metrological research trends for the future, and will enable cooperation to be planned more effectively. Simplified scenarios have been prepared to illustrate the possible options for the future of the high-level metrology infrastructure in Europe. Every effort was made to ensure all options, popular or otherwise, were considered. Thus scenarios examined ranged from the status quo to a single institute for Europe. It is clear from the first workshop that there is a clear consensus amongst the NMIs that collaboration must be increased, though a single institute for Europe is not considered the most appropriate option for the future. This is not surprising; the knowledge transfer (KT) associated with high level metrology has been recognised increasingly as one of the major impacts at national level. Even if R&D is concentrated, and facilities shared, local (national) KT capability is likely to remain a prerequisite. Thus there is a strong rationale for the continued existence of an NMI in each country. Whilst it is too early in the project to be definitive it would seem that a mixture of primary and national standards, coordinated research and greater joint use of facilities is likely to be the most successful and widely supported approach.

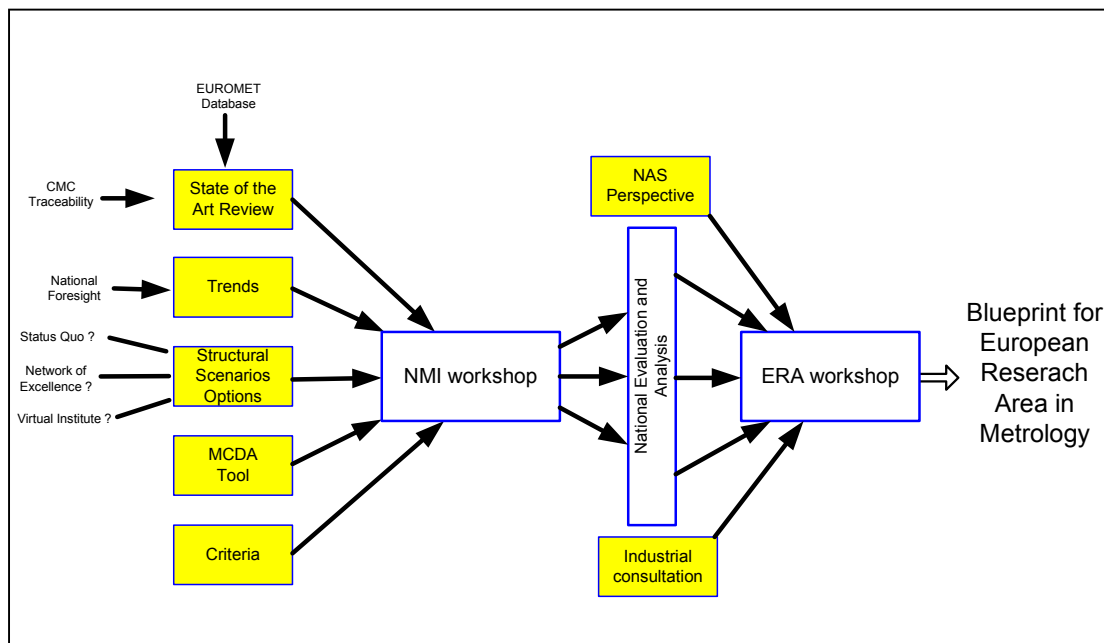


Fig. 1. MERA work plan

The changes implied may impact most dramatically on the larger NMIs. Smaller NMIs in Europe have always focused their resources on the most pressing priorities in their country, relying on the larger NMI capabilities for the balance. In many larger countries the NMIs have historically, by and large, provided a comprehensive range of services and research. The pressure on resources means that this assumption, that all capability must be provided from within the country, is being questioned even in the larger European countries. Whilst smaller countries can identify and concentrate on their priority topics on a unilateral basis, if the larger countries adopt the same approach Europe risks losing vital capability. Thus the larger NMIs either have or are undertaking exercises to develop methodologies to identify their options.

The first project workshop, held in Rotterdam in December 2002, was open to all the NMIs in Europe, and representatives of almost all the laboratories that make up the NMIs (almost 70 laboratories across Europe) were briefed on the project and able to contribute to the debate. The preliminary output of the early workpackages were aired and discussed. The NMIs are now (with national funding) conducting analysis of national metrology priorities, identifying those best addressed collaboratively. Stakeholder consultation and review of the special circumstances of the Newly Associated States is under way to ensure appropriate balance.

The second MERA workshop in June 2003 marks a major step forward in planning the strategic planning process. By bringing together the various strands developed in the project, a comprehensive view can be gained of this issue.

For the first time the NMI funding agents from around Europe also have the opportunity to discuss together and alongside the NMIs the issues they face and to review the possible solutions. The involvement of the national funding bodies is crucial for those NMIs who wish to go much beyond the current level of cooperation. Greater collaboration, for example through the establishment of joint facilities, implies that the issue of joint funding must be explored. In the short term such solutions may not be feasible, and joint planning rather than joint funding may be more realistic.

### 3. CONCLUSIONS

MERA aims to lay the foundations for greater collaboration in research, the shared use of facilities and increased mobility of researchers, as well as more effective exploitation of research. The project is identifying metrology trends and research priorities and has developed decision-making aids to help identify research and services within Europe that would be optimised through greater collaboration. Scenarios for increased collaboration have been studied and are being tested with the stakeholders. A road map is under development that proposes a co-ordinated pan-European approach to meeting high level metrological needs. The real challenge still lies ahead: that is implementing the output of the project.

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