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TrainMiC®: Providing a Tool for the Inter-Calibration of Technical Assessors in Europe in the Area of Chemical Measurements

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Abstract: The TrainMiC® (Training in Metrology in Chemistry) programme is a European programme for Life-Long Learning in metrology in chemistry, which is a truly unique system operational across many parts of Europe (19 countries) *via* national teams. It uses shareware pedagogic tools and the learning content has been harmonised at the European level by a joint effort of many experts across Europe working *via* an Editorial Board. This paper gives an overview of the activities within the TrainMiC® programme where there is an interaction with national accreditation bodies and the European Cooperation for Accreditation. It is the responsibility of the accreditation bodies to ensure that outcome of the assessments is reliable and transparent and is meeting the relevant requirements. The paper explains the potential of TrainMiC® in providing a tool for accreditation bodies to ensure a harmonised level of knowledge in a specific sector of those who are involved in technical assessments for accreditation in the field of chemical measurements. Some use the word inter-calibration to describe this process.

Keywords: Confidence in measurements · European Cooperation for Accreditation · Inter-calibration of assessors · Training in Metrology · TrainMiC

1. Introduction

As a consequence of the EU enlargement, the Institute for Reference Materials and Measurements (IRMM) of the European Commission's Joint Research Centre recognised in 2000 the need to make knowledge regarding metrological issues in chemical measurements available in the countries acceding to the EU. Rather than approaching the matter in an anecdotal way and organising *ad hoc* events, the efforts of several experts were convened to set up a system to create teaching material as well as to disseminate knowledge in the various European countries. The aim and operation of this system is explained in this paper. Since 2000, national teams have been set up and some 4000 people have been trained in 19 countries all across Europe. It is mainly laboratory analysts that come to such training events, but also technical assessors linked to national accreditation bodies attended either to improve their knowledge concerning metrological issues and/or to mingle with laboratory analysts in order to experience what is their level of understanding and what issues they are concerned with.

Accreditation has been developed to ensure confidence in competence.[1] It has become a cornerstone of the European quality infrastructure. Recently a new European Legislative framework has been created that strengthens the role of accreditation (765/2008/EC).[2]

The challenge for the European Cooperation for Accreditation (EA) is to ensure equally credible implementation across the EU. The existing multilateral agreement on mutual recognition between accreditation schemes and reciprocal acceptance of accredited conformity assessment services and results serves this purpose. For the same reason, EA manages a peer evaluation system consistent with international practices. These processes are quite high level processes. For that reason, in its recent development plan, EA has created a specific project entitled 'Harmonisation of the assessment of national accreditation bodies, to ensure effective and uniform approaches by EA members'.[3] It also recognises that *building up of a solid metrological culture and good metrological practices* is important for the various sectors. It is the responsibility of the accreditation body that technical assessors are competent and that their knowledge and practices are harmonised. Accreditation bodies ensure this by training the assessors (theoretical and practical training), then followed by monitoring and by organising regular conventions where these people meet.

TrainMiC® can be seen as a facilitator for inter-calibration in a specific area, namely chemical measurements in accordance to ISO/IEC-17025.[4]

2. The TrainMiC® Programme

The vision of the TrainMiC® programme is to improve the quality of analytical results by promoting and providing a European-wide harmonised training in Metrology in Chemistry *via* a network of national providers sharing resources (materials, training processes).[5,6]

In this way, it forms an open way of European collaboration. IRMM as a European institute offers coordination and provides assistance only for the European 'layer of activities' as explained further on. National network partners provide and organise the

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harmonised trainings in their respective countries and are convinced that by sharing teaching material – in a controlled way – they can in fact provide a better training product to their local communities than if they would only rely on themselves. The individuals in the TrainMiC® network are typically employees of national metrology institutes, academia or research institutes depending on the local or national needs.

The purpose of TrainMiC® is to facilitate the training about metrology in chemistry to laboratory staff, researchers, educators, decision-makers and technical assessors, in order to strengthen the measurement infrastructure.

A system that is so distributed and devolved as is TrainMiC®, can only work if processes and process owners have been clearly defined. This has been done following the principle of subsidiarity, thus establishing what are the responsibilities at the European level, and what are those at the national level.

2.1 *The European Layer*

At the European level, the key processes are the running of a management board and the operation of an editorial board.[5]

The *Management Board* ensures the quality of the TrainMiC® products and related activities and for this creates appropriate procedures, it sets quality criteria (*e.g.* for teaching material, events and trainers) and manages the operation of TrainMiC® *via* a Quality Manual. It is thus responsible for the TrainMiC® quality documents and ensuring their implementation. It also ensures internal and external communication, including public relations. This Board is composed of the TrainMiC® Programme Leader, various persons responsible for the processes and the TrainMiC® Quality Manager.

The *Editorial Board* designs and maintains – *via* annual revision – the harmonised teaching material.[5,7] It is composed of persons actively involved in training and with the necessary educational background in metrology in chemistry. *Via* such a combined European effort, material is produced that does not reflect the opinion of a set of individuals, but integrates knowledge across many countries and sectors. Board members are predominantly selected from the trainers of the national teams. In this way, the Board members have excellent knowledge on how the material is used during the training events. The Board performs according to a set of specific procedures which incorporate a number of checks and balances so that the material is of proper quality and matures during the extensive review process. The Board also takes into consideration input received from national trainers and from course participants.

Every two years, authorised trainers are invited to a common assembly, called a *Convention*. At such an event, they receive an update on changes in the teaching material and they are also invited to give input on the material, based on their own experience. This assembly promotes further harmonisation and alignment of training approaches across Europe.[8]

As the need arises, candidate trainers are trained at a European training-of-trainers event. They are exposed in detail to all the presentations and the attendees learn about the TrainMiC® system and quality assurance issues.

2.2 *National Deployment of the TrainMiC® Programme*

Without a national team, there would be no TrainMiC® activity in a country. It would obviously serve no purpose that a single organisation would provide training across the entire EU. The training courses are provided by the national team as a not-for-profit type of activity, where participants merely contribute to the payment of the cost of organising the event. The reason is that TrainMiC® does not pay staff time of the people involved for the organisation of such events. Trainers are made familiar with the shareware TrainMiC® teaching material by IRMM and on authorisation get a User Licence Agreement which is based on a Decision of the European Commission (dated 17th Dec 2008). This decision recognises the special role that authorised TrainMiC® trainers have and protects the shared teaching material *via* a European Communities copyright. Translation of the shared teaching material is often provided by the National TrainMiC® team and the material is currently available in nine languages.

2.3 *The Teaching Material: Educational Shareware Harmonised at European Level*

The authorised TrainMiC® trainers use presentations to provide theoretical training covering the topics related to metrology in chemistry and the requirements of the related standards and guidelines (*e.g.* ISO/IEC-17025; ISO Guides 34, 35 and 43-1).[4,9,10] They are prepared, updated and approved by the TrainMiC® Editorial Board.

Furthermore, there is a growing library of TrainMiC® examples, which complement the presentations and are practical exercises for different areas of application *e.g.* environmental analysis, clinical analysis, and food safety and quality.

Because the teaching material is a collaborative effort of many individuals, the copyright is established at the European level and is with the European Communities. The material can be used by others in a not-for-profit mode, after prior consent by the TrainMiC® Management Board. All teaching material has a common format and design.

3. The Tools to Harmonise the Understanding of ISO/IEC-17025 by Technical Assessors in a Specific Area

It is far from obvious to create – across different countries and different technical sectors – a common understanding and a common view on a particular standard like ISO/IEC-17025. Neither is it obvious to establish a common implementation practice and culture. It requires a great deal of interaction and communication between the actors involved.

The national accreditation bodies use experts which they train to be assessors. This training focuses on the accreditation requirements and assessment techniques, so as to achieve a harmonised approach. Generally technical questions are discussed within the committee structure of the accreditation body. When necessary, guidelines are issued. Accreditation requirements include traceability and metrological aspects. Efficient tools for the training and harmonisation are therefore needed. It is important that this happens in sufficient detail to be effective, as an example, knowledge and practice on the way to interpret the metrological principles of ISO/IEC-17025 in a certain sector (*e.g. what are acceptable proficiency testing schemes to participate to regarding EU's Water Framework Directive for component X*, or *how to demonstrate traceability for particulate matter in air measurements* …).

TrainMiC® offers a system to enable this. TrainMiC® events can be organised in such a way that trainers interact either with an audience composed of technical assessors, or with a mixed audience composed of assessors as well as laboratory practitioners. Both formats have been shown to bring great value.

4. Training of Technical Assessors in Metrology in Chemistry: Past Achievements and Future Prospects

From the 4000 people that have been trained *via* TrainMiC®, approximately 10% have been people who are regularly involved in performing technical assessments in their country.

On two separate occasions, TrainMiC® events were organised at the European level to expose technical assessors to the harmonised teaching material. More frequently, national teams have taken the initiative to

gather those involved in technical assessment, either in separate sessions or in sessions mixed with laboratory practitioners.

Participants provided very positive feedback. In the homogenous groups (only technical assessors), people can freely ventilate their concerns, personal experience and share best practice. Discussion can also lead to concrete follow up steps. In the mixed groups (composed of practitioners and assessors), both parties can learn from looking at the issues from the point of view of the other.

As a consequence of the above, many national accreditation bodies have therefore developed a close collaboration with the national TrainMiC® teams who have become strategic partners.

Obviously, further in depth development is required. EA is convinced of the need for specialist knowledge and expertise to operate in the different technical sectors and that such know-how is properly and consistently applied to their activities, to ensure valid results.

In this sense, activities carried out in the context of the EAQC-WISE project (European Analytical QC in support of the Water Framework Directive (WFD) *via* the Water Information System for Europe) might provide inspiration.[11] In its Blue Print document, this project recommends that the National Accreditation Bodies should have a process in place to ensure that the technical assessors used in the WFD area have adequate expertise and that EA should define common EU-wide minimum quality criteria applicable to technical assessors that will be carrying out assessment of a WFD monitoring laboratories. This implies to have a system in place to ensure harmonised competence of technical WFD assessors based on appropriate knowledge transfer at EU level. Setting up regular training events, using the TrainMiC® programme, therefore seems appropriate. For the future, a major challenge lies in organising – for different sectors – pan-EU events where technical assessors can receive training, work on case studies, and be exposed to the concrete questions that arise from practitioner laboratories.

TrainMiC® offers a good structure to enable this, as it provides the harmonised teaching material, which is constructed with the input of many technical experts of various sectors. Currently, TrainMiC® is putting in place a system to map the competence of its authorised trainers in the various sectors. This will enable that technical experts can better interact across borders to exchange experience. Plans exist to create an e-learning environment where such a knowledge base is created, for different sectors.

5. Conclusion

TrainMiC® has become the largest and most widespread Life Long Learning tool for harmonised training in metrology in chemistry across Europe. It pools the knowledge and abilities of many European experts into shareware pedagogic tools, that can be used freely but under controlled conditions. The European overlay for this is provided by the Institute of Reference Materials and Measurements of the European Commission's Joint Research Centre, the national deployment *via* national teams.

TrainMiC® has provided training to about 400 people active as technical assessors in accreditation. For this reason, it has become a vehicle to create inter-calibration of technical assessors in the various sectors of chemical measurements.

TrainMiC® has proven to be a sustainable and dynamic system, exactly because it combines flexible national deployment and devolution, with European harmonisation. In future, efforts will be directed to improve the system by initiatives as e-learning and by having a more structural relationship of TrainMiC® and EA.

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[1] *http://www.european-accreditation.org/content/ea/europnetwork.htm.*
[2] Regulation (EC) no 765/2008 of the European Parliament and of the Council of 9 July 2008 setting out the requirements for accreditation and market surveillance relating to the marketing of products and repealing Regulation (EEC) No 339/93, Official Journal of the European Union, 13.8.**2008**.
[3] EA development plan **2008**-2013: Sub-project 1.
[4] ISO/IEC 17025:**2005**; 'General requirements for the competence of testing and calibration laboratories' (*www.iso.org*).
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[8] P. Taylor, E. Bulska, S. Duta, N. Majcen, I. Papadakis, L. Van Nevel, E. Vassileva, *Accred. Qual. Assur*. **2009**, *14*, 343.
[9] ISO Guide 34:**2000**; 'General requirements for the competence of reference material producers' and ISO Guide 35:**2006**; 'Reference materials - General and statistical principles for certification' (*www.iso.org*).
[10] ISO/IEC Guide 43-1:**1997**; 'Proficiency testing by interlaboratory comparisons – Part 1: Development and operation of proficiency testing schemes' (*www.iso.org*) will be replaced by ISO 17043.
[11] *http://www.eaqc-wise.net/Results_deliverables.asp*.