

Impact of Eurachem 25 years of activity¹

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Abstract

A review of the impact of Eurachem to the analytical community since its formation 25 years ago is presented and the review shows that Eurachem is on the right track to fulfil the aim of promotion of good quality in chemical measurements. After 25 years of existence Eurachem today is a pan-European organisation producing materials that are widely used by the analytical community within and outside Europe, and organising workshops that are very well attended. All material, guides, leaflets and workshop presentations, are related to important parts of the measurement cycle, improving the quality of analysis. The work of Eurachem is used in international standards and is well cited in the analytical literature. Eurachem material is today widely accepted by national accreditation bodies through close cooperation at international (ILAC), European (EA) and national levels between Eurachem and accreditation organisations.

Introduction

The aim of Eurachem is to provide a focus for analytical chemistry and quality-related issues in Europe. The main objectives are establishing a system for the international traceability of chemical measurement results and the promotion of good quality practices.

Measurement quality is about fulfilling analytical requirements, which should be based on the intended use of the results. The quality objectives of any analysis can be illustrated by the measurement cycle (Figure 1). One could state that we have good quality when the client can take a correct decision on the basis of the analytical result, $x \pm U$.

The focus of Eurachem has mainly been on the measurement part, the analysis and evaluation work inside the laboratory. The main cornerstones for quality in the measurement part are:

- Metrological traceability
- Method validation
- Measurement uncertainty
- Internal quality control
- Proficiency testing

These are, of course, the principal technical requirements in ISO/IEC 17025.

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² At the time of writing, B Magnusson is the Chair of Eurachem, and S Ellison and M. Patriarca are members of the Eurachem Executive Committee. S. Ellison was also Eurachem Vice-Chair for the period 2004-2006 and Chair 2006-2008.

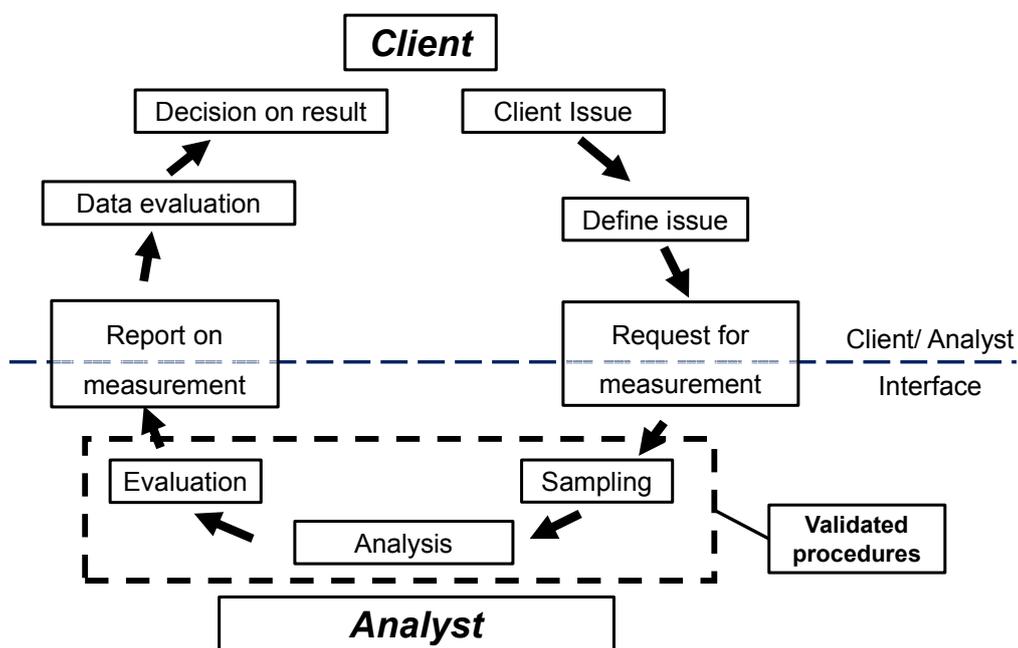


Figure 1. The measurement cycle, starting with a client issue which leads to a request to undertake measurement, followed by sampling (if required), analysis and reporting, and ending with a (client) decision based upon the result. Reproduced with permission from SP Technical Research Institute of Sweden

In recent years the work of Eurachem has been extended to include aspects of sampling and evaluation of the result. For example, the Guide on *Measurement uncertainty arising from sampling* [1] includes aspects of sampling and the Guide on *Use of uncertainty information in compliance assessment* [2] covers evaluation of the result against limits, taking measurement uncertainty into account.

Eurachem has worked extensively on all these quality issues and in this paper we assess the impact that Eurachem has had so far on the analytical community in Europe, that is, analytical laboratories, accreditation bodies, regulatory bodies and other authorities and stakeholders. The history of Eurachem's first 25 years is given in a separate paper in this issue of Accreditation and Quality Assurance.

Assessing the impact of Eurachem

Eurachem works to assist laboratories in improving the quality of analytical measurement. However, over the 25 years since Eurachem was formed many organisations have been working towards the same general objective: for example individual European accreditation bodies, the European co-operation for accreditation (EA), Eurolab, EURAMET (the European Association of National Metrology Institutes), IUPAC (International Union of Pure and Applied Chemistry), CCQM (Consultative Committee for Amount of Substance – Metrology in Chemistry) and of course the laboratories themselves, have all played a part over the last quarter century and it is not possible to provide a simple measure of improvement attributable to any one organisation. Eurachem accordingly monitors its impact in terms of coverage, output, participation in Eurachem events and, more recently, evidence of uptake of its guidance in the literature and in standards issued by other organisations. To

to assess the impact of Eurachem on the analytical community in Europe we therefore will look at the following:

- Eurachem members – Coverage of European countries
- Liaisons
- Impact on accreditation, assessed through accreditation body reference to Eurachem guidance
- Material produced by Eurachem – Guides and leaflets;
 - Number of guides and leaflets
 - Number of translations
 - Use of the Eurachem website, www.eurachem.org, including downloads of guides
- Conferences and workshops organised by Eurachem and its members
- Standardisation
 - ISO standards citing Eurachem guidance documents
- Scientific literature
 - A literature survey of references to Eurachem and citations of Eurachem guidance documents.

Eurachem members

In 2013 nearly all countries in Europe were members of Eurachem. Of the 39 countries in Europe with a population over 0.1 million, 32 were members of Eurachem – see Figure 2.

The list and contacts of organizations serving as representatives in Eurachem is available from the Eurachem Website.

Liaisons – cooperation with other organisations

Currently Eurachem has formal liaison arrangements with the following European organisations: EA, EUROLAB, the Technical Committee of Metrology in Chemistry (TC-MC) within EURAMET, the European Commission, via the Institute for Reference Materials and Measurements (IRMM, one of the seven institutes of the Joint Research Centre (JRC), a Directorate-General of the European Commission), and the Division of Analytical Chemistry (DAC) of the European Association for Chemical and Molecular Sciences (EuCheMS, a network of European scientific and technical societies). On the international level the liaisons are: CITAC (Cooperation on International Traceability in Analytical Chemistry), CCQM, IUPAC and the CODEX Alimentarius Commission (via its Committee on methods of Analysis and Sampling). Informal links, via members of the Eurachem Executive serving in other capacities on the respective committees, are additionally maintained with AOAC International and its Sections, and ISO/REMCO, the ISO Committee on reference materials.

Impact on accreditation

Many laboratories use Eurachem guidance documents in order to prepare for accreditation. It is therefore vital that the information in all the relevant Eurachem material is accepted by EA, as well as the national accreditation bodies. Eurachem therefore has close co-operation with EA as a liaison and as member of the EA laboratory committee. For example, the first version of the guide on accreditation for microbiology laboratories [3] was developed and published as a joint EA and Eurachem guide, and the recently published second edition [4] of the same guide included input from EA. (Note: although the 2013 revision of this Guide was undertaken in conjunction with EA, the 2013 edition is published solely as a Eurachem guide following changes in policy on development and publication of technical guidance within EA). The permanent working group between EA, Eurolab and Eurachem on "Proficiency Testing in Accreditation", currently chaired by Eurachem, has produced several joint guidance documents, including EA 4-18 *Guidance on the level and frequency*



Figure 2 Eurachem membership. Countries in white were full members 2013. Members not shown on the map are Cyprus and Georgia.

of proficiency test participation (2010) and the Eurachem Guide *Selection, use and interpretation of proficiency testing (PT) schemes by laboratories* (2011). Eurachem has similarly contributed to the development of other Guides referenced in Accreditation; for example the Eurolab guidance on management of computers and software in laboratories [5] was developed by a joint committee including Eurachem and EA representatives. Eurachem also maintains liaison with the International Laboratory Accreditation Cooperation, ILAC, in particular through the ILAC Laboratory Committee. In each Eurachem member country there is a Eurachem member organisation and in most cases there is further close cooperation with the national accreditation body.

Impact on accreditation may also be judged by seeking references to Eurachem guidance in published national accreditation body documents. A search for such references was therefore conducted through the 35 EA member websites listed on the EA website. The search used both the search engines on the sites themselves (where available) and a site-specific search using a publicly available search engine. Searches sought the specific word 'Eurachem' in each case. References to 'Eurachem' were individually followed to confirm whether the reference was a citation of a Eurachem guide, whether it appeared in a national accreditation document or in an EA document held on the site, or whether the site only included an informative link to the Eurachem website. This search was supplemented by

enquiry to Eurachem National representatives who examined their national accreditation body documents and in some cases added further references.

Of 34 EA member websites available for searching (one site document library was unavailable) 20 EA members were found either to include reference to Eurachem guidance in at least one of their own published documents or to hold one or more Eurachem guidance documents on their website. Five more EA members were found to reference EA documents (directly or via the EA website) which cite Eurachem guidance, and a further two EA members provided at least a link to the Eurachem website for information.

Material produced by Eurachem

All material produced by Eurachem is made available on the website (www.eurachem.org) for free download. In order that the material produced by Eurachem is widely accepted a detailed procedure has been established on how to develop and revise guides and leaflets. A new document, e.g. a guide, is prepared by a working group. The working group is encouraged to seek comment from Eurachem members and liaison organisations during development, and may additionally arrange workshops to discuss a draft. The number of comment rounds is at the discretion of the working group and depends, for example, on whether the guide is entirely new or a minor revision of previously approved guidance; however, all guides are required to be circulated for comment at least once prior to final approval. The proposed final draft is distributed to members for voting and at that stage members may accept, accept with comments or reject the draft (this is regarded as one comment round for the purpose of meeting the minimum comment requirement). The working group then addresses any final comments and submits the resulting draft to the Executive Committee for final approval. The Executive Committee must be satisfied that adequate consultation has taken place, that there is consensus on the content and that comments at the final stage have been sufficiently addressed. Following Executive Committee approval, guides are published immediately on the website. Hard copy publication may follow at the discretion of the working group. National members may additionally translate guides into their own language and distribute the translation as they see fit. This procedure ensures good quality but, of course, it may take a relatively long time for any guide to be published. As a recent example the revised guide *Accreditation for microbiological laboratories* [4] was published in December 2013 after an intensive four year revision period.

In order that all guides should be up to date, they are reviewed every five years by the responsible working group. The outcome of the review is one of the following decisions: 1) affirm the guide in its present form; 2) undertake revision of the guide; 3) withdraw the guide. Working groups may additionally undertake revision at any time, for example where referenced international guidance or standards change.

Currently Eurachem has twelve guides and six leaflets. Some of the guides are joint work with other organisations such as CITAC or Eurolab. Members of Eurachem have also participated in several other working groups producing guidance material including, for example, the Eurolab 2007 report *Measurement uncertainty revisited* [6] and the forensic validation guide *Guidelines for the single laboratory validation of instrumental and human based methods in forensic science* in preparation by the European Network of Forensic Science Institutes (ENFSI). Eurachem Information Leaflets are short introductions to a guide or to a main quality issue.

Thanks to active Eurachem national members several Eurachem guides are translated to local languages. Languages where today there are two or more guides translated are Czech, Slovak, Italian, Bulgarian, Russian and Turkish. Currently the Eurachem/CITAC guide *Quantifying uncertainty in analytical measurement* [7] has been translated into seven European languages and there is also a Japanese translation available.

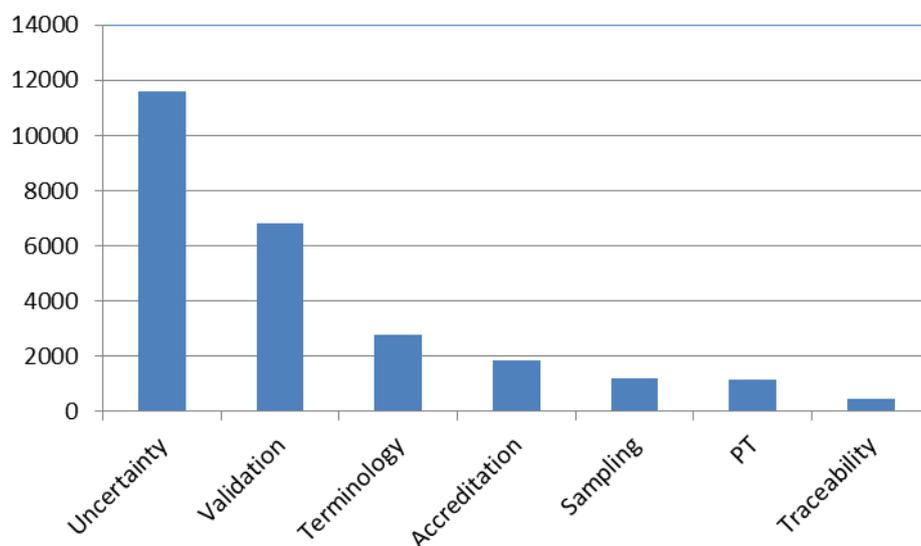


Figure 3 Number of downloads of Eurachem guides during 2012-10-01 to 2013-09-30. The Guides are referred to with a single name. Note that Sampling refers to the guide Uncertainty in sampling.

In order to keep track of the use of Eurachem materials, Eurachem monitors visits to the website and the number of downloads. Figure 3 shows the number of downloads of Eurachem guides from www.eurachem.org in the period 2012-10-01 to 2013-09-30. (Full download data are available only for these seven guides).

Conferences and workshops organised by Eurachem

Eurachem usually organises two international workshops each year. The preferred workshop structure includes invited lectures, short communications, poster sessions and breakout sessions where relevant issues are discussed in detail. In order to plan future events feedback from delegates are collected. During some of these workshops, current draft guides as well as issues that needed further guidance were also discussed in detail. Since the year 2000 there have been 22 international workshops and also several training events in conjunction with the annual General Assembly meetings. The number of participants in each event is normally 50 to 90. The most visited workshop is the PT workshop, held every third year, which currently attracts from 150 to 250 people. The workshops are intended mainly for Europe but in most cases we have international participation e.g. the workshop on internal quality control held in Berlin in 2012 had participants from all continents.

In addition Eurachem members arrange their own national events. At the last general enquiry on numbers of participants in national Eurachem workshops (undertaken in 2008), National members had run approximately 40 events involving over 1600 individual participants during the preceding year. Further information on the impact of Eurachem at a national level can be found in the national reports in the Eurachem Newsletter, issued yearly and available for download from the Eurachem website.

The Eurachem website (currently under “Events/Completed events”) additionally publishes available materials from international workshops including programmes, summary reports, oral or poster presentations in pdf format, and summaries of breakout sessions.

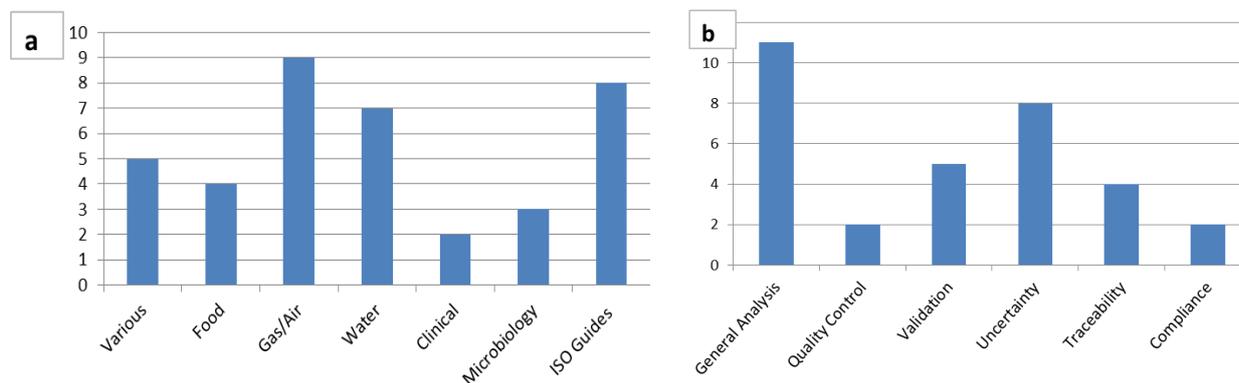


Figure 4 References to Eurachem in ISO documents, (a) number of documents with references for each sector and for general ISO guidance and (b) number of documents by metrological topic where Eurachem has guidance documents.

Standardisation

In order to assess the impact of Eurachem on standardisation we undertook a free text search during December 2013 on the ISO standards at www.iso.org. We found in total 35 ISO documents with reference to Eurachem. In Figure 4a the numbers of references are shown for different sectors and in Figure 4b the numbers of references are shown against metrological issues where Eurachem has produced guidance documents.

For European or national standards, a free text search was not available. However one example where Eurachem guidance on compliance is directly used in a European standard is the nickel release reference method [8] Annex A of which makes informative reference to the EURACHEM/CITAC Guide 2007 on *Use of uncertainty information in compliance assessment*.

Scientific literature

In order to get an overview of references to Eurachem we undertook two simple literature surveys using *Web of Science* from Thomson Reuters and Google scholar.

In *Web of Science* literature search we found 288 citations to Eurachem guides in 266 different papers, mainly in analytical journals. The following journals had more than 10 citations to Eurachem guides: *Journal of Chromatography A/B*, *Accreditation and Quality Assurance*, *Analytica Chimica Acta* and *Talanta*.

Google Scholar lists number of citations to documents. In total 5890 hits were found on there (on 2014-01-02) on a search for documents having Eurachem in the title. More than 600 publications make reference to the Eurachem guide on measurement uncertainty and more than 300 to the Eurachem guide on validation.

Conclusion

The aim of Eurachem is to provide a focus for analytical chemistry and quality related issues in Europe. This assessment of impact shows that Eurachem is on the right track to fulfil this aim. After 25 years of existence Eurachem today is a pan-European organisation producing materials that are widely used by the analytical community within and outside Europe, and organising workshops that are very well attended. All material, guides, leaflets and workshop presentations, are related to important parts of the measurement cycle, improving the quality of analysis. The work of Eurachem is used in international standards and is well cited in the analytical literature. Eurachem material is today

widely accepted by national accreditation bodies through close cooperation at international and national levels between Eurachem and accreditation organisations.

In the future, in order to fulfil the aim of focus for analytical chemistry Eurachem needs to continue to communicate with stakeholders. Today we have an organisation that communicates through many channels to the analytical community: accreditation bodies, liaison organisations, workshop discussions and Eurachem national member meetings. This will ensure that Eurachem will continue to be on the right track for the next 25 years.

Acknowledgement

We wish to thank all those who in many different ways have contributed to the development of the Eurachem network, for their time and efforts and for sharing both their knowledge and their doubts with a wider community, thus making it possible for it to progress.

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