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Nordic Innovation Centre

POSITION PAPER

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NORDTEST VIEWS ON COMPARATIVE TESTING

NORDTEST
a Nordic Innovation Centre brand

Nordic Innovation Centre
Holbergsgate 1, 0166 OSLO
Telephone +47 23 35 45 40
Fax +47 23 35 45 45
info@nordicinnovation.net
www.nordicinnovation.net

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Verification of testing laboratories becomes increasingly important in connection with the principles of openness, transparency and competition declared by the European Community. The verification procedure includes the formal elements of the quality standards, and the assessment of the real technical operations which has to rely on expertise and experience.

Comparative testing has a considerable potential as a practical instrument in the verification process, and hence it is also an important part of the quality assurance work in laboratories. In addition it helps to create cooperation and mutual confidence between laboratories.

However, comparative testing is used too sparsely, and when it is used it tends to be very expensive and time consuming. The results are not used in an optimal way, e.g. to draw conclusions and disseminate knowledge.

An attempt is made here to describe the present situation and to make suggestions for the treatment of some of the problems involved. The content is based to a considerable extent on the presentations and group studies at the EUROLAB workshop on comparative testing in Borås, Sweden 26-27 September 1991.

1. Technical issues

One important problem, and perhaps the most important one, is that the purpose of a comparative testing project often is unclear, and that attempts are made more or less consciously to cover more than one purpose in the same investigation. Some such purposes are

- proficiency testing, i.e. an overall assessment of the capability of a laboratory, including and integrating procedures, equipment and personnel
- verification of methods and equipment as regards stability and reproducibility
- verification of references (materials and standards)[1]

If the purpose of an intercomparison is clearly stated it should also be possible to describe, for each purpose, the conditions, working procedures and expected use of the results.

[1]It is mentioned here that from a testing laboratory standpoint calibration of measuring equipment is not defined as comparative testing.

It should be noted here that in some cases there is a conflict between the desired capability of a test, and the Scientific possibility to reach it. An example is the analysis of very small concentrations of pollu6ons, as dioxins. This may lead to confused evaluations of intercomparisons.

Another difficulty is connected to the fact that different technical areas have to use comparisons under different conditions and with different aims, while the standard procedures and Scientific state of the art almost exclusively stems from the areas of metrology and chemical analysis where statistical analysis of large numbers of results play an important part (e.g. intentional standards as ISO 5725 and ISO 10012). Existing practice and experience should enable the establishment of a corresponding theoretical basis for other areas.

Definitions should be made and accepted procedures should be evaluated and introduced for comparisons in areas where only a few tests on expensive objects can be made in a small number of laboratories, as in fire testing or building technology. Ibis need is clearly indicated in the list of priority areas produced at the EUROLAB workshop (see Appendix 1) or in the work programme of the EC Measurement and Testing programme.

Comparative testing should also be possible to perform simply and on it own merits in small groups of laboratories, where the lower degree of confidence is consciously balanced by the lower cost and the quicker results, which may be of great use as indications to further actions.

2. Organizational issues

Experience shows that intercomparisons often are seriously delayed and that the results are not used as well as they could have been. Further, they tend to be very expensive. Some of the reasons for this have been identified to be:

- The laboratories involved do not get their costs fully covered, and hence the competition with ordinary assignments is unfavourable.

- The large costs which still appear are due to the considerable time spent in planning, detection of mistakes, and starting the investigation with insufficient knowledge. The Scientific background is well established in many places in text books and standards. Still, many groups of unexperienced, or uneducated test engineers start their investigations by "inventing the wheel" anew.

- The intercomparison is, erroneously, treated in a special fashion, not representative for the laboratory, in order to get "better results".

- The logistics are complicated and handled inefficiently. This involves transportation of standards across national borders, slow reporting, damaging of test specimens due to insufficient packaging etc.

Hence, there is a great need for management responsibility, for clear guidelines regarding practical procedures, which are well-known in the laboratories. Independent and accepted organizations (like EUROLAB or NORDTEST) should take on the task to organize intercomparisons in an "assignment-like fashion" and evaluate and disseminate results.

[Up to this point the BCR program (M&T) of the EC has been too concentrated on investigations of inadequate methods, mostly in chemistry and agriculture, and with a too low efficiency and dissemination of results].

Presently, there is an intensive production of new documents going on, based on existing knowledge, unfortunately without covering the needs mentioned above. To a large extent the deficiencies of this considerable double (and triple) work is due to the fact that is produced by competing parties of the accreditation society, by the aid of the standardization organizations, without taking due regard to the experiences and expertise of the laboratories. One example is the WELAC WG 4, and its production of a paper, an extensive one, on proficiency testing in accreditation, at the same time as parallel documents exist or are under production elsewhere[2].

A problem is that these documents both include unnecessary requirements, and are devoid of important, practical advice.

3. Suggestions

Some suggested courses of action to make comparative testing more efficient, and more frequently used, are the following:

- A document defining groups of comparative testing with different purposes and different technical and merits should be produced. This should help greatly to enable comparative tests in important areas, where the classical methods are of limited use.

- A document giving simple and clear technical guidelines for the various groups of comparative testing should be produced, as interpretations of the present standards, as ISO 5725.

- Also practical guidelines on how to perform a comparative test in a correct, practical and ethically non- conflicting way would be of great use, as a complement to the present directives on formal requirements, e.g. the WELAC WG 4-group paper.

In this way it is thought that a much greater percentage of the resources spent could be used in technical laboratory work, and in producing and publishing useful results. Correspondingly, the work used to discuss procedures, mistakes and delays should be possible to decrease.

[2]As the work of ILAC Committee 3 and the draft ASTM standard EI301

It is, however, important that the development of documents is harmonized, so that multiple work is avoided, and that laboratory experts as well as accreditation officers, with active scientific competence, take part in the work. The present situation where e.g. WELAC is producing unilateral documents is most unsatisfactory.

In order for comparative tests to be efficient they have to be attractive to laboratories, either

as giving status or a possibility to take part of important information, or as costcovering assignments. Thus, some of the important parts of the total amount of comparative tests should be given priority, and be planned and carried out by international organizations as the EC or EUROLAB. Financing and contractual conditions, including reporting, should be very similar to those of ordinary assignments.

The evaluation of results and dissemination of the general and important parts of the results should be much more extensive than at present. Also in this case the international organizations should take on a much larger responsibility. So, summing up, the following organizational aims should be achieved:

- Harmonization of the production of standards and guidelines internationally,
- Dissemination of results and knowledge through established channels,
- International organization of intercomparisons regarding proficiency testing and validation of methods. Here, it is important that financing and administration is made analogous to ordinary assignments. Laboratories could contribute by membership in "R-R-associations".

In all these tasks EUROLAB could play an important part, in co-operation with other organizations.

Important areas for comparative testing, as identified at the EUROLAB workshop in Borås 26-27 September 1991

1. Immediate needs

Mechanical test methods, for
- metals
- polymers
- composites

Viscosity pressure, tribological properties

Acoustics

Energy efficiency

Environment, combustion, emission

Software safety

Endurance, ageing

Corrosion (incl ph-measurements, conductivity)

Chemistry, food

Telecommunications

2. Future needs (3-5 years)

Indoor climate. building physics

Performance of electronics, e.g. EMC

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etc

It was underlined that certain areas are fairly well covered, but still attract repeated interest, so that they to some extent take resources away from more imminent needs.

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norden
Nordic Innovation Centre

Return address:
Nordic Innovation Centre,
Holbergs gate 1,
NO-0166 Oslo, Norway

NORDTEST

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Nordic Innovation Centre

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