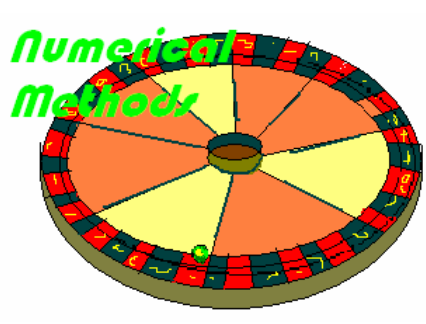
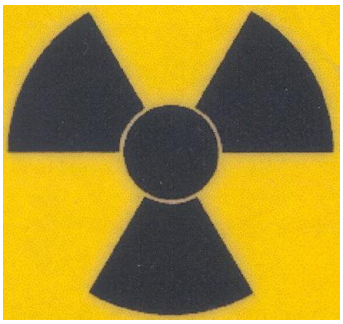
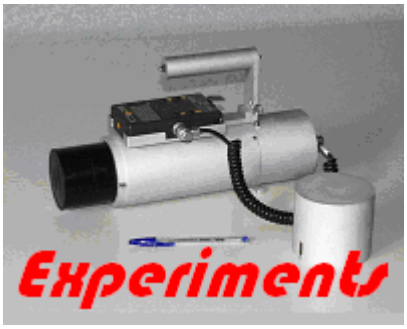
Questionnaire on the status of uncertainty assessment in dosimetry for ionizing radiations







CONRAD

European Union
Coordinated Network for Radiation Dosimetry

Work Package 4

2005 –2007

========== CONRAD - Work Package 4 ==========

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Questionnaire on the status of uncertainty assessment in dosimetry for ionizing radiations

Introduction

Generally, the result of a measurement or a computation is only useful and acceptable if a quantitative indication of the quality of the measured or computed value is provided. In science, one uses the *uncertainty* associated with the value and in technical and industrial practice and in health care applications often the so-called expanded uncertainty as a quantitative measure of that quality.

The assessment of uncertainty or expanded uncertainty as a quantitative measure of the quality of a measurement or test result received in recent years increasing attention. One cause for this is the strive for worldwide mutual recognition of measurement or test results in a global economy and the increased awareness for the need of quality assurance, as for instance reflected by the Standard ISO: 17025, issued by the International Standardization Organisation (ISO, Geneva (CH)). Another cause was and still is the publication of the *Guide to the expression of uncertainty in measurement* (GUM: International Organization for Standardization (ISO), Geneva,1995) that introduced some new concepts and in part a fundamentally different interpretations of uncertainty.

The introduction of the GUM lead to intense and sometimes controversial discussions. However, nowadays, the GUM is increasingly accepted worldwide as the master document for the evaluation of uncertainty. It provides a standard procedure that handles the majority of problems encountered in practice, and – interpreted in terms of Bayesian probability theory– a general procedure that works for the remaining cases. The most important advancement achieved by the GUM is that it accounts for contributions to uncertainty, which arise from the statistics of repeated measurements, termed Type A, and so-called Type B uncertainties. The latter are associated with the values of influencing quantities, which are not measured in a given measurement, but taken from previous measurements, literature, calibration- or testing certificates, product sheets or educated guesses. This is of great importance since Type B contributions generally contribute considerably to the overall uncertainty.

In the field of *dosimetry for ionizing radiation* it is not only necessary to assess uncertainty as a quantitative measure of the quality of a measurement in order to achieve scientific progress but perhaps even more so in applications where in the end human health is at stake. However, in this field one encounters in detail quite some problems in uncertainty assessment. Therefore, one finds in the literature still results without an acceptable statement of uncertainty.

CONRAD Work Package 4 ‘Computational Dosimetry’ (WP4) is devoted to encouraging uncertainty assessment in general and in conjunction with computations in particular. Therefore, WP4 has initiated an action to provide computational exercises and it is distributing a questionnaire in order to establish the status quo and existing problems with the practical realisation of uncertainty assessment and reporting within European laboratories. From the returns, we hope to learn how to better support scientists and better promote an increased use of uncertainty assessment in the field of dosimetry for ionizing radiation.

The replies to the Questionnaire should be returned to Bernd.Siebert@ptb.de by September 15th 2006.

Questionnaire on the status of uncertainty assessment in dosimetry for ionizing radiations

In case of multiple choices, please mark the adjacent box.

Part 1: Identification of the participant

We guarantee anonymity, However if you wish to remain anonymous then just fill out P1.4, but indicate the type of facility you work at.

P1.0 Name:

P1.1 Laboratory:

P1.2 Address:

P1.3 EMAIL:

P1.4 Main task:

Part 2: Do you provide any form of calibration service?

P2.0 ☐ **YES** ☐ **NO**

If your answer is NO please turn to **Part 3**.

Within the field of dosimetry for ionizing radiation, the term "calibration" is used for various activities; please briefly characterize your activity:

Your text:

P2.1 *Do you provide this service*

☐ **in house** ☐ **to third parties** ☐ **both: in house and to third parties ?**

P2.2 *Are you accredited for this service?*

☐ **YES** ☐ **NO**

If your answer is NO please turn to **Part 3**.

If your answer is YES please provide the name of the accrediting organisation:

Your text:

Part 3: Do you rely on a protocol that requires a function or system to stay within a predefined tolerances?

P3.0 ☐ **YES** ☐ **NO**

If your answer is NO please turn to **Part 4**.

If your answer is YES please provide a reference of this protocol. The term "protocol" is well-coined, however, here we include any form of recommended procedure that is used for quality assurance:

Your text:

Part 4: Do you assess uncertainty?

P4.0 ☐ **YES** ☐ **NO**

If your answer is NO please turn to **Part 5**.

P4.1 *Do you for that purpose use*

☐ **the GUM** ☐ **other guidance** ☐ **your own procedures?**

If your answer is not "**the GUM**" please provide a reference to the "**other guidance**" or a brief description of "**your own procedures**":

Your text:

P4.2 *Do you consider contributions other than those derived through statistical methods in your uncertainty assessment?*

☐ **YES** ☐ **NO**

If your answer is YES please list some examples.

Your text:

P4.3 *Can you provide a copy of reports or papers in which you assess uncertainties?*

☐ **YES** ☐ **NO**

If your answer is YES please cite these documents, or –preferentially– provide a copy.

Your text:

P4.4 *Do you use uncertainty (or variance) analysis to optimize your measurement?*

☐ **YES** ☐ **NO**

If your answer is YES please provide a brief description.

Your text:

Part 5: Comments and remarks

Of interest are for instance comments and remarks on

- your experience with the GUM or other guidance documents or the protocol used
- your opinion on possible reasons for the still frequent lack of uncertainty assessment
- how to improve this situation
- the need for quality assurance
- exaggerations of quality assurance
- and on anything that you feel is relevant in the context of uncertainty assessment.

Your text:….