BOUNDARIES OF METROLOGICAL TRACEABILITY

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Abstract

The general association of the term (metrological) 'traceability' with the concept of relating measurement results to 'higher level' references is well established. However, there exist in practice a variety of interpretations as to what actually constitutes traceability of a measurement result. This is because of the complexity of the concept, encompassing diverse issues such as what the references can be (including how 'higher level' they must be, and whether 'intrinsic standards' and measurement processes or procedures are credible 'higher level' references), how 'direct' the comparisons in a traceability chain have to be, what the role is of measurement uncertainty in establishing traceability (and vice versa), and the implications of possible multiple chains for establishing traceability of the same measurement result. In addition, for measurement results where the measurand is a function of several input quantities (and influence quantities), there is the question of the need for all of the measured values of these quantities to themselves be traceable to appropriate references. The meaning and usefulness of the expression "Traceability to the SI" draws different opinions, as does the relationship between "traceability" and "equivalence" (as described in the BIPM MRA). This paper explores these issues, and the related question: When is it metrological traceability, and when is it something else?

NOTE: Definition of "traceability" from the *International Vocabulary of Basic and General Terms in Metrology*, ISO, 1993: "property of the result of a measurement or the value of a standard whereby it can be related to stated references, usually national or international standards, through an unbroken chain of comparisons all having stated uncertainties".

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