



The role of government in a National Metrology System

National Metrology System (NMS) overview

A national metrology system comprises:

1. the institutions, both public and private, that carry out the metrology activities
2. the policies to be carried out by those institutions, brought together in a national metrology policy
3. the appropriate legal and regulatory framework that establishes the institutions and policies
4. the practices needed to support and enhance the metrology activities.

It is important to first understand what constitutes metrology activities for which the NMS must cater. Metrology activities fall into the areas of scientific metrology, industrial metrology, and legal metrology.

Metrology activities

- **Scientific and industrial activities include:** maintenance and dissemination of national measurement standards and of certified reference materials; conducting research into new methods of measurement; calibration of instruments and provision of reference materials; contract testing and analytical services; and training in metrology. In practice, most legal metrology activities are underpinned by scientific and industrial metrology, and the needs of legal metrology help to set the activities of scientific and industrial metrology.
- **Policy-making activities in legal metrology include:** setting the national policy on the structure and funding of public metrology institutions, both scientific and legal; setting the role of metrology within the National Quality Infrastructure; determining the national policy for areas to be regulated and how that regulation should be accomplished; setting the policy on engagement with international and regional metrology bodies; setting the policy on public funding related to metrological controls and documentary standards for measuring instruments subject to legal or regulatory controls and prepackaged products; and setting the policy on public funding of research into improvements in measuring techniques.
- **Other legal metrology activities include:** advice on legislation and the standards it refers to; the various activities of type approval (registration, testing and evaluation, conformity of measuring instruments); carrying out pre-market conformity assessment of measuring instruments; verification, in-service inspection, and post-market surveillance of regulated instruments; and inspections of prepackaged products.

Institutions within the National Metrology System

At the core of an NMS there should be an authority in the government (here referred to as the *Central Government Authority* or CGA) that is unambiguously in charge of the national metrology policy and coordinating the actions of other parts of the government related to metrological issues. The CGA is usually the budget holder responsible for the government support provided to those parts of the NMS that are publicly funded. This authority should be responsible for much of the policy-making activities stated earlier, as well as coordinating metrology activities that are relevant to other parts of the government. A *National Metrology Institute* (NMI) is important for the scientific aspects of metrology; it has the responsibility of developing and maintaining national measurement standards and disseminating the SI units. NMIs serve as the national focus on measurement science, providing leadership in nation wide and world-wide cooperation relating to metrology. The NMI engages in the regional and international metrology systems. The world-wide metrology community ensures that measurements are accurate, stable, comparable, and coherent. It is also necessary for national authorities or institutes to carry out *legal metrology activities*. This is often the responsibility of the NMI, but in other jurisdictions the activities may be distributed among several institutes or authorities specializing in different fields, with appropriate coordination. Many legal metrology activities (such as prepackage inspections or instrument validation) require implementation at a local level. Some metrological services, such as calibrations within industry or accreditation of testing laboratories, are more appropriately implemented by the private sector.

National metrology policy

The CGA should be responsible for developing a national metrology policy. This development should begin with a report on the status of metrology in the country, which is then submitted to the highest level of government that will be making the decision on the authorization of the NMS. This report should include an economic analysis of the resources required for implementing and operating the proposed NMS. The evaluation of the status and goals should utilize national expert bodies and/or international experts. Consideration should be given to the specific institutions and legal and regulatory framework envisioned in the NMS; there exist many examples of States which have successful national measurement systems whose framework can be used as a guide.

Legal and regulatory framework

Laws and legal requirements interact with metrology in two distinct ways: first, by providing the framework within which metrology in a country or economy operates, and second, through regulations relating to trade, health, safety and environmental protection, which set measurement-based requirements and requirements for measuring instruments used for such purposes. National measurement standards are a key part of the national metrological infrastructure, and a system of national measurement standards should be set up to maintain and disseminate legal units in order to meet a country's needs. These standards should either be a primary realization of the SI, or metrologically traceable through calibration under the CIPM MRA to the primary realization maintained by another country. In broad terms, metrological traceability to the SI is required for the application of any laws and regulations prescribing requirements on measurements, measuring instruments, or on prepackages.

A country's national metrology system is a key part of its National Quality Infrastructure. This requires that the national metrology system should work in close collaboration with the national institutes responsible for accreditation, standardization and conformity assessment.

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For further information:

This insert has been developed from the BIPM and OIML joint publication:
National Metrology Systems - Developing the institutional and legislative framework.

For more complete information, please refer to this document and its references.
The document is available through the BIPM and OIML websites.

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