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Data Management and Utilization of National Metrology Institutes (NMIs) in the Republic of Korea

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National metrology institutes (NMIs) serve to establish measurement standards for their respective nations and disseminate these standards to end users, including various industries. Through this process, NMIs facilitate freedom in economic activities by overcoming technical trade barriers through compliance with the International Committee for Weights and Measures Mutual Recognition Arrangement (CIPM MRA). Countries participating in the MRA recognize each other's calibration and measurement capabilities, enabling the NMIs of these nations to gain international recognition for their measurement results based on mutual trust. Consequently, NMIs play a crucial role in producing and disseminating credible research data grounded in traceability, high accuracy, and reliability.

The Korea Research Institute of Standards and Science (KRISS), the NMI of the Republic of Korea, categorizes and manages its research data into four distinct types. First, KRISS produces research data through its research and development pursuits that it undertakes as a government-funded research institute. These data are managed on KRISS's data management platform (DMP) and are also linked to Korea's national research data platform, 'DataOn'to be made publicly available as open data for nationwide utilization.

The second category involves measurement data used to establish national measurement standards, ensuring reliability and transparency through international key comparisons between countries. Calibration and measurement capabilities (CMCs) of individual countries are registered in the CIPM MRA database (KCDB) of the International Bureau of Weights and Measures (BIPM). Additionally, these measurement standards are managed as legally recognized research outputs of national R&D projects.

Third, national reference data are certified data derived from scientific analyses that evaluate the accuracy and reliability of measurement data and information. These data are produced by relevant organizations and data centers in various fields, such as physics, chemistry, biology, medicine, and materials science. Managed as research data for continuous and repeated use, national reference data are made available through the national research data platform.

Lastly, measurement data used to verify measured values on calibration certificates are integrated into a system for issuing digital calibration certificates (DCCs). A dedicated platform has been established to ensure that relevant measurement data are provided alongside calibration certificates when issued.

This study examines the characteristics of the four aforementioned research data types and explores methods of collecting, storing, and managing each type of data. Additionally, this study reviews case studies of research data utilization, namely the application of the Korean standard time as national measurement standard data for terrestrial navigation systems and the implementation of brain magnetic resonance imaging data as standard reference data.

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