

UKRAINE NATIONAL QUALITY INFRASTRUCTURE GAP ASSESSMENT

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ABBREVIATIONS AND ACRONYMS

AA	Association Agreement
ACAA	Agreement on Conformity Assessment and Acceptance of Industrial Products
BIPM	Bureau International des Poids et Mesures/International Bureau of Weights and Measures (bipm.org)
BLA	Bilateral Agreement
CAB	Conformity Assessment Body
CEN	Comité Européen de Normalisation/European Committee for Standardization (cen.eu)
CENELEC	European Committee for Electrotechnical Standardization (cenelec.eu)
CIPM	Comité International des Poids et Mesures/International Committee for Weights and Measures of the BIPM
CMC	Calibration and Measurement Capability
CMU	Cabinet of Ministers of Ukraine (kmu.gov.ua)
COOMET	Euro-Asian Cooperation of National Metrological Institutions (coomet.net)
DCFTA	Deep and Comprehensive Free Trade Area
DI	Designated Institute
DSSU	Derzhspozhivstandard/State Committee for Technical Regulation and Consumer Policy
EA	European Co-operation for Accreditation (european-accreditation.org)
EN	European Standard
ETSI	European Telecommunications Standards Institute (etsi.org)
EU	European Union (europa.eu)
EURACHEM	Eurachem (eurachem.ul.pt)
EURAMET	European Association of National Metrology Institutes (euramet.org)
EUROLAB	European Federation of National Associations of Measurement, Testing and Analytical Laboratories (eurolab.org)
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
GoU	Government of Ukraine
IAF	International Accreditation Forum (ifa.org)
IEC	International Electro-Technical Commission (iec.ch)
IFC	International Finance Corporation (ifc.org), a member of the World Bank Group

ILAC	International Laboratory Accreditation Cooperation (ilac.org)
ISO	International Organization for Standardization (iso.ch)
IT	Information Technology
LMIU	The Legal Metrology Institute of Ukraine contemplated herein
MEDT	Ministry of Economic Development and Trade of Ukraine (me.gov.ua) (including other former names of this ministry)
MEDT TRD	MEDT Technical Regulations Department
MIU	The Metrology Institute of Ukraine contemplated herein
MoJ	Ministry of Justice of Ukraine
MoU	Memorandum of Understanding
MRA	Mutual Recognition Arrangement
MSB	Market Surveillance Body
NAAU	National Accreditation Agency of Ukraine (naau.org.ua)
NMI	National Metrology Institute
NQI	National Quality Infrastructure
NSB	National Standards Body
NSC	National Scientific Center
OIML	Organisation Internationale de Métrologie Légale/International Organization for Legal Metrology (oiml.org)
PIU	Project Implementation Unit
PT	Proficiency Testing
QA	Quality Assurance
R&D	Research and Development
RIA	Regulatory Impact Analysis
SE	State Enterprise
SI	Système international d'unités (International System of Units)
SME	Small and Medium-sized Enterprise
SSUFSCP	State Service of Ukraine on Food Safety and Consumer Protection
SWOT	Strengths, Weaknesses, Opportunities, Threats
TBT	Technical Barriers to Trade
TR	Technical Regulations
UkrCEPRO	Ukrainian Certification System

UkrNDNC	Ukrainian Scientific-Research & Training Centre for Standardization, Certification & Quality Problems (ukrndnc.org.ua)
UME	National Metrology Institute of Turkey
ViM	Vocabulary in Metrology
WBG	World Bank Group (worldbank.org)
WELMEC	European Cooperation in Legal Metrology (welmec.org)
WTO	World Trade Organization (wto.org)

ACKNOWLEDGMENTS AND DISCLAIMER

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The findings, interpretation, and conclusions expressed herein do not necessarily reflect the views of the Board of Executive Directors of the World Bank or the governments they represent. The World Bank does not guarantee the accuracy of the data included in this work.

INTRODUCTION

As part of ongoing cooperation with the WBG, the Ministry of Economic Development and Trade of Ukraine (**MEDT**) requested that WBG conduct an NQI Market Gap Assessment for Ukraine (**Assessment**) to inform various reform initiatives being implemented by the Government of Ukraine (**GoU**). The Assessment is aimed at evaluating market gaps between supply of and demand for quality assurance (**QA**) services in Ukraine and includes analyses of the current status and capabilities of facilities providing QA services in Ukraine and of producers' demand for such services, particularly in relation to European Union (**EU**) market access.

The Assessment was carried out using factual information received from various stakeholders in Ukraine as well as from publicly available documents and data. The Assessment also benefited from previous relevant report and studies prepared by the WBG, namely:

- Yacoub, Max; Senchuk, Bohdan; Tkachenko, Taras. 2001. *Ukrainian enterprises in 2000: an IFC survey of Ukrainian enterprises*. Washington, DC: World Bank.
<http://documents.worldbank.org/curated/en/770531468111881784/Ukrainian-enterprises-in-2000-an-IFC-survey-of-Ukrainian-enterprises>
- World Bank. 2008. *Ukraine - Technical regulations: ensuring economic development and consumer protection*. Washington, DC: World Bank.
<http://documents.worldbank.org/curated/en/483761468111878654/Ukraine-Technical-regulations-ensuring-economic-development-and-consumer-protection>.
- M.N. Frota, J.L. Racine, F. Blanc, P. Rodrigues, S. Ibragimov, D. Torkhov, S. Osavolyuk. 2010. "Assessment of the Ukrainian Quality Infrastructure: Challenges Imposed by the WTO and Commitments to EU Accession," *Key Engineering Materials* 437: 611-615.
- World Bank. 2009. *Investment climate in Ukraine as seen by private businesses*. Washington, DC: World Bank.
<http://documents.worldbank.org/curated/en/477881468128996454/Investment-climate-in-Ukraine-as-seen-by-private-businesses>.

The Assessment's conclusions and recommendations aimed to help the Government of Ukraine prioritize specific legal and institutional reforms, identify needs for upgrading its NQI facilities, and inform financial needs to implement such reforms.

STRUCTURE OF THE REPORT

The Report has the following structure:

- the Executive Summary gives a summary of concepts used, observations, findings, and recommendations and should suffice for a quick understanding of Ukraine's NQI;
- Chapter I describes the existing state and recent development of Ukraine's NQI;
- Chapter II lays the foundations for a desired state of Ukraine's NQI;
- Chapter III sets out the gaps identified;
- Chapter IV proposes reform recommendations;
- Chapter V estimates needed investments and suggests impact assessment; and
- the Conclusion recaps the main messages.

METHODOLOGY

This Assessment was carried out in six steps, which assessed:

1. the desired state of NQI;
2. the current state of NQI;
3. the gaps between the current and desired states of NQI;
4. the steps required to close the identified gaps and recommendations for reform;
5. the investment needs based on the suggested recommendations and the absorption capacity of NQI organizations; and
6. the applicable impact assessment methodology.

The first step of the gap analysis study was to determine the reference conditions against which the gaps may be identified. For this purpose, the “desired state” of NQI is a situation in which NQI’s economic and social benefits are maximized. These benefits can be deduced from the goals of GoU reforms, which aim at sustainable development through increased exports, improved competitiveness, and a growing private sector and small and medium-sized enterprise (**SME**) share in the economy.

The role of NQI in Ukraine’s economy and society can be described in the following five areas:

1. Development of Science and Technology

As one of the major elements in NQI, metrology possesses considerable infrastructure in measurement, and thus is a very good source of know-how for the development of science and technology. The interaction of metrology institutes with other research and development organizations yields a considerable input to research in science and technology.

2. Product Development

In developed countries, NQI organizations—especially metrology, and sometimes product certification bodies—play a significant role in developing new products in terms of design, production techniques, and material development, as well as testing during production.

3. Product Compliance

The international trade system—through World Trade Organization (**WTO**) agreements as well as through EU requirements—has strong rules for exported goods to comply with standards and technical regulations (**TR**). NQI is the major tool to demonstrate this compliance.

4. Market Protection

A fair market and a well-working competitive environment are critical for enhancing the quality of products and are prerequisites for foreign investments.

5. Consumer Protection

Measurements and certification play a very crucial role in consumer protection, especially in health, safety, and trade.

Every government has different priorities; therefore, NQI’s contribution to the above-mentioned five areas differs in each country. Due to the importance of international trade in a globalized world, product compliance is of primary importance to most governments, including the GoU.

The reference conditions developed for Ukraine's NQI assessment can be split into two parts as "necessary conditions" and "sufficient conditions":

1. Necessary Conditions

For Ukraine, compliance with the general requirements of international trade is an absolute necessity for export-led economic growth. Ukrainian producers must be able to have their export products certified at low cost in order to be competitive. The GoU places top priority on compliance with the requirements of international trade determined by EU and WTO rules and practices. Ukraine is already a WTO member and is trying to increase exports to the EU under the Ukraine-EU Association Agreement (AA) and Deep and Comprehensive Free Trade Area (DCFTA).

The main rule in international trade is "certified once, accepted everywhere." In accordance with this rule, products must be properly tested and certified once by an internationally recognized body. With this "license to market," a product may be sold in any country participating in the relevant trading system. The general requirements of international trade (common to both the WTO and the EU) are the following:

- Accreditation bodies must be independent from other NQI institutions.
- Metrology, accreditation, conformity assessment, and standardization bodies should not be involved in developing TR, mandatory standards, or other regulatory activities.
- Metrology, accreditation, and standardization bodies should be free from political interference and be able to respond to market needs and represent their countries in relevant international organizations.¹

In addition to these general requirements, trade blocs such as the EU have their own rules (in the form of regulations, directives, and standards), so any country that wants to export to a given trading bloc has to fulfill such bloc's requirements. The condition is called "necessary" since if these conditions are not met, Ukraine's international trade will have serious technical problems, thus increasing the cost of certification of Ukrainian products and decreasing their competitiveness.

2. Sufficient Conditions

Compliance with the international standards regimes of the WTO and EU will support the development of Ukraine's economy by ensuring that it produces and exports high-quality products while protecting Ukraine's domestic consumers from low-quality, non-complying products. As a result, Ukraine's economy will generate more high-value and high-quality exports, generating more revenues and taxes, and investing more for the protection of Ukrainian consumers as well as exporters. This condition is called "sufficient" because the previous "necessary condition" is not sufficient to sustain economic development, since it has nothing to do with production processes and the nature of products.

¹ Jean-Louis Racine, ed. 2001. *Harnessing Quality for Global Competitiveness in Eastern Europe and Central Asia*. Washington, DC: World Bank.

In addition to the classical role of NQI, namely, to make sure what is done complies with the rules and regulations, NQI has another role: to improve production processes for high-quality and technologically-advanced goods. Rather than erecting barriers to innovation and product development, NQI should encourage and support production of better products.

Fortunately, the use of mandatory certification and standards is rapidly decreasing in Ukraine and, as a result, more space is open for innovative, high-value, high-technology products. However, considerable improvements are needed in NQI in order to support Ukrainian industry to produce better-quality products.

EXECUTIVE SUMMARY

Ukraine has inherited its NQI from the Soviet Union. With independence, Ukraine started to reform its NQI in line with the changing political, social and economic structure driven by international trade agreements. Starting in 2001, attempts to comply with the WTO Technical Barriers to Trade (TBT) Agreement have accelerated, and the concept “technical regulation” (TR) was introduced by the first set of new laws that started to change the whole NQI system. Transformation from the Soviet-era system of mandatory standards, verification, and weak accreditation to a new system of TR, calibration and verification, strong accreditation and conformity assessment processes has started. As part of the initial reform process, the National Accreditation Agency of Ukraine (NAAU) was established as a separate entity from the State Committee for Technical Regulation and Consumer Policy (DSSU). In principle, NAAU took over accreditation responsibilities (mainly for certification purposes) from DSSU. In all other areas, the institutional conflict of interest persisted, as remaining functions were still with DSSU until 2011, when a new phase of major reforms started. During that phase, the whole of Ukraine’s NQI was transformed to a modern system, which operates today with some gaps and shortcomings. However, the change in legislative framework was too fast for many NQI organizations. Thus, major reforms of NQI organizations are needed to match with new legal framework.

The Assessment has assessed the reference conditions against which gaps are identified. The main objectives relevant to NQI are to comply with the requirements of international trade as determined by EU and WTO rules and practices, and, in doing so, to facilitate sustainable development based on increased exports, more competitive products, and a larger contribution to gross domestic product (GDP) by the private sector and SMEs.

The Assessment then defines the necessary and sufficient conditions for the desired state. Compliance with the requirements of international trade as determined by EU and WTO rules and practices is a necessary condition to sustain development of the economy by producing and exporting high quality products and to protect the domestic market from low-quality, non-complying products.

CURRENT STATE OF UKRAINE’S NQI

Ukraine’s NQI consists of a technical regulatory system; standardization, measurement and certification infrastructures; and accreditation, conformity assessment, market surveillance, and inspection systems. There are three groups of NQI organizations in Ukraine: regulatory bodies that prepare TR, market surveillance bodies (MSBs) that enforce the implementation of TR, and service providers that provide services which are needed to assure quality vis-a-vis certain standards and/or TR. Service providers are subdivided into *core service providers* (standardization, accreditation, and metrology organizations, including calibration) and *other service providers* (conformity assessment bodies such as measurement laboratories, certification and inspection bodies). Core service providers are under MEDT; other service providers exist in both the public and private sectors.

The structure of Ukraine’s NQI is consistent with accepted international practices and there are no major problems regarding international recognition of elements of Ukraine’s NQI.

The state of an NQI can be assessed from two perspectives:

1. Effectiveness of NQI

- Fulfilling the necessary condition (complying with the requirements of international trade)
- Fulfilling the sufficient condition (contributing to the economy and society by actively participating in the development of new or improved products or services)

2. Sustainability of NQI

Regarding the effectiveness of Ukraine's NQI, there are no serious problems in fulfilling the necessary condition (complying with the requirements of international trade). However, there are serious questions as to whether Ukraine's NQI contributes to the economy and society by increasing economic growth and citizens' wellbeing and improving products and services (the sufficient condition). Ukraine's NQI is a legitimate, large network with considerable management experience, infrastructure and logistics. Unfortunately, these resources are mostly utilized to only make sure that products are tested properly and comply with the relevant requirements. The utilization of the NQI's experience in management, infrastructure and logistics network could be put to more productive use supporting industry to produce higher-value, more innovative products. This concept is discussed in various parts of this Assessment. In order to achieve the GoU's objectives of increasing the competitiveness of Ukrainian producers in export markets and developing sustainably, it is necessary to change the role of Ukraine's NQI from its existing, passive, post-production state to a proactive system that feeds into innovation and the design and production of higher-value and technologically advanced products.

Regarding the sustainability of Ukraine's NQI, some of its physical premises to house laboratories are not sufficient (lack of space, old buildings, poor environmental conditions). Most equipment is old and problematic to maintain and staff lacks sufficient foreign language skills and experience with modern equipment. The NQI also has some operational limitations in the areas of market surveillance and product testing. The system suffers from weaknesses in perception and awareness regarding the nature, operation and social and economic role of NQI. Finally, there are issues regarding mentality and culture for some NQI processes and weaknesses in the institutional development of some NQI organizations.

DESIRED STATE OF UKRAINE'S NQI

The desired state of Ukraine's NQI determines the reference conditions, against which the gaps in the current system are identified, based on good international practices. The desired state is aimed at obtaining maximum benefits for the economy and society. As stated above, the Assessment defines the desired state as one that both complies with the requirements of international trade as determined by EU and WTO rules and practices (necessary condition) and sustains the development of the economy by producing and exporting high quality products and protecting the market against low quality, non-complying products (sufficient condition).

The role of NQI in Ukraine in the desired state consists of (i) core NQI functions (relating to conformity assessment of finished products or services) and (ii) supplementary NQI functions (contributing to the development of new products, materials or services or improvement of existing ones). A detailed description of the desired state of Ukraine's NQI is provided in Chapter II.

GAPS IN UKRAINE'S NQI

The development of any NQI occurs in three stages:

1. Compliance with international trade rules and international recognition
2. Generating added value to customers
3. Generating added value to economy and society

In every economy, the relative importance given to these stages varies depending on the perception and expectations from NQI and its organizations. The business excellence self-assessment models and discussions with various stakeholders carried out as part of this Assessment suggest that Ukraine's NQI is approximately 40 percent dedicated to stage 1 (compliance), 20 percent dedicated to stage 2 (adding value to customers), and 40 percent to stage 3 (adding value to the economy and society).

In stage 1, the objective is for NQI-related processes to be sufficient for the requirements of international trade. This is achieved by having a proper legal framework, properly established NQI bodies, an operational NQI system, membership in international organizations and signing of mutual recognition agreements between these organizations. As per available information, it can be assumed that Ukraine has achieved approximately 95 percent of this. Main areas for improvement are full membership in international metrology organizations and active participation in technical committees, notably consultative committees of the International Committee for Weights and Measures (**CIPM**).

In stage 2, the objective is comprehensive stakeholder awareness of NQI functions, such that all stakeholders understand the benefits NQI is generating for Ukraine. The Assessment estimates that Ukraine has achieved approximately 50 percent fulfillment of this stage, as noncompliance is observed, detected, or sensed in certain areas.

In stage 3, the objective is to move beyond core NQI functions to generate more added value to society and economy. The Assessment estimates that Ukraine's fulfillment of this stage is around 20 percent.

In summary, it can be estimated that Ukraine's NQI is approximately 56 percent effective at present and its contribution to GDP can be estimated at the level of about US\$4.5 billion annually. If the desired state of NQI is achieved, it is expected that the fulfillment ratios of these three development stages will be 100 percent, 80 percent, and 75 percent, respectively; thus, overall effectiveness could reach about 86 percent.

There are 84 observed gaps (using "sufficient condition" as a reference), grouped in 5 major areas:

1. Gaps in concept, operations and outputs
2. Gaps in infrastructure and capabilities
3. Gaps in awareness, expectations and perception
4. Gaps in coordination
5. Gaps in funding

The identified gaps are mostly related to institutional structure and operational framework, with only a few problems observed with regards to legal framework, conflict of interest issues and international recognition.

Special attention will be paid to decision-making systems for management of core NQI organizations such as accreditation, metrology, standardization, as well as to overall coordination of NQI activities, including TR and market surveillance.

The main limitations for the successful implementation of NQI reforms are:

- Availability and suitability of laboratory and other space
- Time and funding needed for construction or renovation of facilities
- Foreign language skills and trainability of staff
- International procurement, maintenance and traceability costs
- Delays in decision making

RECOMMENDED REFORM ACTIONS

A road map to address the observed gaps is presented in the form of recommended steps to be taken in the short and long terms, as set out in the chapter on Recommended Reform Actions for the Transformation of Ukraine's NQI.

Short-term recommendations are proposed as a program of 50 Quick Wins out of 11 short-term activities. Each of these short-term activities can be implemented in fewer than three years and generate considerable benefits at reasonable cost:

- Prepare a detailed action plan for long-term reforms
- Complete remaining required elements of compliance and international recognition
- Encourage institutional development of NQI organizations
- Assess the effectiveness of the legal system
- Resolved perceived conflict of interest issues
- Increase confidence in market surveillance
- Increase efficiency of core NQI organizations
- Increase the effectiveness of the NQI system
- Raise awareness about NQI role and benefits
- Make access to NQI-related information easier
- Enhance cooperation with research and development (**R&D**) establishments

Long-term recommendations will take more than three years to implement or need to be discussed and studied further. Long-term reform priorities are:

- Prepare a strategy for technological development with involvement of relevant NQI organizations
- Develop an effective central coordination system for NQI
- Revise the role of the MEDT in NQI
- Reorganize the metrology system
- Further modernize the legal framework
- Institutionalize need assessment, long-term planning, and investment prioritization processes

NEEDED RESOURCES

If the necessary funds (estimated at roughly USD 700,000) can be secured for the implementation of the Quick Wins, initial reforms could be completed within a three-year time period. Ukraine's NQI would then be at a more advanced stage and able to absorb larger investments in premises, equipment, and

new services. This Quick Wins will serve two purposes: i) to prepare Ukraine's NQI organizations for one or more large investment projects by increasing investment absorption capability through an institutional development program and ii) to provide all necessary inputs and information required for a large investment project.

After successful completion of the Quick Wins, a larger initial investment of approximately US\$25 million (based on initial calculations) would be needed to cover the costs of needed premises, laboratory and information technology (IT) equipment, and staff capacity-building. It should be noted that the actual need is probably double this figure, due to aging equipment in the four Scientific Metrology Centers defined below, and it is highly probable that an additional investment project would be needed in future.

With the implementation of such an investment project and the changed role of the MEDT Technical Regulations Department (**MEDT TRD**), Ukraine's NQI could become one of the best examples in Eastern Europe, and make an enormous contribution to the country's economy and society.

I. CURRENT STATE OF UKRAINE'S NQI

RECENT DEVELOPMENTS

Ukraine's NQI reforms have passed through three phases. The first phase was the "formative" phase. The first years after independence were marked by attempts to establish an NQI centered around the State Committee of Ukraine for Standardization, Metrology and Certification (Derzhstandart) by adopting relevant legislation that was needed with independence from the old Soviet system. In 1999, Derzhstandart was placed under the auspices of the MEDT and in 2002 became the State Committee for Technical Regulation and Consumer Policy (Derzhspozhivstandard, also referred as DSSU). This system was fundamentally similar to the Soviet Gosstandart system. Technical norms were based on mandatory standards, measurements were based on verification, and inspection was done through testing. The system had very weak accreditation functions. DSSU was a central organization, with 28 regional branches, the Legal Metrology Centers defined below. These centers were responsible for legal metrology operations, among other functions. Until 2011, DSSU also effectively controlled (directly through ownership, or indirectly through partnership agreements) the four Scientific Metrology Centers defined below, as well as a large number of testing and analysis laboratories and product and quality system certification bodies. Most of inspection functions were also controlled by DSSU through testing laboratories. DSSU regional branches were entitled to perform all the NQI functions except accreditation and, as such, constituted a virtual monopoly in NQI. This created a serious conflict of interest problem: all regulatory, surveillance and certification functions were concentrated in one institution and its subordinated organizations.

The foundations of Ukraine's current NQI system were laid by two laws enacted in compliance with the WTO TBT Agreement. With this development, the second phase of Ukraine's NQI reforms started. The second phase lasted about 10 years and can be characterized as the "adoption" phase. These two new laws, the Law on Standardization and the Law on Assurance of Conformity, both dated 2001, provide for the notion of TR for the first time.

The Law on Assurance of Conformity also introduced the concept of a declaration of conformity instead of mandatory certification. This law was followed by a resolution of the Cabinet of Ministers of Ukraine (**CMU**) that described and effectively adopted the conformity assessment modules defined by EU Decision 93/465/EEC.

Following that, a new Law on Standards, Technical Regulations and Conformity Assessment Procedures was adopted. This law specified the procedures for the development of TR. However, the earlier Ukrainian Certification System (**UkrCEPRO**) system remained operational. The result was a confusing situation in which two different conformity assessment systems coexisted, one mandatory and one modular with mandatory and voluntary components.

At the end of 2005, the GoU and the EU agreed on an action plan to prepare the Agreement on Conformity Assessment and Acceptance of Industrial Products (**ACAA**), which required the alignment of Ukraine's NQI with those of EU states. Within this alignment, four product groups were chosen within the new conformity assessment system. However, there was little progress in this area until the third phase, which started around 2011.

Starting in late 2006, the CMU adopted a large number of TR, apparently based on EU New Approach Directives², several of which were scheduled to enter into force starting in 2009. These TR incorporate concepts embedded in the New Approach Directives, such as essential requirements, reference to voluntary standards, modular approach to conformity assessment, and involvement of third party designated (notified) bodies to assess the technical aspects of conformity.

However, Ukraine faced some challenges with their implementation. These challenges included the lack of resources and the lack of political and financial commitment to abolish the UkrCEPRO system of mandatory standards. Thus, while the intention on paper was to move from mandatory standards and mandatory certification to TR and conformity assessment modules, in practice, the old system remained in place for some time.

This inability to implement the new system hampered innovation, R&D, and the production of higher-value export products. Every new product had to comply with a relevant normative document confirmed by tests conducted by state-owned organizations. Since preparing a normative document for every new product might take a long time, the system stymied the development of new and especially high-tech products. In addition to this major problem, producers had to comply with numerous safety, sanitary, and other rules imposed by various ministries.

It was only in the third phase of Ukraine's NQI development that problems with implementation were realistically addressed with the enactment of seven new laws designed to align Ukraine's NQI-related legislation with EU and WTO requirements. DSSU was dissolved in early 2011. Consumer protection functions were transferred to a newly set-up State Consumer Protection Inspectorate. Since 2011, 10 new MSBs have been established, and the remaining functions of the former DSSU were entrusted to the newly formed MEDT TRD.

These developments have helped eliminate the remaining conflict of interest problems by removing implementing functions from MEDT and assigning them to specific institutions (even though some of these are within MEDT). These are all in high compliance with WTO and EU requirements and practices.

In 2010-11, the following three horizontal laws were adopted that are the core of the third phase of Ukraine's NQI development:

- The Law "On State Market Surveillance and Control of Non-Food Products"
- The Law "On General Non-Food Product Safety;" and
- The Law "On Liability for the Damage Caused by a Defect in the Product."

This was followed in 2013-2015 with adoption of three additional horizontal laws:

- The Law "On Standardization;"
- The Law "On Metrology and Metrological Activity;" and
- The Law "On Technical Regulations and Conformity Assessment."

² "New Approach Directives" are European Union directives that define essential environmental, health and safety requirements that must be met for products to be sold in Europe. New Approach Directives are enabled by harmonized European standards set by CEN, CENELEC or ETSI.

The Law “On Accreditation of Conformity Assessment Bodies” was amended in 2011 and 2015.

Work on TR was intensified in 2011-2012 during negotiations for the AA and DCFTA. In fulfillment of its 2005 ACAA action plan, and with EU assistance, Ukraine in 2012 and 2013 developed and adopted TR on Low Voltage Equipment, Electro-Magnetic Compatibility, and Safety of Machinery that are highly compatible with the relevant EU directives.

This third phase, which can be described as the “contemporary” phase of NQI development is still ongoing. As of October 2016, the legal framework for a modern NQI is in place, though there are some minor problems with legislation and some serious issues regarding implementation, which will be discussed in following chapters.

It is reasonable to say that the remainder of the third phase will be focused on solving the implementation problems and improving NQI effectiveness and its contribution to the society and economy.

Ukraine’s NQI is going through major reforms as it transitions from a costly product-oriented system to a modern, internationally-competitive process and effect-oriented NQI that will allow producers to react more innovatively to international market opportunities. These reforms will bring practices into line with Ukraine’s WTO commitments and with EU and other international standards. The reformed NQI will be based on voluntary standards and limited mandatory TR that are essential for health, safety, and environmental impact reasons. However, the progress up to date has been limited. Additional financial and technical support is needed for the GoU to address the implementation problems, improve NQI effectiveness and complete the reforms.

STRUCTURE AND INTERNATIONAL RECOGNITION

NQI is made of technical regulatory system, standardization, measurement and certification infrastructures, accreditation, conformity assessment, market surveillance, and inspection systems. A summary of the structure of Ukraine’s NQI is described below.

There are three groups of NQI organizations in Ukraine:

1. Regulatory Bodies that Prepare TR:

Sixteen regulatory bodies are appointed by CMU Resolution #1057 dated December 16, 2015 to prepare TR for production and service provision. These regulatory bodies engage only in development, and not enforcement, of regulations.

In accordance with the Orders of the President of Ukraine, the MEDT TRD controls the top management of metrology, accreditation and standardization bodies and approves their work plans and budgets. The MEDT TRD, as the authorized central executive body in the field of technical regulation is responsible for implementing the state policy in the fields of technical regulation, standardization, metrology and metrological activity. MEDT TRD operates the 28 Legal Metrology Centers in the field of legal and industrial metrology and certification, and drafts TR in industrial policy, metrology and metrological activity. MEDT TRD approves the draft TR and conformity assessment procedures developed by the relevant central executive bodies.

2. Market Surveillance Bodies that Enforce the Implementation of TR

Nine market surveillance bodies are appointed by CMU Resolution #573 dated June 1, 2011 (as amended) to enforce TR prepared by regulatory bodies.

3. Service Providers

Core service providers are standardization, accreditation and metrology organizations; other service providers are conformity assessment bodies such as measurement laboratories and certification and inspection bodies.

Core service providers operate within the MEDT; other service providers are from both public and private sectors.

Core NQI services:

1. Standardization

In general, standardization processes in Ukraine are handled by the Ukrainian Scientific Research & Training Centre for Standardization, Certification & Quality Problems (**UkrNDNC**), Ukraine's National Standards Body (**NSB**). In autumn 2015, the NSB received confirmation of membership in the International Organization for Standardization (**ISO**) and the International Electrotechnical Commission (**IEC**). Today, the NSB is working on renewal of membership agreements with the European Committee for Standardization (**CEN**) and European Committee for Electrotechnical Standardization (**CENELEC**). The NSB routinely signs bilateral agreements with the standardization bodies of Ukraine's trade partners.

2. Accreditation

Main accreditation processes in Ukraine are handled by NAAU. Regarding international recognition at the European level, an associate membership agreement between NAUU and European Cooperation for Accreditation (**EA**) was signed on November 23, 2011. EA recognizes NAAU through bilateral agreements (**BLAs**), in the accreditation areas of calibration, testing (except for ISO 15189), product certification, management systems certification, certification of persons, and inspection. According to MEDT, on November 26, 2015, during the EA General Assembly, a BLA between the EA and NAAU in the area of products certification (ISO/IEC 17065) was signed. This is a significant achievement for the recognition of Ukrainian products in European and other markets, and also contributes to the effectiveness of economic provisions of the AA, which entered into force on January 1, 2016.

Statistics on accredited organizations as of May 23, 2017 are set out below.

Name	File	Number of valid certificates of accreditation	Number of invalid certificates of accreditation	Total number
Testing laboratories (DSTU ISO/IEC 17025)	DOC	443	261	704

Calibration laboratories (DSTU ISO/IEC 17025)	DOC	19	6	25
Medical Laboratories (DSTU EN ISO 15189)	DOC	1	0	1
Products, processes and services certification bodies (ISO/IEC 17065)	DOC	115	29	144
Personnel certification bodies (ISO/IEC 17024)	DOC	10	0	10
Inspection bodies (ISO/IEC 17020)	DOC	21	69	90
Management systems certification bodies (ISO/IEC 17021)	DOC	59	11	70
Total		668	376	1044

Source: naau.gov.ua

On September 24, 2014, NAAU received full membership of International Laboratory Accreditation Cooperation (**ILAC**) and became a signatory of a Mutual Recognition Agreement (**MRA**) with ILAC in respect of accreditation of calibration and testing laboratories. On December 11, 2014, NAAU expanded its recognition and become a signatory of the ILAC MRA Agreement in respect of accreditation of inspection bodies. However, the International Accreditation Forum (**IAF**) website does not list Ukraine or NAAU as a member.

3. Metrology

As in any other country, the metrology system in Ukraine has three levels: (i) national measurement standards (scientific metrology); (ii) calibration (industrial metrology); and (iii) verifications (legal metrology). MEDT in this system takes the role of the Central Metrology Authority (as defined in OIML D1 document) and is responsible for scientific metrology and for the coordination of industrial and legal metrologies. There are four Designated Institutes (**DI**s) in the area of metrology, which are referred to as **Scientific Metrology Centers** in domestic legislation. These Scientific Metrology Centers are located in Kyiv, Kharkiv, Lviv, and Ivano-Frankivsk; from the technical perspective, these, together, constitute a virtual National Metrology Institute (**NMI**).

- **Scientific Metrology (National Measurement Standards)**

National measurement standards are maintained in and disseminated by the four Scientific Metrology Centers operating under MEDT:

1. National Scientific Centre "Institute of Metrology" (**NSC "Institute of Metrology"**), Kharkiv.

This center is in charge of 52 national measurement standards in the areas of DC voltage, current and resistance, AC voltage, AC current, other DC and low frequency measurements, electric and magnetic fields, radio frequency measurements, length, linear dimensions, end standards, line standards, diameter standards, form, complex geometry, various dimensional measurements, mass standards, density, pressure, force, torque, viscosity, hardness, gravity, photometry and radiometry, ionizing radiation, thermometry, time and frequency.

2. State Enterprise "All-Ukrainian State Research and Production Center for Standardization, Metrology, Certification and Consumers' Rights Protection" (**SE Ukrmetrteststandard**), Kyiv

This center is in charge of 15 national standards in the areas of impedance (up to the MHz range), AC power, high voltage and current, angle, heat flow rate, and metrology in chemistry.

3. The State Enterprise "Scientific-Research Institute for Metrology of Measurement and Control Systems" (**DP NDI Systema**), Lviv

This center is in charge of one national standard in the area of sound in air and sound in water.

4. The State Enterprise "Ivano-Frankivsk Scientific and Production Center for Standardization, Metrology and Certification" (**SE Ivano-Frankivskstandartmetrology**), Ivano-Frankivsk

This center is in charge of one national standard in the area of volume gas flow rate, mass gas flow rate, and gas flow speed.

Interaction and collaboration among the Scientific Metrology Centers are limited, due to their physical distance from one another. In terms of scientific and technical activities, there are significant differences between the centers. Certain of them also handle legal metrology activities. Responsibility for some of the electrical and mechanical measurements (and national measurement standards) is shared between two large centers (NSC Institute of Metrology and SE Ukrmetrteststandard).

In international relations, Ukraine has been an associate of the Metre Convention since 2002, and a corresponding member of OIML since 1997. At the regional level, Ukraine has been a full member of the Euro-Asian Cooperation of National Metrological Institutions (**COOMET**) since 1992, and MEDT has been a liaison organization for the European Association of National Metrology Institutes (**EURAMET**).

While MEDT, in its role as the main metrology authority, is the signatory to the CIPM MRA, technical work is carried out by the Scientific Metrology Centers as DIs. The Scientific Metrology Centers provide 238 Calibration and Measurement Capability (**CMC**) entries in Appendix C of the International Bureau of Weights and Measures (**BIPM**) Key Comparison Database.

Below is a comparison table that shows the position of Ukrainian metrology in the system of international metrology. Only relevant countries have been selected for comparison.

UKRAINE NATIONAL QUALITY INFRASTRUCTURE GAP ASSESSMENT

Country	CMC entries	GDP (US\$, billion)	Membership in international organizations	
			Meter Convention	OIML
USA	2112	17947	Full	Full
Russia	1691	1326	Full	Full
Germany	1578	3355	Full	Full
China	1381	10866	Full	Full
UK	1154	2848	Full	Full
Korea	1097	1378	Full	Full
Japan	1088	4123	Full	Full
France	900	2422	Full	Full
Brazil	519	1775	Full	Full
Italy	515	1814	Full	Full
Czech Rep.	477	182	Full	Full
Turkey	465	718	Full	Full
Poland	429	475	Full	Full
Hungary	405	121	Full	Full
Slovakia	378	87	Full	Full
Ukraine	238	91	Associate	Corresponding
Belarus	234	55	Associate	Full
Romania	217	178	Full	Full
Bulgaria	213	49	Full	Full

Key Observation 1

Ukraine is underrepresented in the international metrology system.

In the Metre Convention, Ukraine is an associate member. Other than Belarus, Ukraine is the only major country in Europe that is an associate member and therefore not benefitting from all the opportunities of full membership.

In OIML, Ukraine is the only country at this level of economic development to remain a corresponding member.

Relations with COOMET and EURAMET are satisfactory, though interaction with EURAMET could be increased to become eventually a full member.

There seems to be no interaction with WELMEC. This is an area for improvement.

MEDT is the signatory to the CIPM MRA, while technical work is carried out by the Scientific Metrology Centers as DIs. This is very unusual.

The number of CMC entries is on the low side for an economy of Ukraine's size.

- **Industrial Metrology (Calibration Services)**

Calibrations for the dissemination of national measurement standards are performed by the Scientific Metrology Centers and 19 accredited calibration laboratories. Many MEDT metrology enterprises perform calibration services.

- **Industrial Metrology (Testing and Material Analysis Services)**

Tests and material analysis are done by 443 accredited testing laboratories and one accredited medical laboratory belonging to both the public and private sectors. Most of the Scientific Metrology centers and MEDT metrology enterprises perform tests on products or materials.

- **Legal Metrology Services**

Legal metrology operations are handled by 28 regional branches of MEDT with the status of state enterprises (**Legal Metrology Centers**). The Legal Metrology Centers also provide certification services.

Verification services are handled by the Legal Metrology Centers. These entities also handle calibrations, product testing, etc. Pursuant to the Law on Metrology and Metrological Activities, legal metrology consists of the following activities:

- (i) ensuring the protection of life and health of citizens;
- (ii) controlling the quality and safety of foodstuffs and pharmaceuticals;
- (iii) controlling the state of environment;
- (iv) controlling workplace safety;
- (v) controlling road and traffic safety and the technical state of vehicles used in transport;
- (vi) topographic, geodetic, cartographic and hydrometeorologic works and land surveying;
- (vii) controlling measurement units used in commercial transactions, including during the provision of transport, household, public utilities, telecommunications services, mail services,

- supply and/or consumption of energy and material resources (electrical and heating energy, gas, water, petrol products, etc.);
- (viii) calculation of the amounts due for taxes and fees, as well as tax and customs clearance control;
 - (ix) determining the parameters of buildings, including their location and structure;
 - (x) ensuring the technical protection of information as required by law;
 - (xi) works related to global satellite navigation and positioning systems;
 - (xii) works commissioned by investigative bodies, prosecutor's offices and courts; and
 - (xiii) registration of national and international sports records.

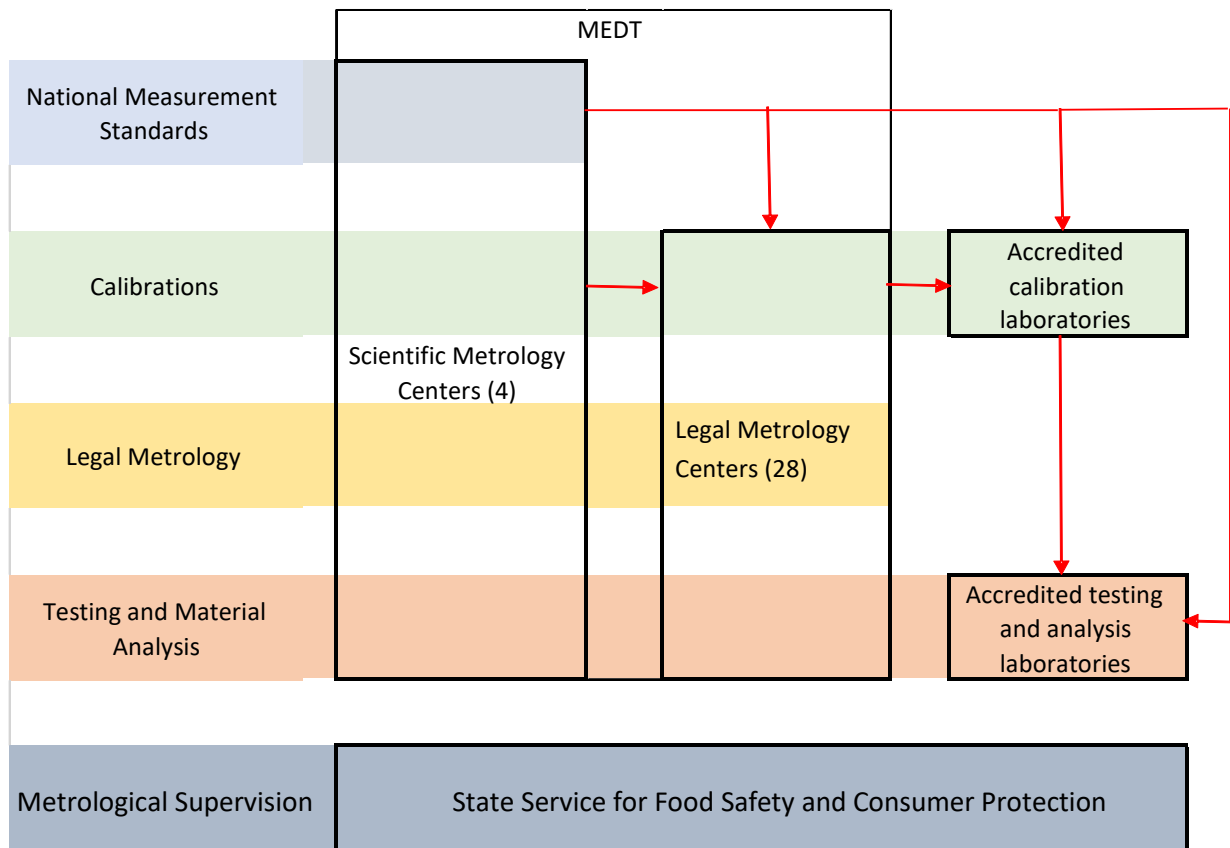
- **Type Testing, Type Approval**

Type approval is done by relevant appointed conformity assessment bodies. According to MEDT, NSC Institute of Metrology is the authorized body. Type testing is done by accredited testing laboratories that are appointed by the relevant authorities during the appointment of related conformity assessment body.

- **Metrological Supervision**

Metrological supervision is handled by the State Service of Ukraine on Food Safety and Consumer Protection (**SSUFSCP**), which exercises, *inter alia*, the powers of the State Veterinary and Phytosanitary Service and the State Inspection for Protection of Consumers' Rights. The relationship of SSUFSCP with metrology organizations with regard to metrological supervision is unclear.

MEDT metrology enterprises as well as accredited calibration and testing laboratories are traceable to national measurement standards maintained in the four Scientific Metrology centers. A diagram of Ukraine's metrology system is set out below:



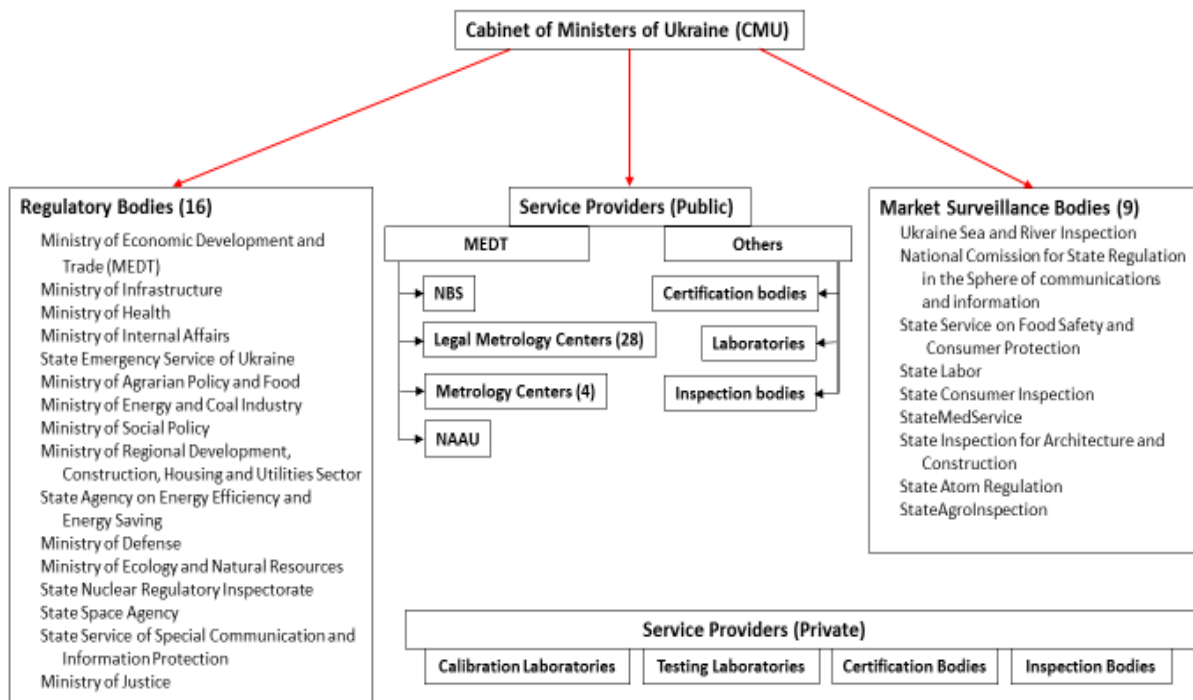
4. Certification

Certification of products, processes, services, management systems, and personnel is achieved by 184 accredited conformity assessment bodies (CABs). These entities belong to both public and private sectors. Most of the Scientific Metrology Centers and Legal Metrology Centers take part in the certification processes.

5. Inspection

Inspections are carried out by 21 accredited inspection bodies. However, neither of the nine market surveillance organizations authorized by the Government is accredited, nor are external accredited inspection bodies used. The role of inspection bodies within market surveillance operations is not clear.

Below is a scheme of Ukraine's NQI.



The structure of Ukraine’s NQI is consistent with accepted international practices and its constituent organizations are internationally recognized.

Key Observation 2

Ukraine has a developed, complete and functioning NQI. All the elements of a modern NQI exist. However, further reforms are needed to ensure such elements work in the most efficient way.

NEEDS

International Needs

The main sources of international requirements for Ukraine are the WTO and EU as well as MRAs for metrology and accreditation. There is no additional requirement, so there is no problem in this area.

Regulatory System Requirements

Ownership of TR is well defined by CMU Resolution #1057, dated December 16, 2015. Sixteen regulatory bodies are appointed by this resolution, which covers all major areas, leaving no obvious problems for preparing TR. The legal infrastructure is good in this area; however, there is not much information regarding how implementation is conducted, and whether there are any problems in this area. There is room for improvement in the area of testing laboratories, as these are subject to some limitations.

Industry Needs

Industry's primary need for NQI is in product compliance. There is not much need for NQI functions in product development, with the exception of testing during production. This is due to Ukrainian industry's weak knowledge of and low expectations from NQI organizations, especially metrology.

The majority of Ukraine's manufacturers resolve testing problems by having in-house testing facilities. These problems are minor, but there is room for improvement.

Internal Needs

The major need internal to the NQI is in the area of calibration, since, at every level, laboratories need each other for traceability purposes. The NQI's problems are related to lack of centralization in the system. Specific functions are carried out by each of the Scientific Metrology Centers: for example, AC electrical measurement standards are handled by the Kharkiv Scientific Metrology Center and DC measurements—by the Kyiv Scientific Metrology Center. For traceability, however, AC measurements are referenced to DC measurements. Similarly, responsibility for angle and length measurement are split between the same two centers, despite the fact that angle requires length for traceability. National temperature, humidity and air pressure measurement standards are managed by one center, to which the remaining three centers need traceability. This lack of centralization is a problem of moderate seriousness for the functioning of the Scientific Metrology Centers. There is room for improvement.

Social needs

Social needs for health, safety, and trade are mostly satisfied in Ukraine's NQI; however, problems may exist in respect of accreditation of medical laboratories.

LEVEL OF MATURITY

Metrology:

Metrology is well developed in Ukraine. The four Scientific Metrology Centers provide national measurement reference standards that are essential for the establishment of traceability for industrial and legal metrology. These four centers cover almost all the metrology areas required for a modern economy.

The Scientific Metrology Centers face the following problems: the need to transport equipment to other countries for repairs, calibrations and inter-laboratory comparisons; and the difficulty and expense of maintaining old as well as modern, highly sophisticated equipment.

In every area of metrology, financial and administrative autonomy is lacking.

National Measurement Standards

Other than in a few areas, the set of national measurement standards is appropriate for the economy. However, most of the equipment is rather old, and laboratories need considerable renovation, especially in case of Kharkiv NSC Institute of Metrology. Some new national standards are needed for new measurement areas. With existing and new equipment to be procured, there is great need for international laboratory comparisons and proficiency testing, which will require considerable financial, time, and staff resources.

Having four Scientific Metrology Centers with both separate and overlapping fields of responsibility is an unwieldy structure that causes serious problems. In addition, Ukrainian metrology is represented by MEDT rather than a (single) metrology institute, as is commonly the case elsewhere. The classification of the Scientific Metrology Centers as DIs in the CIPM MRA is also cause for concern, since DIs are excluded from many activities of the Metre Convention. A metrology institute, on the other hand, can permit DIs to participate in almost all activities in the name of the metrology institute.

Beyond this issue, Ukraine's NQI satisfactorily fulfills the requirements of the CIPM MRA in terms of comparisons and quality system presentations, as well as CMC table entries.

Interaction with industry with respect to product development is rather weak and could be enhanced.

Industrial Metrology (Calibration)

There is a sufficient number of accredited calibration laboratories in Ukraine, though it would be preferable for their number—and the scope of work they perform along with uncertainties they can provide—to be increased considerably.

Industrial Metrology (Testing and Material Analysis)

There is a sufficient number of laboratories for industrial metrology, except in certain areas such as for testing explosion-proof equipment. The law permits the use of foreign laboratories in such areas, but the costs associated with foreign testing are considerably higher, adding to production costs and potentially reducing competitiveness.

Legal Metrology

Ukraine's NQI in respect of legal metrology is in relatively good shape as far as scientific (national reference standards) and industrial metrology (calibration) areas are concerned. Here again, however, the absence of a legal metrology institute is an area for improvement. In addition, type approval procedures need to be clarified for new equipment being brought to market.

Accreditation

Accreditation is subject only to minor concerns. The number of accredited organizations is satisfactory in all areas of accreditation, though there is a lack of capacity in some areas. There may be problems finding appropriate assessors in some fields of accreditation. Another minor problem is the availability of accreditation-related international standards adopted by the standardization body. There are no coordination problems with metrology. While these problems are relatively minor, there is room for improvement. Financial autonomy has not yet been obtained.

Standardization

In the area of standardization, it is difficult to hire and retain appropriate staff. Industry participation is low in key decision-making systems such as technical committees, reducing the potential benefits of the NSB. The NSB's income is low, which is a big burden on the state, despite the fact that NSB is not fully funded by the government. Financial autonomy has not yet been obtained.

Certification

Certification is in good shape and there are no major problems except that, in some areas, the number of accredited certification bodies may not be sufficient.

Market Surveillance

Nine MSBs currently operate in Ukraine, in accordance with CMU Resolution #573, dated June 1, 2011, as amended. These bodies are central executive authorities and use their own staff for inspections. The structure of MBS generally meets international and EU practices and requirements, while operations and the way inspections are performed face are not up to good international practice.

According to Ukrainian legislation, i) inspections staff are not certified, due to their civil servants' status assuming the staff is appointed based on required qualification skills and they do not directly inspect a product, what is done by accredited laboratories, ii) nor are inspection operations accredited. In terms of laboratory operations in Ukraine, MSBs either operate their own laboratories (and get them accredited) or use external accredited laboratories for testing (mostly state owned, but sometimes private as well).

Based on international good practices, inspectors are under the responsibility of accreditation system which is impartial and free from political and economic pressure and influence. Impartiality of inspection is demonstrated by a third party. Is quite common world-wide that state entities are entrusted market surveillance (MS) functions and to perform these functions state MSBs use external services such as inspection, testing, certification. Otherwise, MSBs have to establish their own relevant services and get them accredited. Laboratories accredited for testing or calibration can do inspections only provided they fulfill the requirements of inspection standards and get accredited in the area of inspection.

In case an MSB operates a small inspection service itself and accreditation (in inspection) of this service is too costly or not possible by some reason, then the inspectors engaged should be properly certified in the relevant area. That being said, personnel certification is less preferable method in institutional inspection. In every area of inspection, there is a corresponding personnel certification scheme. Some examples of personnel certification in inspections are household inspector, factory inspector, welder inspector, non-destructive testing inspector, road inspector, building inspector, food/agriculture inspector, elevators/lifts inspector, health service/equipment inspector, motor vehicle inspector, etc.

Personnel certification and/or organization accreditation is required to ensure "confidence" in the processes, *i.e.*, to demonstrate that inspection processes are done according to internationally accepted standards and TR.

There is thus potential for considerable improvement in market surveillance operations. Metrological supervision is not handled by metrology centers³ but by the SSUFSCP. It is not clear how this organization handles this rather specialized and sophisticated task. There is no evidence that SSUFSCP has a formal agreement with competent bodies for cooperation in this area.

GOVERNANCE

Ukraine's NQI may be classified as a technical regulation-based system from the operational point of view. However, from the governance point of view, it is rather a centralized system. Core standardization, metrology and accreditation service providers are controlled by MEDT TRD. Through its Scientific Metrology Centers as well as state enterprises, MEDT also controls quite a large number of certification services. MEDT is the power center and the main decision maker in the NQI, since the implementation and enforcement of TR depend on metrology and accreditation. It is frequently argued that MEDT doesn't control core NQI organizations but rather supervises them. However, MEDT has the legal authority to change the top administration of these bodies. For example, the Law on Accreditation of Conformity Assessment Bodies (the most important body regarding impartiality) clearly states that "[t]he national accreditation body of Ukraine shall be managed by the head who shall be appointed and dismissed by the central executive authority that ensures the formation of state policy in the area of economic development for the term of five years."

This tendency toward centralized control is observable in every part of Ukraine's NQI. The main decision-making system is generally entrusted to "administrative competency" instead of "technical competency". This makes a considerable difference in the effectiveness of the system. The international representation of metrology in the Metre Convention illustrates the problem. The Metre Convention was signed by 18 nations in 1875. Governments come together every three or four years and make decisions on administrative matters or approve the technical decisions. Besides this general assembly, the rest of the decision making in the international metrology system is technical. Membership in COOMET or EURAMET, participation in recognition agreements or similar activities are all through metrology organizations. However, as seen below, Ukraine is represented in the recognition agreement of the Convention, known as the CIPM MRA, by an administrative body, MEDT, and not by a metrology institute. Besides the Russian Federation, Ukraine is the only country that chose to do that. All other developed economies are represented by their metrology institutes. No metrology institute is registered on behalf of Ukraine; the existing Scientific Metrology centers are mentioned only as DIs.

³ Note: In this Assessment, "metrology centers" refers to both Scientific Metrology Centers and Legal Metrology Centers.

Contact:

Ministry of Economic Development and Trade of Ukraine
 174, Gorky Street
 UA-03680 Kyiv
 Tel.: + 380 226 2971
 Fax: + 380 226 29 70
 Web: <http://me.kmu.gov.ua/control/en/index>

Participating in the CIPM MRA since:
 14 October 2003

Signed by: G. SYDORENKO
 (Ministry of Economic Development
 and Trade of Ukraine)

Signatory:

- Ministry of Economic Development and Trade of Ukraine (Ministry of Economic Development and Trade of Ukraine), Kyiv

Designated institute(s):

- For electricity and magnetism: DC voltage, current and resistance; AC voltage, AC current, other DC and low frequency measurements, electric and magnetic fields, radio frequency measurements, materials; length: laser, linear dimensions, end standards, line standards, diameter standards, form, complex geometry, various dimensional; mass and related quantities: mass standards, density, pressure, force, torque, viscosity, hardness, gravity; photometry and radiometry; ionizing radiation; thermometry; time and frequency: *National Scientific Centre "Institute of Metrology" (NSC "Institute of Metrology"), Kharkov*
- For electricity and magnetism: impedance (up to the MHz range), AC power, High voltage and current; for length: angle; for mass and related quantities: heat flow rate; for metrology in chemistry: *State Enterprise "All-Ukrainian Research and Production Center of Standardization, Metrology, Certification and Consumers' Rights Protection" (SE "Ukrmetrteststandard"), Kiev*
- For mass and related quantities: volume gas flow rate, mass gas flow rate, gas flow speed: *State Enterprise "Ivano-Frankivsk scientific and production center for standardization, metrology and certification" (SE "Ivano-Frankivskstandard metrologia"), Ivano-Frankivsk*
- For acoustics, ultrasound, and vibration: sound in air, sound in water: *State Enterprise "Scientific-Research Institute for Metrology of Measurement and Control Systems" (SE "NDI Systema"), Lviv*

From the legal and international recognition point of view nothing seems to be wrong. However, this state of affairs is not fully aligned with national interests, as the hypothetical situation in Explanation 1 illustrates.

Explanation 1

Let us assume that an international event for metrology institutes is organized and an invitation is sent to MEDT. MEDT responds either on its own or following a meeting with the Scientific Metrology Centers and chooses an organization to represent Ukraine at the event. The choice may or may not be appropriate; there is a risk that an important decision may be made without consulting the appropriate experts or that feedback may be delayed or not transmitted optimally. This situation is avoided in countries in which the centralized metrology institute is always the entity that attends such meetings.

This example is the simplest of the problems faced by a centralized administrative decision-making system in an NQI, and it is chosen to demonstrate how the effectiveness of an NQI is based on the decision-making system(s) used to govern it.

In the example given above, once a decision regarding who will represent Ukraine in an international event has been taken, after coming back from the meeting, the selected representative must brief the remaining three centers along with MEDT, and there is a probability that the other centers might have other opinions. If the decision regarding the representative is not optimal, then Ukraine is inappropriately represented in the meeting with possibility of getting less from the meeting. In case of a single metrology institute, there is a much-reduced probability of inappropriate representation or differences of opinions among equal-level directors.

Key Observation 3

In Ukraine, unlike many other developed economies, technical decisions are made mostly by administrative competence. The decision-making system in Ukraine's NQI needs major rethinking—especially in respect of core service providers in standardization, accreditation and metrology.

As stated earlier, the existing NQI system is quite acceptable by the international system, since it does not affect it. However, this system may not be optimum for the rapid, and sustainable development of Ukrainian economy.

LEGAL FRAMEWORK

The core of Ukraine's NQI legislation is the following seven laws, which are based on WTO Agreements, the Code of Good Practice for the Preparation, Adoption and Application of Standards set out in Annex 3 to the WTO Agreement on Technical Barriers to Trade (**Code of Good Practice for Standards**), and OIML documents:

- The Law "On State Market Surveillance and Control of Non-Food Products," in force since July 05, 2011;
- The Law "On General Non-Food Product Safety," in force since July 5, 2011;
- The Law "On Liability for the Damage Caused by a Defect in the Product," in force since September 16, 2011;
- The Law "On Accreditation of Conformity Assessment Bodies," in force since June 20, 2001 (with major amendments introduced in 2011 and 2015);
- The Law "On Metrology and Metrological Activity," in force since January 1, 2016;
- The Law "On Standardization," in force since January 3, 2015; and
- The Law "On Technical Regulations and Conformity Assessment Procedures," in force since February 10, 2016.

In addition to these main laws, there are numerous secondary legislation mostly issued as CMU resolutions.

See Appendix A for a detailed list of laws and regulations governing Ukraine's NQI.

In addition to these core laws, approximately 70 decrees, 47 TR and numerous standards governs Ukraine's NQI. The legislative work is ongoing. Three of the main laws date back to 2011; the remaining four were adopted in 2015 and 2016. About 95 percent of the secondary legislation (except for TR stemming from EU directives) was enacted in last two years. The horizontal legislation can be considered complete, and each individual law in this set is highly compliant with the relevant EU legislative acts. However, the more recent legislation has not yet been fully tested, and it is highly likely that more amendments, replacements and corrections will be needed. This uncertainty causes serious problems for the implementation of NQI legislation. There are some additional problems in the implementation of the legal framework due to insufficient resources available to the implementing organizations.

Key Observation 4

Although the legislative framework is more or less complete, businesses and (some) government entities may be confused by continued frequent changes to implementing laws and regulations.

One cause for these frequent changes is that the laws use the notion of “delegation of authority” rather than “executive rules”. These laws appoint the executive authority for a process, and set some fundamental rules, and implementation is carried through CMU or MEDT decrees. Laws may even avoid naming an executive authority with language such as: “The national accreditation body of Ukraine shall be a state organization established by the central executive authority that ensures the formation of state policy in the area of economic development, and shall carry out not-for-profit economic activities.” In this example, the law mentions neither NAAU nor MEDT. The decision to select the executive authority and the accreditation body are left to the CMU. With a stable political environment, such approach may not be a problem. In Ukraine’s political context, however, it is possible that succeeding governments may revisit previous decisions.

In the “executive” type of law making, the law clearly defines and names the proper organization. In this case, it is not up to the governments, but up to the Parliament to make fundamental changes in key state organizations. In such environments, legislation changes less frequently, and industry and affected organizations have time to adapt to the changes.

OPERATIONAL SYSTEM

Ukraine’s NQI is well designed and its operation is rather straightforward, with some minor problem areas. The CMU determines and publishes a list of regulatory bodies in charge of preparing TR, which are the basic technical rules of the market. The CMU also publishes a list of the MSBs charged with enforcing TR and specifies their responsibilities. A clear separation exists between rule makers and enforcers.

MSBs make use of conformity assessment services, such as standardization, calibration, testing, material analysis, and certification, which are provided by NQI service providers. However, it is not clear how accredited inspection bodies are used by MSBs.

Production, trade, and other service sectors use QA service providers in order to demonstrate compliance with TR during conformity assessment.

Conformity assessment in Ukraine is transitioning from mandatory certification by a single organization to modular, mandatory, and voluntary certification that can be done by a number of organizations. This transition is being carried out by phasing out the UkrCEPRO system, a process that will be completed by the beginning of 2018. By that time, conformity assessment in accordance with TR based on EU directives will replace mandatory third party certification. In the meantime, mandatory pre-market certification of goods is being steadily phased out. The list of products subject to such certification has already been reduced by 70 percent, most recently with the cancellation of mandatory certification of fuel and 12 other product groups by MEDT orders in May 2015.

Currently, conformity assessment is carried out mainly by the 28 regional Legal Metrology Centers. The Scientific Metrology Centers also perform some conformity assessment functions. Note that conformity

assessment is no longer a state monopoly: accredited private conformity assessment bodies may carry out various conformity assessment activities.

Ukraine's first stage of NQI reforms was slow and could not keep pace with radical economic transformations during the post-independence period. In the second and third stages, driven by the WTO and ACAA agreements, NQI began changing very rapidly, especially in last three years, and industry was unable to synchronize its pace with the changes in NQI. For example, in 2014, 122 old standards were withdrawn, and by the end of 2014, 1,588 new standards were adopted by endorsement method, and 19 were adopted by reproduction. This trend has continued in 2015 with adaptation of 3,996 standards, of which 2,970 were harmonized with EU and internationally. In 2016, 1,442 standards were adopted, of which 1,319 were EU or internationally harmonized. In three years, more than 7,000 new standards have been adopted. Adjusting to 7,000 standards in three years is an enormous burden for both NQI organizations and market actors.

Key Observation 5

Significant progress in the reforms of the regulatory system and related institutional structures regarding conformity assessment have been achieved, namely:

- The UkrCEPRO system is progressively fading out and is expected to be abolished on January 1, 2018;
- The list of products subject to mandatory pre-market certification is getting smaller, and has been reduced significantly in the last three years;
- New technical regulations have been put in effect; and
- Full alignment with the EU New Legislative Framework is expected by 2020.

There seem to be no major problems in the area of traceability, though there is room for improvement in specific areas, such as direct calibration of highly sophisticated metrology equipment, inter-laboratory comparisons and proficiency testing. The Scientific Metrology Centers provide the necessary traceability to the International System of Units (SI) and participate in international laboratory comparisons to demonstrate the equivalence of Ukraine's measurement standards with those of other countries. Inter-laboratory comparisons and proficiency testing are also carried out with the participation of accredited measurement laboratories.

Major legal metrology functions such as the verification of measurement equipment used in trade and other key sectors, as well as type approval for new products, are handled primarily by the Legal Metrology Centers.

One major legal metrology function, metrological supervision, is entrusted to SSUFSCP. It is not clear what kind of expertise SSUFSCP possesses and how it carries out or will carry out this function. There is no agreement between SSUFSCP and any of the metrology centers to enable SSUFSCP to benefit from the centers' experience in metrological supervision.

Key Observation 6

There appears to be a problem with metrological supervision since SSUFSCP, which is in charge of this process, neither has the necessary infrastructure for this process nor any arrangement with the centers that have such infrastructure.

Article 20 of the Law on Metrology and Metrological Activity defines how metrological supervision is carried out and its types as:

1. *Metrological supervision shall be an activity carried out in the area of legally regulated metrology with the purpose of checking economic operators as for their compliance with the requirements of this Law, technical regulations and other regulations in the area of metrology and metrological activity.*
2. *The types of metrological supervision shall be:*
 - *state market surveillance of the compliance of legally regulated measuring instruments with the requirements of technical regulations;*
 - *metrological supervision of legally regulated measuring instruments in use;*
 - *metrological supervision of pre-packaged goods.*
3. *Metrological supervision shall be carried out by the central body of executive power that implements the state policy in the area of metrological supervision.*

Article 20 clearly states that metrological supervision is a legal metrology action. All the elements of legal metrology are the responsibility of MEDT, which has the competency required for metrological supervision. However, under the existing system, with SSUFSCP in charge, it is highly unlikely that metrological supervision can be properly undertaken in Ukraine.

In respect of certification, there are may be problems in two discrete areas: measurement infrastructure and personnel certification. First, measurement infrastructure required in relation to newly adopted TR based on EU directives—such as Low Voltage Equipment, Safety of Machinery, and Electro-Magnetic Compatibility—may not be sufficient. Second, problems may exist with the personnel certification processes, whose use is not widespread outside of a small number of industrial processes.

Other than these two possible problems, there are no known or reported issues regarding certification, which is handled by a large number of organizations, both public and private. There are a sufficient number of accredited certification bodies for an economy of Ukraine's size and complexity.

It is not clear how the full NQI system is coordinated. MEDT TRD plays a coordination role, especially within MEDT. However, greater coordinating capacity is required to synchronize the preparation, implementation and enforcement of TR, as well as the needs of the various NQI organizations and the broader NQI system.

Along with coordination, another area for improvement is the strategies, policies and business plans of MEDT, its departments and sections, and NQI organizations. The Strategy for the Development of the Technical Regulation System (including an action plan) until 2020 approved by CMU resolution in August 2015 is a good attempt to fill this gap. The NSB has produced a strategy for its own development; perhaps other NQI organizations will prepare their own strategies. However, a much broader and more

detailed consolidated national quality policy or strategy, based on comprehensive analysis and international good practices, is needed.

Key Observation 7

Two key areas for improvement are (i) overall coordination of the Ukrainian NQI and (ii) preparation of a comprehensive and consolidated National Quality Policy or Strategy. A National Quality Policy or Strategy is needed not only to identify priority investments, but also to serve as a tool for the overall coordination of Ukraine’s NQI.

Some crucial management tools are not used by NQI organizations, and management processes are not institutionalized. Management decisions are mostly reactive, rather than proactive.

Major management tools that are not used by NQI organizations (with some exceptions) are:

- Stakeholder perception and expectation
- Technology trend analysis
- Knowledge management and intellectual property protection
- Project management
- Human resources management
- Performance monitoring, evaluation and self-assessment
- Public awareness and public relations

EFFECTIVENESS AND SUSTAINABILITY

As noted above, the state of an NQI can be assessed from two perspectives:

- Effectiveness (basically, what the NQI is doing and how useful it is)
 - Fulfilling the necessary condition (complying with the requirements of international trade)
 - Fulfilling the sufficiency condition (contributing to the economy and society by actively participating in the development of new or improved products or services)
- Sustainability (whether the existing system can function effectively for a long time)

Regarding effectiveness, Ukraine’s NQI fulfills the requirements of the “necessary” condition. In other words, it complies with the requirements of international trade rules as defined by the WTO and the EU. There are minor incompatibilities to be resolved and there is some room for improvement, especially in the area of measurements.

Key Observation 8

Ukraine’s NQI fulfills the requirements of international trade defined by the WTO and the EU rules and it is internationally recognized by relevant organizations.

Ukraine's NQI faces a serious problem with sustainability, since most of the existing measurement systems are rather old and certain premises are unsuitable for precise measurements. Some old equipment cannot be properly maintained due to lack of spare parts. In some areas, there are problems regarding staffing, with respect to both quantity and quality.

Key Observation 9

Considerable amount of new investments is needed in terms of new (or renovated) premises, equipment and know-how transfer along with the new systems.

Another aspect of sustainability is the stability of the system. The operational system of Ukraine's NQI seems to be simple and straightforward, in accordance with applicable legislation. However, frequent changes in the legislation complicate the system. Due to such frequent changes, the system seems to be in transition all the time, creating confusion not only in industry, but in many state organizations as well. With changing legislation, the structure of NQI also changes frequently. This hampers the stability, and affects the sustainability of the whole NQI. On the other hand, Ukraine's NQI does not completely fulfill the requirements of the "sufficient" condition. In other words, its contribution to economy and society is limited, since it does not actively contribute to developing new products and/or services. Therefore, currently, the available NQI infrastructure is underutilized. The existing measurement infrastructure is used predominantly to test finished products, calibrate or verify commercial equipment, and make material analysis.

No research has been published assessing the effectiveness of Ukraine's NQI or its impact on the economy. The performance of individual NQI organizations, along with the effectiveness of their operations and constituent parts, does not appear to be externally assessed. Self-assessment tools are rarely used. There are no findings on the costs or benefits of obtaining QA services abroad. It is unclear how needs analyses for new investments are carried out. There is little long-term planning.

In the absence of evaluation documentation, this Assessment bases its appraisal of the effectiveness Ukraine's NQI system on the considerations set out below.

Effectiveness of NQI Organizations

NQI has inputs and outputs. The question "Are we getting enough benefits for the efforts we are putting in?" should be answered. Without data on monitoring, evaluation and self-assessment, as well as the resources used by NQI operations and outputs obtained, it is difficult to make an accurate assessment. However, it is possible to make an educated guess by looking at the costs and benefits of metrology, which usually makes up more than 80 percent of the costs and benefits of NQI.

Two Scientific Metrology Centers visited in the course of this Assessment are good metrology organizations with necessary premises, equipment, and staff. Outputs such as scientific, technological, and industrial work in terms of research, development, and industrial services seem to match the resources used. There may be some waste of resources due to overlapping functions of the four Scientific Metrology Centers and costs for additional staff needed to run these centers at four distant locations. Resources may also be wasted to maintain the old premises and outdated equipment used by some Scientific Metrology Centers.

There is a limited quantity of scientific research taking place in Ukraine’s metrology centers beyond the normal NQI functions. Only a small fraction of this research is directed towards the development of more competitive products or services. The considerable underused infrastructure and know-how in metrology centers could play a role in innovation, for example through collaboration with universities and other research institutions.

Key Observation 10

Ukraine’s metrology centers do not sufficiently contribute to the development of new or improved products or services.

Ukraine is missing an opportunity by failing to fully make use of NQI to improve its citizens’ wellbeing through export-led economic growth, better-quality goods and consumer protection.

Despite these minor problems related to the efficiency of operations, Ukraine’s NQI core organizations may be considered rather effective from the operational point of view.

Effectiveness of NQI as a Whole

In addition to assessing the internal functioning of NQI organizations, consideration must also be given to the effectiveness of the entire NQI system in Ukraine’s society and economy. In the absence of studies of stakeholder perceptions and expectations and economic and social impact studies, needs analyses and long-term strategic planning, it is not possible to make an accurate assessment of the external effectiveness of Ukraine’s NQI system. Instead, we can look to the services customers receive from the system, *i.e.*, certification of compliance by a product, process or services. During our visits, we did not observe appreciation for QA services. Stakeholders thought NQI organizations carried out assessment services, but, when asked about NQI’s contribution to the development of processes or products, the answers were negative. No success stories exist in the media. NQI activities in Ukraine appear to be limited to conformity assessment and market surveillance processes. Ukraine, therefore, is not maximizing the benefits of its NQI.

There is no motivation for Ukraine’s NQI organizations to do “extra” work such as contributing to solving the problems of companies that are developing new or improving existing products, processes or services. The relevant legislation neither requires such activity nor provides incentives for the staff of NQI organizations to innovate or collaborate with their “customers” in the private sector and research institutions.

The lack of collaboration between NQI organization and their “customers” also excludes potential sources of income that could potentially be generated by NQI organizations. Without incentives, NQI institutions such as the Scientific Metrology Centers do not generally take part in industrial or international projects. The result is foregone income for the national budget.

The conclusion is that, while Ukraine’s NQI organizations appear to be operationally effective, overall NQI effectiveness, in terms of contribution to the economy and society, could be substantially increased.

Key Observation 11

Although each organization in Ukraine's NQI fulfills its duties reasonably efficiently, on the whole, Ukraine's NQI is not effective, since its functions are limited mostly to conformity assessment and market surveillance. The overall potential of NQI (both equipment and know-how) is not fully utilized, and contribution to the development of new or improved products or processes is very limited.

Some changes in legislation may be needed in order to improve the effectiveness of Ukraine's NQI in terms of new task or role definitions, especially for metrology centers, and to provide incentives to staff to be more innovative" and participate in domestic and international product and process development projects.

II. DESIRED STATE OF UKRAINE'S NQI

The desired role of NQI in Ukraine can be defined in two parts: core NQI functions (conformity assessment of finished products or services) and supplementary NQI functions (contributing to the development of new products or services as well as improvement of existing ones).

The desired state of Ukraine's NQI is an NQI system that maximizes benefits to the various stakeholders: the GoU, producers and consumers of goods and services, and the broader society and environment.

DESIRED STATE OF CORE NQI FUNCTIONS

Technical Regulations

In the desired state, TR have been prepared and put into effect by the regulatory bodies. The list of regulatory bodies has been prepared and published by CMU.

The regulatory bodies have ensured that the TR are compatible with those of Ukraine's trading partners. A regulatory impact analysis (**RIA**) has been performed in respect of each technical regulation. Regulations have been prepared in close cooperation with all stakeholders including producers, representatives of consumers, the market surveillance body that supervises enforcement, and relevant NQI bodies that carry out enforcement.

The transition of the technical regulatory system as of 2020, so that the relevant Ukrainian legislation is in alignment with that of the EU.

Enforcement

Rules for conformity assessment and inspections are enforced by MSBs. The list of MSBs has been promulgated by CMU. While enforcing rules, MSBs use accredited conformity assessment bodies such as inspection organizations, certification bodies, and measurement laboratories. Where they use their own facilities (operating laboratories, certification, and inspection services), these are properly accredited. In rare cases, when an MSB's own facilities are not large enough to justify accreditation, the staff taking part in such activities have been certified to perform their tasks by an accredited personnel certification body.

Peer review visits and assessments have been conducted with corresponding organizations in other countries, especially from the EU, to ensure compatibility with other systems and international acceptance.

The market surveillance body in charge of a given technical regulation prepares regularly updated reports on the implementation of the regulation and shares them with all relevant organizations with responsibilities for the preparation and enforcement of relevant technical regulation.

Coordination

An NQI Coordination Body has been established within MEDT, either as a new body or as a redefined MEDT TRD. Its secretariat and logistics support are provided by a new entity, either the Legal Metrology Institute of Ukraine (**LMIU**) or Metrology Institute of Ukraine (**MIU**) (the functions of these prospective entities are discussed in the sections of this Assessment entitled Desired State of Core NQI Functions and Recommended Reforms for the Transformation of Ukraine's NQI—Long Term Actions). The main tasks of the NQI Coordination Body are as follows:

- Needs assessment in respect of NQI system
- Needs assessment in respect of NQI organizations
- Performance monitoring of NQI organizations including technical regulators and market surveillance organizations, as well as specialized bodies such as customs, doping control, and forensics
- Operational supervision and complaints' handling
- Tracking of technological and international trade developments in order to forecast future NQI needs for Ukraine
- Regular impact analysis and gap assessment of NQI processes
- Development of quality policy and NQI strategy

Standardization

Standardization has completed the transition to a technical regulation-based conformity assessment system, with the help of electronic translation and expert review, and has adopted all necessary international standards as Ukrainian national standards. Standards are managed by an electronic data management system that is isolated from the internet. External users have limited access to the system via a separate server that retrieves and delivers standards but allows no input from users.

Industry participates not only in Ukrainian technical committees, but also in the committees of international standardization organizations.

The NSB takes an active role in the work of major international standardization organizations.

Interest groups formed by industry associations participate in drafting new standards. Through this mechanism, industry helps the NSB to prepare short-(one year) and medium-term (5 years) programs for standards preparation and adoption.

The NSB is financially self-sufficient, thanks to revenues generated by its conformity assessment functions, such as product and material testing and certification, as well as training and consulting services provided to industry via an appropriately-staffed Quality and Training Center, as described below.

The NSB contributes to EU R&D programs and bids on EU tenders alongside other European organizations. To incentivize staff, the NSB has implemented a performance-based remuneration scheme in its human resources management and career development systems.

In addition to self-assessment, the NSB uses an international peer-review system in order to assess its operations.

The NSB is managed by an executive board. External influence on core NSB decision-making is negligible. The NSB invests in institutional development while giving due consideration to stakeholder interests, knowledge and project management and human resources.

Accreditation

NAAU's sectoral committees are operational, with active participation from industry and relevant NQI organizations. NAAU contributes to the work of international accreditation organizations and has signed recognition agreements with such organizations in all areas of accreditation.

NAAU is financially self-sufficient. In addition to earning income through accreditation and training, it disseminates information to industry and public organizations.

In cooperation with MIU, NAAU regularly organizes laboratory inter-comparisons and proficiency testing.

Additionally, NAAU:

- runs an internal training program for the development of lead and technical assessors;
- maintains an active personnel certification scheme for its assessors that is based on assessors' performance, experience, and customer complaints;
- in addition to self-assessment, participates in the international peer-review system in order to assess its operations;
- is managed by an independent executive board with broad mandate, with negligible external influence on core decision making;
- invests in institutional development while giving due consideration to stakeholder, knowledge, and project management as well as to human resources development.
- organizes meetings, workshops and seminars to exchange information with industry and assess future needs and evolving technologies.

Metrology

Ukraine is a full member of the Metre Convention and OIML. MIU represents Ukraine in the Metre Convention and participates in all its technical committees. MIU is also a member of COOMET and a liaison organization for EURAMET and participates in the activities of these organizations.

The new LMIU represents Ukraine in OIML and European Cooperation in Legal Metrology (WELMEC) and participates in the activities of these organizations. Both MIU and LMIU are managed by independent executive boards, protecting them from political and economic pressure.

In addition to MIU, three DIs are designated to maintain national reference measurement standards; LMIU is one of these DIs. The four Scientific Metrology Centers cooperate with universities and other research establishments for the development of new standards and measurement equipment at all levels of metrology.

In addition to LMIU, 28 Legal Metrology Centers serve the industry and trade throughout the country. MIU and the three DIs also function as Legal Metrology Centers. All of these centers are self-sufficient financially and free to develop and use their resources as they see fit. These centers handle (on a voluntary basis) most conformity assessment services, such as measurement, type testing and approval, metrological supervision, product certification and inspection. MSBs are encouraged to use inspection services provided by these centers. All NQI functions of Legal Metrology Centers are accredited except national measurement standards. While performing conformity assessment functions, these centers work under the same rules as private conformity assessment bodies.

The Legal Metrology Centers support other NQI functions such as standardization, TR, and certification using their infrastructure and know-how. They also support accreditation through participation in sector committees and help design and implement inter-laboratory comparisons and proficiency testing.

Conformity Assessment

Conformity assessment is handled by various NQI organizations and coordinated by the NQI Coordination Body. Mandatory certification for products has been abolished. Organizations such as UkrCEPRO no longer exist. All conformity assessment system is aligned with European approaches. Private and public organizations take part in conformity assessment processes on an equal basis, without discrimination or favoritism. Both groups operate on an equal technical and financial footing.

The NQI Coordination Body has prepared a working document “On Conformity Assessment in Ukraine” that summarizes the list of regulatory bodies, MSBs, product categories grouped according to conformity assessment processes, and designation of relevant testing and certification bodies. The document also defines the roles of specialized organizations such as customs in respect of conformity assessment. It is publicly available to all stakeholders.

Internal market rules, as well as those of Ukraine’s trading partners, have been summarized and disseminated through flyers and websites. The market rules have been annexed to the “On Conformity Assessment in Ukraine” document mentioned above or disseminated separately. NQI organizations and MEDT provide advisory and training services for companies in respect of the rules of international trade.

Certification

As part of the conformity assessment process, certification is handled by both public and private and both domestic and foreign organizations. All the organizations that provide certification are accredited by NAAU.

All types of certification bodies (product, management systems, personnel) are represented in the NQI Coordination Body.

Inspection

As part of the conformity assessment process, inspection is carried out by both public and private and both domestic and foreign organizations. All organizations that provide inspection services, including inspection services for market surveillance organizations, are accredited by NAAU. Market surveillance organizations may use these accredited inspection services rather than their own accredited inspection services.

Explanation 2

A comprehensive NQI strategy and set of policies are needed in order to make the use of NQI more effective. To illustrate, NQI strategy can be used to address the following hypothetical shortcomings:

- There is no capability for measurement or accreditation in a particular area.
- Prices of the NQI services offered by public organizations are too low, hence there is not much incentive to encourage the private sector to invest in NQI; or, alternatively prices for such services are too high, and the private sector, as a result, tends to use foreign service providers.

The following strategy can address the first issue: the government will invest in the areas in which there are no measurement capabilities, and keep prices relatively high; once there is proper investment by the private sector, the government will leave this area to the private sector, and terminate its services.

The following strategy can address the second issue: fees will be determined for public services in such a way that they will be at least 30 percent higher than the competitive services offered by the private sector and at least 30 percent lower than similar services offered in neighboring countries.

DESIRED STATE OF SUPPLEMENTARY NQI FUNCTIONS

In addition to complying with the requirements of international trade, NQI plays a very important role in the development of new products and services. NQI organizations' measurement infrastructure and expertise are used very effectively to design, test and develop prototypes for new products and improve existing ones. In the desired state, Ukraine's NQI system includes the following supplementary functions:

- Core NQI organizations provide know-how transfer by providing industry with training and consultancy services in the areas of compliance with international trade rules, conditions and requirements of foreign markets, tests needed in during production and tests needed for type approval.
- The measurement infrastructure transmits know-how about new methods for production and testing as well as services for developing prototypes. These services are provided as part of industrial development projects, and relevant metrology organizations function as "solution providers" for resolving problems encountered in the development of new products and services.
- NQI organizations, especially the measurement infrastructure, play a strong role in techno-parks, incubation and innovation centers, and intellectual property protection processes as consultants and experts. They serve as a bridge between academia and industry.
- Measurement infrastructure serves as a research tool for experiments that cannot be easily carried out at universities. Technical shops at metrology centers function as sophisticated repair centers for high-end measurement equipment used by industry, hospitals, and measurement-oriented services

Explanation 3

Industrial projects that are executed by metrology centers are very important for these centers as well to NQI's impact on the economy. The Fuel Marker Project executed by Turkey's metrology institute, UME, is a good example. Considerable quantities of petroleum products are smuggled into Turkey across its southern border from Syria, Iraq and Iran. This causes significant tax losses for the government. Furthermore, some portion of the smuggled products do not comply with standards and harm the equipment they are used in, incurring additional costs for customers, insurance companies, and the state as well as causing environmental pollution.

UME's Chemical Measurements Department developed a fuel marker system composed of a coded chemical marker and detection equipment. The chemical marker is added to domestically produced or legally imported petroleum products. During inspections, the relevant market surveillance body uses detection equipment to determine whether the product is legal or smuggled. The chemical marker is changed periodically, so that smugglers have difficulty reproducing it through reverse engineering. This system is successfully at keeping smuggled products off the market and safeguarding tax revenues estimated at around US\$9 billion. Fines collected amount to US\$80 million per year. UME produces approximately 150 tons of chemical marker annually that is used in 18 billion liters of petroleum products. This system is so successful that many major petroleum products traders use specialized markers produced by UME for their own processes.

This approach does not only generate considerable income for UME, but secures an important revenue stream for the Turkish government. The people and environment of Turkey benefit from proper control of petroleum products.

III. GAPS IN UKRAINE'S NQI

OVERALL ASSESSMENT

Based on international experience, there are three main stages in the development of an NQI:

1. Compliance with international trade rules and international recognition
2. Generating added value to NQI customers
3. Generating added value to economy and society

In every economy, the weights of these stages vary, depending on the perception and expectations from NQI stakeholders. Based on international self-assessment models of business excellence and discussions with various Ukraine's NQI stakeholders, the respective weights of these three stages are estimated at 40 percent, 20 percent, and 40 percent respectively. These weights are typical of economies like Ukraine's, in which industrial output is higher than that of agriculture, but in which industrial products make up a smaller share of exports than agricultural products.

In the first stage, the objective is to convince others that NQI related processes in Ukraine are up to the requirements of international trade. This is achieved by having an appropriate legal framework, properly established NQI bodies, an operational NQI system, membership in international organizations, and mutual recognition agreements with these organizations. The level of fulfillment of this stage in Ukraine could be estimated at about 95 percent. The main area for improvement is full membership of international metrology organizations and active participation in the technical committees (especially CIPM consultative committees).

In the second stage, the objective is to do things right and effectively, not only to convince others. This requires comprehensive stakeholder awareness of and appreciation for the benefits of NQI functions.

In respect of the second stage, Ukraine exhibits a number of noncompliances in specific areas:

- Measurements are not taken in some areas
- Measurements are not done properly
- Uncertainty is not assessed correctly
- Traceability is not provided fully
- Inter-laboratory comparison and proficiency testing are not undertaken
- Accreditation assessment is not carried out properly or is oversimplified
- Metrological supervision is not carried out by experts in metrology
- Inspection is not done properly or at all
- Inspection is not based on hard data, giving the feeling that it is based on personal judgment rather than on an objective process
- Paperwork for certification is not complete

It is not clear to what extent such noncompliance is due to bad intentions and to what extent it is due to lack of resources. Taking into account these problems, fulfillment of the second stage in Ukraine is approximately 50 percent.

Explanation 4

The concept of “believing in the benefits of NQI” may need some explanation. The following example illustrates this added value for NQI customers.

When Turkey’s UME was established in 1992, it faced customers who could not understand why they should bring their equipment to UME for calibration. UME management had to spend considerable time to explain why calibrations were needed and how uncertainty evaluation was used to make better measurements.

In about 10 years, customers’ understanding of the added value of calibration services has completely changed. Today’s customers are not only happy to bring their equipment to UME for calibrations, but ask for more measurements, details of uncertainty calculations, and more data so they can use their measurement equipment more effectively. Some customers even ask for small modifications or additions to their existing equipment. Their increased understanding and appreciation is due to extensive public awareness work done by UME as well as the increasingly high-value products produced for export by Turkish businesses.

The need for calibration (and, to some extent, need for tests) ranges from the basic need for a certificate to prove that the rules are followed, to the advanced need to understand how measurement equipment behaves under specific conditions. NQI plays an increasingly important role as the sophistication of producers and their products grows.

In the third (and last) stage, the objective is to go beyond core NQI functions to generate more added value to the society and economy especially for producing better products. Some examples of such contributions are listed below:

- Raising public awareness in NQI functions, especially in measurement
- Using measurements in social areas such as management, system development, and performance evaluation
- Helping to generate better services by convincing process owners to use relevant NQI tools
- Helping operators to use scientific tools
- Contributing to Ukraine’s innovation system by taking part in the establishment and maintenance of the system
- Taking part in techno-parks and incubation centers and assist with funding organizations to select proper projects to support
- Contributing to the development of science and technology by providing research infrastructure
- Establishing partnerships with foreign organizations for the development of new or improved products or services
- Contributing to product development processes by assisting developers and manufacturers

We estimate that fulfillment of the third stage of NQI development in Ukraine to be approximately 20 percent, since there are some product development activities, as well as publication of some scientific papers that contribute to Ukraine’s international reputation for quality infrastructure.

In summary, Ukraine’s current NQI can be assessed at 56 percent of its potential effectiveness; its contribution to GDP is around US\$ 4.5 billion annually.

If the desired stage of Ukraine’s NQI is achieved, the fulfillment ratio of these three development stages would be expected to be 100 percent, 80 percent, and 75 percent, respectively, raising overall effectiveness of NQI to about 86 percent.

Below is a table summarizing the stages of development for the current and desired states of Ukraine’s NQI, indicating assigned weights, realization rates and the value (score) for each stage.

Development Stage of Ukraine’s NQI	Assigned Weight	Current State		Desired Stage	
		Realization	Value	Realization	Value
Compliance with international system	40%	95%	38%	100%	40%
Generating added value to NQI customers	20%	50%	10%	80%	16%
Generating added value to economy and society	40%	20%	8%	75%	30%
Total development level	100%		56%		86%

The gaps identified between the desired and existing states of Ukraine’s NQI are summarized below. Gaps are grouped according to functions in NQI and numbered sequentially.

GAPS IN CONCEPTS, OPERATIONS, AND OUTPUTS

Market Structure

- G1. The market has a large share of state-owned enterprises. This situation has many disadvantages:
 - Lack of real competition
 - Low productivity
 - Weak participation of industry in NQI decision making system
 - Weak customer feedback mechanisms
 - Weak complaint handling processes
 - Weak tracking international technical developments and "seeing the future"
- G2. In such an environment, support for new, high-quality, high-value or high-technology products or services is insufficient.
- G3. There is an absence of a strong venture and/or risk capital culture. This is hampering the development of new high-value products, reducing the competitiveness of Ukrainian products in international markets.
- G4. National innovation policy is not well developed. It neither covers all sources of innovation (such as using NQI as one of the pillars of innovation) nor is implemented fully.

Concepts Observed that May Have a Negative Effect on NQI Development

- G5. The private sector expects the GoU to solve its problems.
- G6. There is a tendency to rely on personal connections rather than on the rule of law to solve problems.
- G7. Expectation from NQI organizations is mostly in terms of “provide the paper I need”.
- G8. Public servants and public organizations are considered competent and therefore immune from certification and accreditation.
- G9. Most state organizations are wary of private sector participation in NQI decision-making processes. In turn, the private sector is “too busy” or “lacks resources” to participate in decision-making. As a result, participation of the private sector in Ukraine’s NQI decision-making system is low.

Operations

- G10. All NQI organizations exist, but their effectiveness is not sufficient for the needs of Ukrainian industries.

Legislation and NQI Structure

- G11. In general, legislation is good; however, implementation of the legislation may not be very successful, due to resource limitations in certain NQI organizations.
- G12. Legislation needs improvement in the following areas:
 - Designating the metrology institute(s) as well as accreditation and standardization organizations in legislation
 - Improving the governance of these organizations to better protect them from political and administrative interference
 - Providing financial autonomy to these organizations and re-define their roles such that they become financially self-sustainable
- G13. A considerable quantity of secondary legislation has been enacted to implement seven core NQI laws. It may be that there has been too much legislation (primary and secondary), which places a burden on industry. The legal framework needs to be supported by capable implementation.
- G14. Having four Scientific Metrology Centers and not having a (single) metrology institute is not in line with OIML D1 recommendations and is not a streamlined situation. This also has negative consequences in international representation and participation in international activities.
- G15. There is no technical lead organization in legal metrology.
- G16. Conflict of interest issues are not easily clarified, especially with frequent changes of legislation.
- G17. MEDT has a major role in the NQI system; it appears to be the major decision maker for most of the NQI. However, its coordinating role is not well defined.
- G18. Administrative and financial autonomy is missing in core NQI service providers (in metrology, accreditation, and standardization). This makes the impartiality for metrology and accreditation questionable.
- G19. Inspection processes within market surveillance operations are not accredited. This raises questions about the technical competence of inspectors.

Market Operations and Support for Better Products

- G20. Less and less mandatory certification for products is needed; however, the benefits generated by this policy have not been assessed yet.
- G21. A notion of “product development support” with active utilization of NQI organizations does not exist.
- G22. The contribution of metrology to product development is unsatisfactory.
- G23. There are no strong linkages between metrology and technology development. Linkages between metrology and the national innovation ecosystem (including industrial R&D) need considerable enhancement.

Conflict of Interest Issues

- G24. MEDT TRD’s scope of operations is very wide and its powers are broad. It controls the core QA service providers and gives the impression of being centralized NQI organization. This impression generates the appearance of a conflict of interest in two areas:
- MEDT TRD appoints the directors of the core NQI institutions, and approves these organizations’ operations, budgets, and international relations. As a result, MEDT TRD has enough leverage to influence the decisions of core QA service providers. This apparent conflict may not have had a negative effect up to now, but there is nothing to prevent it from doing so in future.
 - MEDT TRD does not appear to have policy to avoid conflicts of interest between MEDT TRD facilities performing certification, calibrations and testing and other organizations that perform similar activities. To further complicate the matter, accreditation of MEDT TRD “competitors” is done through NAAU, which works under MEDT TRD.

Protection of the Market and the Issue of Inspection

- G25. Existing implementation procedures for discouraging low-quality, non-compliant products (including counterfeit products) are insufficient to protect the market. This is an important issue, as conformity assessment by self-declaration is more and more frequently used.
- G26. Assessment of the impact and effectiveness of Ukraine’s market surveillance system is not carried out.
- G27. At present, MSBs perform inspections, even though they are not accredited for this. Inspection requires a specialized set of expertise. Some independent accredited inspection bodies exist, but their role in market surveillance processes is not clear. In addition, the role of personnel certification is not well defined.

Conformity Assessment System

- G28. The difference between implementation of local and EU conformity attestation may harm some Ukrainian producers until UkrCEPRO system is phased out completely. These producers may be forced to comply with both set of rules, increasing the cost of the products and reducing competitiveness.
- G29. A list of required conformity assessment processes does not exist. Producers have to spend a lot of time to get this information.

Technical Regulations and Standardization

- G30. The private sector plays an insufficient role in the development of standards. Officials point to the private sector's low level of interest in contributing to standards development. Presenting information on a website and inviting comments from industry representatives are necessary, but not sufficient. Even when industry participates, the impact is low due to limitations on expertise skills in standards development. Interest groups such as manufacturers' unions and sector trade groups make an insufficient contribution to the standards development process.
- G31. The apparent low level of demand for harmonized standards, despite some recent progress, particularly in the field of consumer products, is a problem as it may indicate the domestic markets as a dominant target rather than foreign markets.
- G32. The lack of availability of international standards in Ukrainian is a problem since most people who use these standards, especially for tests, do not have foreign language skills. If Ukrainian versions of international standards are prepared, such these versions need to make clear which language version is legally definitive.
- G33. Stakeholder have low awareness of standardization.
- G34. New standards and information on international developments in standardization are disseminated too slowly.
- G35. Electronic and physical recordkeeping and maintenance of standards need improvement.
- G36. Differences in the prioritization of needs in Ukraine versus prioritization of the EU is a source of concern in the preparation of TR.
- G37. The effectiveness of existing standards has not yet been appraised.

Metrology and Measurements

- G38. The availability and quality of reference materials for chemical and medical measurements are not sufficient.
- G39. Participation in international inter-laboratory comparisons and entries to CIPM/MRA CMC tables are low compared to similar economies in Europe.
- G40. Product testing, a major source of revenue, is restricted by limited laboratory investments in the Scientific Metrology Centers and Legal Metrology Centers.
- G41. There is shortage of exposure (understanding how they operate, and what kinds of management tools they use, as well as how they plan and prioritize new investments) to metrology institutes outside the former Soviet systems.
- G42. Interaction with industry in designing new high-quality goods or improving production is at a low level.
- G43. More measurement laboratories are needed for chemical and medical analysis.
- G44. More measurement laboratories are needed for metallurgical analysis.
- G45. More testing laboratories are needed for products that are in mandatory product testing lists.
- G46. Problems exist regarding uncertainty evaluation for traceability.
- G47. Problems exist with traceability, mostly due to lack of resources.

Accreditation

- G48. Operational effectiveness of accredited bodies could not be assessed. Almost all areas of certification are covered. There is room for improvement in the areas of energy management, information security and, to some extent, personnel certification.
- G49. Accreditation for medical laboratories is not yet recognized by the international system.
- G50. More certifications by personal certification bodies are needed for personnel working in various NQI organizations, especially in MSBs.
- G51. The very large number of accredited organizations results in assessment blindness: the same assessors visit the same organizations over and over.
- G52. IT infrastructure may not be adequate to keeping track of the very large number of accredited organizations.
- G53. Insufficiency of technical assessors especially for laboratory accreditation that makes sure that traceability is obtained properly, is a problem.

Other Issues

- G54. NQI services are not in the form of steering or guiding but controlling. This is especially important in testing and product certification. Existing NQI services are mostly concentrated on controlling end products or services for compliance.
- G55. The following characteristics of independent NQI service providers are not assessed and documented:
 - Quality of operations
 - Scope of operations (especially in product and service certification bodies)
 - Impact on economy and society
 - Relations with core service providers (metrology, accreditation and standardization)
 - Relations with regulating bodies
 - Relations with similar bodies in other countries
 - Relations with international organizations

Decision-Making System and Institutional Development

- G56. There is considerable room for improvement in institutional development in the following areas:
 - Long term planning responsive to national economic forecasts in both NQI institutions and MEDT TRD
 - Assessment of operational effectiveness
 - NQI needs assessment
 - Monitoring and self-assessment of NQI organizations
 - Human resources, staff capacity building and career planning
 - Measurement of the economic and social impact of core NQI service providers
 - Investment planning to prioritize the use of limited resources more effectively
 - Customer feedback and stakeholder expectation monitoring system
 - Knowledge management and project management systems

The overall governance of Ukraine's NQI seems to rely a lot on strong individual decisions makers. As long as these decisions are good, such reliance could be helpful. However, there are no systems in place to protect against poor top-level decision-making. Few collective decision making processes exist.

The main source of these problems in decision-making is the weak institutional development of the key players in Ukraine's NQI. This institutional development problem is related to the institutional experience of core QA service providers. Ukraine's NQI organizations are rather young and need time to fully develop. On the other hand, these NQI institutes have substantial economic and social contributions to make. It would be beneficial to accelerate the institutional development of core QA service providers to increase their effectiveness and efficiency and decrease the cost of their operations.

GAPS IN INFRASTRUCTURE AND CAPABILITIES

- G57. There are serious limitations in metrology due to infrastructure, especially at Kharkiv scientific metrology center (NSC "Institute of Metrology). The other Scientific Metrology Centers also need some renovation of existing premises as well as new and often better measurement system in their laboratories.
- G58. Know-how transfer is also needed.
- G59. Rules for the transportation of equipment to other countries for repairs, calibrations, and comparisons needs revision.
- G60. In some areas, such as product testing laboratories, product certification bodies, and medical laboratories, the number of accredited organizations may not be sufficient to fulfill industry needs.
- G61. Low remuneration hampers the ability to attract and retain sufficiently qualified staff
- G62. There is lack of awareness about usefulness of NQI, including available physical infrastructure.

Know-How

- G63. Existing knowledge in the following areas need to be enhanced or corrected:
 - knowledge of how market economies work
 - knowledge of the operations of NQI organizations and conformity assessment schemes in competitive environments
 - knowledge of what similar organizations in other countries do (and why).
- G64. There is room for improvement in technical staff's knowledge of measurements at various NQI organizations.
- G65. There is a shortage of properly qualified and knowledgeable long-term external consultants.

Physical Infrastructure

- G66. There seems to be considerable need for new investments in the following areas in order to better utilize existing technical capability more:
 - facilities infrastructure
 - measurement equipment
 - IT equipment

Capabilities

Ukraine's extensive network of calibration and testing laboratories is impressive. However, serious capacity problems underlie the impressive numbers of laboratories:

- G67. The capacity of the Scientific Metrology Centers to provide traceability to calibration and testing laboratories through direct calibration of measurement instruments is not sufficient.
- G68. The capacity to organize inter-laboratory comparisons and proficiency testing in order to handle all calibration and testing laboratories is not sufficient.
- G69. The capacity to participate in such comparisons and testing needed for international recognition of accreditation is not sufficient.

GAPS IN AWARENESS, EXPECTATIONS AND PERCEPTION

- G70. A lack of stakeholder awareness and low staff exposure to international best practices seem to be common throughout the NQI system.
- G71. Stakeholder expectations and perceptions are not determined.
- G72. RIA is used, but the effects of various decisions by NQI organizations are not studied.
- G73. There is a gap in public awareness and expectations regarding NQI in Ukraine. This is a serious problem that needs to be remedied as soon as possible. For example, the concept of TR is not broadly understood: TR are often confused with standards or business regulations.
- G74. In industrially developed countries, private sector producers are the driving force in NQIs. Generally, a market need is recognized and the industry responds with proposals to address the need. The state regulates the market and establishes key elements of NQIs, such as regulators, metrology, standardization, and accreditation organizations. Needs are apparent and awareness among producers is widespread. The public is rather knowledgeable due to broad information dissemination. In Ukraine, in contrast, the state is expected to be the driving force in NQI.
- G75. Even within regulatory bodies, there is some confusion about how market surveillance works. Awareness of needs, good practices, and expectations is weak and requires improvement.
- G76. There is a general public awareness problem in Ukraine regarding what NQI is and how it operates. This issue can be solved with a single large public awareness campaign (**Public Awareness Campaign**), as described below, but this has to be sustained in the long run through ownership of the process.

GAPS IN COORDINATION

- G77. Having a central authority should make coordination and long-term planning easy; in the case of the MEDT TRD, however, there is not much evidence that coordination and long-term planning are working efficiently.
- G78. Coordination between the four Scientific Metrology Centers and the 28 regional Legal Metrology Centers may be substandard.

GAPS IN FUNDING

- G79. Financial and other resource problems are common in all NQI organizations.
- G80. Lack of financial autonomy is harming the NQI organizations, which place an unnecessary burden on the GoU budget.

- G81. A new or expanded comprehensive, long-term strategy for Ukraine's NQI is needed in order to make relevant NQI organizations (whether in standardization, metrology or accreditation) financially self-sufficient.
- G82. There is a serious problem regarding funding new operations and services, such as new measurements, production of reference materials and organization of laboratory inter-comparisons and proficiency testing. Raising funds for new investments can be achieved either by (i) increasing government support or (ii) increasing the revenues of core NQI organizations, particularly revenues related to measurement. The second option depends on either (a) increasing capabilities and entering new areas where demand exists, or (b) increasing the size of the market, so that more customers use the services of the NQI. Option (a) requires significant budget allocations. Option (b), increasing the size of the market, can be achieved either by expansion of domestic market through new regulations, or by opening up to the external markets by means of exportation of services (through acquired experience). At present, no guidance or strategy exists in this area.
- G83. In addition to the need for improved laboratory infrastructure, there seems to be insufficient funding for market surveillance. Coverage of inspections for the whole of the market is rather thin.
- G84. In order to sustain public awareness processes as well as transfer know-how, additional funding is needed for a Training and Quality Center to serve the core NQI organizations. Funding to support such Training and Quality Center is not identified.

IV. RECOMMENDED REFORMS FOR THE TRANSFORMATION OF UKRAINE'S NQI

Ukraine has already implemented a number of reforms moving closer to the best international practices in NQI. To ensure the continuation and sustainability of reforms, Ukraine need to ensure its overall strategy and polices are clearly articulated. The Strategy for the Development of the Technical Regulation System (including an action plan) until 2020 approved by CMU resolution in August 2015 is a good starting point for a broader national quality policy or strategy, which is required to reflect the next stage of NQI development in Ukraine.

Such a long-term strategy could be structured as follows:

- Methodology used to develop the strategy
- SWOT analysis for the existing system of Ukrainian NQI
- Vision (where would Ukraine's NQI be in 10 years)
- Objectives (what we want to accomplish in 5 years, 10 years)
- Study of the stakeholder perception of NQI
- Economic and social impact analysis (development of methodology and implementation of the methodology for existing state of NQI and 10 years later)
- Need assessment for whole of NQI (what stakeholders of NQI expect of Ukrainian NQI)
- Need assessment of NQI organizations in order to fulfill the stakeholder expectations
- Structure and operation of NQI
- Investment planning and prioritization (modules that may be used to prepare future projects)
- Policies and Actions for the implementation of the Strategy (how we want to reach objectives set and realize the visions in five and 10 years)
- SWOT analysis for the maintenance and implementation of strategy

The Strategy could cover the following topics:

- Transformation of key NQI organizations as well as MEDT/TRD to their new roles
- Changes needed in the legal infrastructure
- Technology tracking methodology
- Industrial support mechanisms (what has to be done in order to assist industry to produce better products and services besides the standardized services of NQI organizations)
 - Innovation centers
 - Techno-parks and Incubation centers
 - Quality and Technology awards
 - Quality and Training Center
- Institutional Development of NQI organizations (how the services of NQI organization can be improved)
 - Human resources development and career planning system
 - Knowledge management system
 - Project development and management system
 - Stakeholder expectations and customer feedback system
 - Monitoring, evaluation, and self-assessment system

- Need assessment and prioritization of investments methodology

To ensure the implementation of such strategy, the following sections highlight the main reforms actions recommended for further transformation of Ukraine's NQI. Short-term actions (**STAs**) are those that could be implemented within three years and long-term actions (**LTAs**) are those that might require more than three years to be implemented. STAs could be implemented simultaneously. Each STA specifies "what needs to be done" and then provides specific activities called Quick Wins (**QWs**) specifying "how it needs to be done".

SHORT-TERM ACTIONS

STA1 Prepare Program for Long-Term Activities

- QW1. Establish working groups to address the preparation of the strategy and long-term activities specified below. Prepare a program for the implementation of these long-term activities. Raise necessary resources.
- QW2. Prepare investments project(s) in order to strengthen physical and operational infrastructure that are based on investment modules developed under the NQI Strategy.

STA2 Complete Last Elements of International Recognition⁴

- QW3. Achieve full membership of Metre Convention.
- QW4. Achieve full membership of OIML.
- QW5. Make membership in WELMEC an objective.
- QW6. UkrLAB, representing all accredited measurement labs in Ukraine, should be established and become a member of the European Federation of National Associations of Measurement, Testing and Analytical Laboratories (EUROLAB).

STA3 Encourage Institutional Development of NQI Organizations

- QW7. A study should be done for the institutional development of NQI organizations in line with national quality policy or strategy. Prepare a program for institutional development in the following areas as soon as possible:
 - Human resources and career planning
 - Knowledge management
 - Project development and implementation
 - Management of customer and stakeholder expectations
 - Monitoring, self-assessment, and evaluation of processes
 - Assessment of economic and social impact
 - Long term planning
 - Investment planning and prioritization
 - Needs assessment

⁴ NAAU is preparing to sign an IAF Multilateral Agreement, which would be the final step for international recognition in the accreditation area.

- QW8. Enhance the capability of relevant organizations, especially Scientific Metrology Centers, in advance of planning of a large investment project in order to resolve potential traceability issues.
- QW9. Conduct a needs analysis study in order to optimize resources available for market surveillance.
- QW10. Improve stakeholder perception about what market surveillance is and how it is implemented and improve coordination among elements of market surveillance.
- QW11. Conduct study tours to other countries in order to observe how NQIs and their constituent elements function in advanced market economies.
- QW12. Implement a know-how transfer program for staff of MEDT TRD and its organizations.
- QW13. Design a Quality and Training Center, preferably within NSB, to be the center for know-how and the custodian of long-term public awareness processes.

STA4 Assess Effectiveness of Legal System

- QW14. Conduct a review with a view to potential streamlining of the legal framework involving all stakeholders.

STA5 Resolve Conflict of Interest Issues

- QW15. Delegate management functions in each of core NQI organization to a managing board, as discussed in LTA3. Appointment of the director, budget, work plan, travel approvals, investments, all human resources functions (hiring, firing, promotion, salary structure, performance monitoring, training, etc.), as well as all customer-related functions should be determined and implemented by the management of the relevant NQI organization.
- QW16. Promulgate a fee policy in order to prevent unfair competition for the public NQI services. See G24 for a description of the problem.

STA6 Increase Confidence in Market Surveillance

- QW17. Use external accredited inspection bodies for market surveillance.
- QW18. Get internal inspection services of MSBs accredited.
- QW19. Have MSBs' inspectors certified by an accredited personal certification body.
- QW20. Use the Scientific Metrology Centers as well as the Legal Metrology Centers for metrological supervision functions.

STA7 Increase Effectiveness of Core NQI Organizations

- QW21. Facilitate attainment of financial autonomy for core NQI organizations.
- QW22. Increase the role of core NQI organizations in conformity assessment processes by providing measurement (NSB), certification (metrology centers and NSB), and inspection (metrology centers) services to their customers.
- QW23. Raise resources needed for more investments in premises and equipment for the Scientific Metrology Centers.
- QW24. Raise resources needed to increase staff capacity through study tours, training, and consultancy.

- QW25. Establish more contacts with foreign NQI organizations, especially in Ukraine's major trading partners.
- QW26. Be more active in CIPM Consultative Committees (this depends on Ukraine's full membership in the Metre Convention).
- QW27. Establish contacts with EURAMET, EURACHEM, and IRMM, and participate in their activities. Especially in the area of measurement in chemistry, there is a lot to gain in collaborating with these organizations since measurement uncertainty and reference materials are problems in Ukraine.
- QW28. Participate more in international comparisons and provide more entries to CMC tables. For the time being, both comparison data and CMC entries are promising, but do not reflect Ukraine's level of economic development and industrialization.
- QW29. Assess regularly existing testing and calibration capabilities and prepare a program to respond quickly to industry needs.
- QW30. Solve traceability and uncertainty issues by providing more measurement services, starting new measurement services when needed, and improving the accuracy of measurements by using more modern equipment.
- QW31. Increase inter-laboratory comparisons and proficiency testing activities in response to recommendations from international organizations and requirements of regional accreditation and metrology organizations.
- QW32. Clarify the difference between calibration and verification, and use calibration for traceability as much as possible. Prepare a guidance document on NQI concepts. Disseminate Vocabulary in Metrology (**ViM**) to all stakeholders.
- QW33. Get involved in more industrial projects in order to contribute in high quality and/or high technology products as well as improving production processes especially for SMEs.
- QW34. Conduct an assessment study in order to evaluate the effectiveness of market surveillance processes.
- QW35. Compile a national inventory of existing testing and calibration capabilities (that exist in all accredited measurement laboratories as well as in universities, other R&D organizations, military, and special organizations such as doping control, customs, forensics) to provide necessary inputs for a demand and supply analysis as well as need assessment studies.
- QW36. Design training programs in traceability and uncertainty issues.
- QW37. Investigate how effectiveness of inter-laboratory comparisons and proficiency testing can be increased.
- QW38. Improve existing procedures for fighting low quality as well as counterfeit products.
- QW39. Establish a national notification system on hazardous goods in order to strengthen reactive market surveillance

STA8 Increase Efficiency of NQI System

- QW40. Use institutionalized customer feedback system to assess the impact of operations on customer needs for NQI organizations.

QW41. Conduct a customer perception study in order to understand how customers feel about Ukraine's NQI organizations.

QW42. Determine the expectations of customers regularly.

QW43. Assess impact of key decisions made regarding NQI functions and operations.

STA9 Raise Awareness about NQI Role

QW44. Conduct Public Awareness Campaign.

QW45. Conduct a strengths, weaknesses, opportunities, threats (SWOT) analysis workshop to determine the strong and weak areas of Ukraine's NQI and assess threats and opportunities.

STA10 Improve Access to Information

QW46. Develop and disseminate online a product and service compliance database along with the list of regulators and MSBs.

QW47. Make current laws and regulations as well as proposed changes available online (see LTA5 for long term improvements in legal framework).

STA11 Enhance Cooperation with R&D Establishments

QW48. Increase the role of NQI organizations, especially Scientific Metrology Centers in techno-parks, incubation centers, and innovations.

QW49. Increase the role of NQI organizations, especially Scientific Metrology Centers in project assessment and grant allocations to the industry.

QW50. Increase the role of NQI organizations, especially Scientific Metrology Centers in advanced technology awards.

LONG-TERM ACTIONS

LTA1. Prepare a Technological Development Model with the Involvement of Relevant NQI Organizations

A general strategy for technological development is needed to maximize NQI's economic and social benefits. A preparatory study should be conducted for a Product Development Support System, under which NQI organizations would contribute to by developing and improving products, materials, processes, and services. The technological development model should be based on the national quality policy or strategy, make use of national development plans and objectives and determine the role of NQI, especially metrological infrastructure, in national technological development. The study should clarify desired linkages between NQI, innovation infrastructure (including R&D), and product development processes.

LTA2. Develop an Effective Central Coordination System for NQI

Although MEDT TRD has a coordination role, this doesn't cover all technical regulators and MSBs. An NQI Coordination Body needs to be established, possibly within MEDT TRD and a permanent secretariat handled by LMIU. The following stakeholders or representative of stakeholders should be represented in this NQI Coordinating Body:

- Technical regulators

- MSBs
- NAAU
- NSB
- MIU (to be established)
- LMIU (to be established)
- UkrLAB (to be established)
- Representatives of consumer protection organizations
- Representatives of chambers of commerce and industry

Proposed responsibilities of the NQI Coordinating Body:

- Coordinate the activities of NQI organizations
- Assess the overall needs of Ukraine's NQI
- Assess the needs of NQI organizations
- Monitor the performance of NQI organizations, including technical regulators and market surveillance organizations and specialized organizations such as customs, doping control, and forensics
- Supervise operations and handle complaints
- Track developments in technology and foreign trade in order to anticipate future needs, responsibilities and competencies of NQI organizations
- Perform regular impact analysis and gap assessment of processes used in NQI operations
- Implement NQI Strategy
- Propose collaboration and peer review activities with foreign and international organizations
- Guide investors in NQI

LTA3. Revise the Role of MEDT in Ukraine's NQI

Within Ukraine's NQI, technical and daily operational decisions should be made by independently managed, self-supporting (where possible) technical bodies. The MEDT, as the central authority, should be responsible for policy, coordination and long term planning functions. It is generally understood that all decisions regarding the operation of an NQI body, especially NQI organizations, should be handled by body's top management composed of a director and a managing board. Appointment of the director, budget, work plan, travel approvals, investments, all human resources functions (hiring, firing, promotion, salary structure, performance monitoring, training, etc.), as well as all customer related functions should be determined and implemented by the management of the NQI body, not by the central authority.

The MEDT, as the central authority, should be responsible for relations among NQI organizations, relations between NQI organizations and R&D infrastructure, the role of NQI in the innovation ecosystem, weak areas and needs in investments in NQI, areas to be improved, and adaptation of NQI to changing economic and social requirements and system-wide decisions and policies and strategic planning. MEDT should concentrate on how NQI system can more effectively contribute to the development of Ukraine's economy.

Rather than closely managing already well-managed NQI organizations, MEDT could modify its functions in regards to NQI. MEDT could work, in collaboration with the Academy of Sciences,

universities, and innovation centers, to support Ukraine's innovation ecosystem with targeted support to business incubators, techno-parks and advanced technology educational programs, in coordination with relevant NQI organizations. Such support could include laboratory access, mentoring, consulting, technology commercialization and project management assistance, and facilitation of investment by industry.

MEDT may help industry to produce high quality, high value and/or high technology products and services by either contributing to the end product or to production processes. Once this system is working, and proven project management procedures supporting the industry are in place, external funding would be attracted in the form of angel investors, risk or venture capital and, last but not least, foreign direct investment (FDI).

Further study of this idea for a potential shift in the role of MEDT makes sense in the context of national NQI Strategy.

Note that revising the role of the MEDT entails a separation of technical and administrative decision-making systems that would address the conflict of interest concerns raised earlier in this Assessment.

LTA4. Reorganize the Metrology System

As discussed above, the existing system in metrology is internationally recognized and complies with international requirements. However, return on the substantial investment in laboratories and other infrastructures is quite low. The direct customers of NQI are not getting the full benefits and the metrology infrastructure is not sufficiently contributing to the economy and society.

In order to address this problem, the following six models of metrology system setup are suggested, with the first being the most preferred model, and the sixth being the least preferred one. It is strongly recommended that one of these models be implemented in order to increase the effectiveness of Ukrainian metrology infrastructure and increase return on investment.

1. Establish a new national Metrology Institute of Ukraine (MIU) with new premises and equipment. MIU will be headquartered in newly constructed premises equipped mostly with new systems to be procured. Some of the existing national measurement standards will be moved to this new institute. The four existing Scientific Metrology Centers, with remaining national measurement standards, function as DIs. The 28 existing Legal Metrology Centers are merged with MIU. MIU is established by law and managed by a management board composed of an equal number of representatives from the public and private sectors. MIU is a financially autonomous, not-for-profit organization with surplus income directed into new investments. MIU reports to MEDT, and must obtain MEDT's approval when signing international agreements. However, fees due under these agreements are paid from MIU's budget. In time, when new investments in scientific metrology are needed, these investments will be made only through MIU, and scientific metrology work in remaining three centers will be phased out gradually and they will be repurposed as accredited calibration laboratories. MIU will represent Ukraine in all international metrology organizations.
2. Consolidate all metrology centers (the four Scientific Metrology Centers and 28 Legal Metrology Centers) into the MIU, which will be responsible for all-metrology related processes in Ukraine. The MIU will be headquartered in a newly constructed premise equipped mostly

with existing equipment from the Kharkiv Scientific Metrology Center and some items from other Scientific Metrology Centers, and will have 28 branches. The establishment and operation of MIU is identical to the system described in the previous paragraph. In time, when new investments in scientific metrology are needed, these investments will be made only through MIU, and scientific metrology work in the remaining three Scientific Metrology Centers will be phased out gradually. MIU will represent Ukraine in all international metrology organizations.

3. Designate the Kharkiv Scientific Metrology Center as the MIU and the Kyiv Scientific Metrology Center (SE Ukrmetrteststandard) as the LMIU. Merge the Legal Metrology Center in Kharkiv (SE Kharkivstandardmetrologiyi) into MIU. Other Scientific Metrology Centers function as DIs for CIPM MRA purposes. All Scientific Metrology Centers also perform legal metrology work. All Legal Metrology Centers become branches of LMIU. Both MIU and LMIU operate within the structure described in the model 1 for the operation of MIU. MIU represents Ukraine in all international scientific metrology organizations (Metre Convention, EURAMET, COOMET). LMIU represents Ukraine in all international legal metrology organizations (OIML, WELMEC).
4. Designate the Kharkiv Scientific Metrology Center as the MIU and merge the legal metrology center in Kharkiv (SE Kharkivstandardmetrologiyi) with MIU. Three other Scientific Metrology Centers function as DIs for CIPM MRA purposes. The Scientific Metrology Centers also perform legal metrology work. Leave remaining Legal Metrology Centers as state enterprises under MEDT. MIU operates within the structure described in the aforementioned recommendations. MIU represents Ukraine in all international scientific metrology organizations (Metre Convention, EURAMET, COOMET). MEDT represents Ukraine in all international legal metrology organizations (OIML, WELMEC).
5. Leave the metrology system structure as it is, but merge the Kharkiv Legal Metrology Center (SE Kharkivstandardmetrologiyi) with the Kharkiv Scientific Metrology Center. Change the management system of Scientific Metrology Centers as described above. International representation remains as it is currently.
6. Leave the metrology system structure as it is, but provide a fixed budget for each national measurement standard established and maintained, as well as each CMC entry made by each Scientific Metrology Center. Change the management system of Scientific Metrology Centers as described above. International representation remains as it is currently.

In addition to these six models, it is desirable that the Scientific Metrology Centers contribute to development projects in Ukraine and abroad for the improvement and development of measurement systems, products, materials, processes, and services. Collaboration with universities, R&D centers, industry and international organizations should therefore be encouraged and intensified.

LTA5. Modernize the Legal Framework

The legal framework is acceptable, though it is excessively complex and subject to frequent change. In the future, however, considerable changes may be needed as a result of:

- A need for further simplification

- Larger participation of the private sector in delivering QA services. One aspect of this may be that more responsibility, for example for inspection, is delegated to private service providers.
- A change in the role of MEDT TRD and/or core QA service providers. For example, MEDT/TRD may have a better and wider coordination role, NAAU, NSB get more autonomy, metrology is re-structured, or all core service providers are encouraged to be self-sufficient financial

A regular review of relevant laws and regulations is advised.

LTA6. Institutionalize Needs Assessment, Long-Term Planning, and Investment Prioritization Processes

This Assessment appraises the overall needs of Ukraine's NQI and its elements. It could be done once and with rather limited resources. A more in-depth study is also needed looking at the supply and demand for NQI and at long term planning coordinated with the GoU's economic development strategy, and investment planning and prioritization based on quantitative analysis rather than key staff opinions. Without such in-depth study, Ukraine's NQI can do no more than respond to problems as they arise.

The needs of both the customers of NQI organizations and the NQI organizations themselves to address customers' needs are to be analyzed periodically (every two or three years), on both macro and micro levels. Macro analysis (on the basis of this Assessment, enhanced as necessary) should be used as the input for long term planning and investment prioritization. Micro analysis should address details such as the list of needed equipment needed, qualifications of new staff to be hired and needs for know-how transfer, and should be the basis for annual work programs. Elements of the micro analysis will be similar to the elements of investment plans or international projects.

These issues as well as methodologies to be used for needs assessment, long-term planning, and prioritization of investments can be done separately or as a part of the development of a comprehensive NQI strategy.

V. NEEDED INVESTMENTS AND IMPACT ASSESSMENT

ABSORPTION CAPACITY

Investment absorption capacity is mostly limited in the area of measurements. The metrology system and measurement infrastructure consists of the metrology institute, the legal metrology system, secondary accredited calibration, testing and analysis laboratories, government, university and military laboratories, and other measurement facilities. This system is extremely expensive, takes a long time (up to 15 years) to develop fully and requires intensive work with scientists. It is quite difficult to develop a well-functioning metrology system.

Needs for metrology are usually similar around the world. We all need cars, food, medical care, cell phones, and thousands of other products or services. The size of an economy affects the scale, but not the type of needed metrological services. Metrology institutes in all countries should be able to handle as many types of measurement as possible. Therefore, metrology institutes in small economies are at a disadvantage. With limited resources and a scope of work they are expected to handle as many types of measurement as those in large economies. All metrology institutes should have national measurement reference standards in almost all categories of measurements.

The size of the economy also affects secondary accredited calibration, testing, verification and analysis laboratories. If an economy is large, then a large number of laboratories is needed; if the economy is small, demand is small, and a small number of laboratories is sufficient. Set out below are general (i.e. not specific to Ukraine) resources needs for NQIs in all countries:

Metrology Institute: Funds needed for the metrology institute range between US\$ 5 million and USD 200 million, and up to 15 years is required for full development and international recognition. Funds are generally needed for know-how transfer, measurement equipment, and buildings.

Legal Metrology: Funds needed for legal metrology range between US\$ 0.5 million and US\$ 5 million, except for type testing of products. Up to 5 years is needed for full development and international recognition. Funds are generally needed for know-how transfer and measurement equipment.

Secondary Calibration, Testing, and Analyzing Laboratories: Funds needed for the secondary laboratories for calibration, testing, and analysis range widely between US\$ 2 million and US\$ 500 million, depending on the needs of the economy and requirements for product testing. Between two and 15 years are needed for full development and international recognition. Funds are generally needed for know-how transfer and measurement equipment.

So, costs are substantial, especially in the measurement area, and may require about five years to complete planned investments.

The main limitations for the successful implementation could be grouped in terms of:

Facilities

- **Availability of laboratory space**
- **Suitability of laboratory space**
- **Time needed for renovation or construction of laboratories**
- Supply of electricity, other utilities

- Availability of maintenance infrastructure

Staff

- Quantity
- Experience
- **Foreign language skills**
- **Trainability**
- Distribution

Financing

- Running costs
- **Maintenance and traceability costs**
- **Procurement of goods, works, and services**

Ownership/decision-making

- Existence of process owners
- Suitability of process owners
- **National decision-making system**
- Customs formalities

The highlighted limitations in the list above are the most important problems that could affect the absorption of needed investments, which is estimated at about US\$25 million for a five-year period. This is the maximum investment absorption capacity of Ukraine's NQI, taking into consideration that effective use of funds starts in the last quarter of the first year of the project implementation and is completed in the third quarter of the last year of implementation.

It should be emphasized that the actual need is probably twice as much or more (due to the need to replace aging equipment in Scientific Metrology Centers). It is, therefore, highly probable that further investments of similar size will be needed.

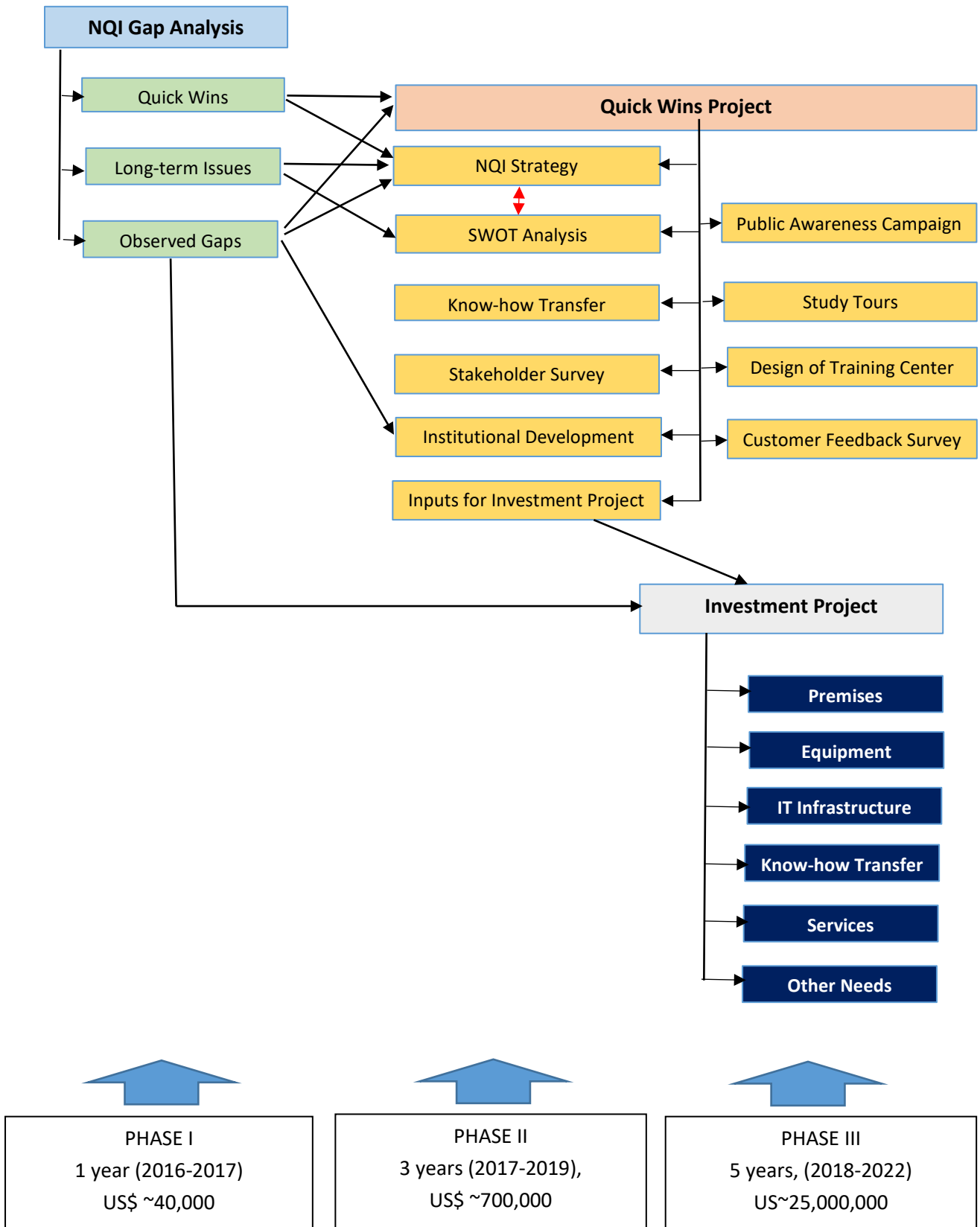
REFORM PHASES AND RESOURCES NEEDED

In summary, the support for Ukraine's NQI is proposed to be carried out in three steps:

1. Gap assessment (this Assessment)
2. Quick Wins reforms with a tentative cost of US\$700,000 to be completed within three years
3. A large investment project with a tentative cost of US\$25 million to be completed over five years.

Below is a graphic depiction of these three phases of the proposed support to upgrade Ukraine's NQI.

Upgrading Ukraine's NQI



Phase I is completed with the finalization of this Assessment.

Phase II would require about US\$ 700,000 for the implementation of the short-term Quick Win activities:

No.	Activity	Estimated cost (US\$)	Approximate duration (months)
1	Development of NQI Strategy	100.000	12
2	Design and implementation of SWOT analysis workshop	20.000	4
3	Design and implementation of public awareness campaign	150.000	36
4	Know-how transfer (training and consultancy)	60.000	36
5	Design and implementation of study tours	30.000	24
6	Design and implementation of stakeholder expectation survey	40.000	12
7	Design and implementation of customer feedback survey	50.000	12
8	Detailed design of an institutional development program	80.000	6
9	Design of the Quality and Training Center	20.000	6
10	Design of a large investment project	150.000	24
	Total	700,000	36

These are tentative figures and do not include overheads such as project management costs if external funding is used. Once the scope of each component to be financed is known, more definitive actual costs could be estimated.

The figures for the development of the NQI Strategy and public awareness campaign are approximated from similar work done in other countries in Eastern Europe, the Balkans, the Caucasus, Turkey, and Central Asia. These are the minimum costs that assume the use of one international expert per activity.

For the development of the NQI Strategy, an international expert would need to be supported by two local experts. Based on these assumption, the cost would be around US\$100,000.

Another option would be to use three international experts for (i) metrology and market surveillance, (ii) accreditation and conformity assessment, and (iii) standardization and TR, along with three local experts. One of the international experts could do the consolidation needed for the final version of the Strategy. The cost would then be expected to be around US\$220,000.

A third option would be to engage a consulting firm for the preparation of the NQI Strategy. The cost could then be around US\$370.000.

For the preparation of a public awareness campaign, a hiring of a local or an international consulting firm with relevant experience is factored in the estimated budget. MEDT TRD would arrange the dissemination of the materials through various channels, including public meetings, media appearances, advertisements, websites, and brochures. The cost would be around US\$150.000.

Costs for know-how transfer and study tours are flexible, and can be adapted in accordance with the funding provided. Study tours are important to expose various key decision makers to good practices in other countries, so that the proposed transformation could be implemented smoothly.

Items 6 and 7 in the table above would be carried out by MEDT TRD, with some external guidance, and depending on the external contribution, these numbers are flexible as well. It may be useful to cooperate with academia to prepare and conduct the studies on a regular basis. These surveys and the analysis of the results can be a basis for one or more academic theses.

Similarly, items 8 and 9 are typical costs for international consultants. However, the costs could change, depending on the contribution from MEDT TRD.

Phase III would require large investments estimated at about US\$25 million, considering the proposed priorities and the absorption capacity.

To estimate the size and composition of such investment project the following two criteria were used:

- What is (tentatively) needed by NQI organizations?
- How much investment could (tentatively) NQI organizations absorb in a given time?

The smaller of these two criteria determines the upper limit of the project. If the needs are smaller than the absorption capacity, then a single project will be sufficient for the NQI upgrade. However, if the limiting factor is the investment absorption capacity, then the first project will be limited by the absorption capacity and subsequent projects will be needed to address the remaining needs.

With these considerations in mind, a tentative cost breakdown of an initial investment is set out below:

No.	Activity	Estimated Cost (US\$)
1	Construction of new premises to house new equipment	15,000,000
2	New measurement equipment	9,500,000
3	New IT equipment and software	100,000
4	Know-how transfer (in respect of new measurements only)	50,000
5	Foreign language training	50,000
6	Training and Quality Center	100.000

7	Follow-up activities ⁵ (institutional development)	50,000
8	Follow-up activities ⁴ (public awareness campaign, stakeholder management)	100,000
9	Other activities	50,000
	Total	25,000,000

Successful implementation of the Quick Wins, especially the institutional development ones, along with a very competent project implementation unit (**PIU**) within MEDT, may increase the investment absorption capacity of Ukraine’s NQI, provided that the number and technical competence of relevant staff is sufficient for the new equipment.

ASSESSMENT OF IMPACT ON ECONOMY AND SOCIETY

As highlighted in the Chapter IV, it is important to regularly assess the economic and social impact of NQI. However, there is no broadly accepted way of such assessment. Social scientists and NQI institutions have attempted to calculate the impact in various ways, but no consensus has been reached on methodology. Assorted methods of estimating NQI’s impact on the broader economy are set out below.

- On the basis of GDP, total exports and imports and high-value exports and imports
- Using calibration, testing, analysis, certification data (numbers and costs), and usage of NQI in production and services, as well as value created, as assessed by tax revenues and employment rates
- By product sector, calculating the sector’s share of total production, exports, and imports, as well as NQI’s effect on that sector
- Using industrial surveys assessing the value added by various elements of NQI

This list is not exclusive and represents methodologies used by the author over the last 20 years in various countries.

One of methodologies was developed by the Turkish Metrology Institute (UME) between 1993 and 2003 to assess the performance of UME and justify new investments needed. This method assesses the two main tasks and two groups of services provided by NQI.

Tasks:

1. Technical aspects of increasing export performance:
 - Ability to produce higher valued products
 - Ability to prove that the product complies with the rules of the external markets
2. Technical aspects of protecting the domestic market:

⁵ These are the activities that need to be continued at a different level after the Quick Wins projects are completed.

- Ability to prepare and implement appropriate rules of the domestic market
- Ability to prove that the product complies with the rules of the domestic market
- Ability to monitor various stages of marketing the products and services.

Two main groups of services need to be considered in order to make a rough assessment of the economic or social impact of NQI: (i) services that can be obtained abroad and (ii) services that must be provided in the country. The benefits of NQI can then be estimated based on the reduction of cost for the first group and absolute value generated by the second group (*i.e.*, by calculating the alternative cost of not having these services).

The group of services that can be obtained abroad includes scientific metrology (national measurement standards), calibrations, product and material tests (industrial metrology), and all areas of certification. One can send out equipment, products or materials abroad for measurements, and use foreign bodies for certification.

The second group (services that must be provided and obtained in the country) includes legal metrology, inspection and market surveillance.

To assess NQI impact, a matrix should be developed for each task, dividing services into those which may be obtained abroad, and that must be provided domestically, and the costs of these services estimated, as well as the effect if no such service is used. For example, in the case of ISO 9000 certification, what would be the result if such certification were not available?

Results of applying this methodology in about 15 countries in Eastern Europe, the Balkans, the Caucasus, and Central Asia, suggest the following observations.

- NQI affects more than 75 percent of GDP, since it plays a major role in production and services, especially trade, health, and safety.
- NQI-related activities in an economy account for 3 to 16 percent of GDP. For agriculture-dominated economies, this figure is 3 to 8 percent; for newly industrialized economies 9 to 16 percent; and for fully industrialized economies 6 to 12 percent.
- The contribution of measurement-related processes is about 85 percent of the value generated in NQI.
- 2 to 5 percent of the value generated is attributable to direct revenues generated by NQI organizations.
- 3 to 15 percent is attributable to tax revenue generated throughout the chain of sale to the end user.
- 45 to 95 percent is due to value generated by conformity assessment of the products and services.
- 0 to 50 percent is due to value generated by contribution to new or improved products or services.
- The return on investment in metrology is between 2 and 50 within the usable lifetime of investments (15 to 20 years). No corresponding figure is available for NQI as a whole.
- Every measurement area has a different impact on the return on investment ratio.
- The above figures are expressed as ranges; the actual impact depends on the structure of a given economy, the NQI in place and the tax regime. For a precise assessment, a reliable set of data needs to be collected over a period of at least three years and analyzed accordingly.

CONCLUSION

Generally, the structure of Ukraine's NQI is up to international standards for a modern NQI. All elements of a system are operational; however, some improvements are required to enhance the effectiveness of the system and ensure its sustainability in the long term.

Ukraine's metrology system is rather complicated and needs to be optimized with a single metrology institute (or a Metrology Institute and a Legal Metrology Institute), consistent with international good practice. Restructuring will greatly facilitate coordination of the various functions of metrology and increase the effectiveness of the system.

Confidence in market surveillance operations should be improved in accordance with good international practices through the accreditation of inspection services and operations and staff certification, as well as through the intensive use of metrological infrastructure for metrological supervision.

The effectiveness of Ukraine's NQI in its current stage is estimated to be around 56 percent, with a 5 percent contribution to GDP, while at the desired state it could be 86 percent effective, with an 8 percent contribution to GDP.

The Assessment has identified a number of gaps between the current state of Ukraine's NQI system and the desired state target. Some of these gaps can be addressed in the short term, with the support of one or more small-scale technical assistance projects, while others, notably the enhancement of NQI infrastructure and capacity, require a long-term effort and significant investment.

Considering the three stages of NQI development mentioned earlier, it is important to pay attention to:

- Attaining international recognition
- Ensuring sustainability
- Generating added value to NQI customers
- Generating added value to the economy and society
- Optimizing the roles of NQI organizations

International recognition

While essential international recognition of Ukraine's NQI is in place, full membership in couple of key international organizations is still missing; and the sustainability of the system needs to be secured. In this respect, the physical infrastructure of the NQI bodies needs to be strengthened. From the operational point of view, especially for conformity assessment processes, the practices of how things are done also affect sustainability.

Ukraine's NQI shall not be only used for the compliance of products (especially for non-food products), but should also and more intensively used for the development or improvement of food and non-food products, materials and methodology used in production as well as services. Participation in such innovation processes depends on close cooperative links with the R&D infrastructure, incubation centers, techno-parks and similar establishments.

The main rule for international recognition is "Certified once, accepted everywhere". In this regard, the products must be tested and certified properly once by internationally recognized organizations,

and with this “license to market” the product should be able to be sold in any country. Naturally, the lowest cost for certification can be achieved domestically. In addition to the cost, the confidentiality considerations require that some products are tested and certified domestically. Therefore, product certification is a very important aspect of industrial development and should be given utmost attention.

In certain countries in Eastern Europe, certification centers are largely fictitious offices that have service contracts with laboratories that either do not exist or whose technological capacities are decades old. It is important to avoid such a situation in Ukraine and to maintain the reputation and quality of Ukraine’s domestic certification institutions.

Sustainability

The Kharkiv Scientific Metrology Center, Ukraine’s largest body for national measurement standards, needs a considerable quantity of new equipment to replace aging devices and accommodate new measurement areas. The premises to house this equipment are also old and unsuitable for modern metrology. Therefore, substantial investments are needed in national measurement standards.

Since a new building and new equipment are needed, it may be a good time to consider re-structuring the entire scientific metrology system. Six different restructuring models are set in LTA4. These options should be urgently discussed by the relevant stakeholders and the decision be made before starting the construction of a new building or renovation of an existing one and the procurement and setting up the sophisticated measurement equipment, which would also take a long time.

Added value to NQI customers

Although most of the NQI related processes seem to be in order in Ukraine, there are some indications of problems with the operations of certification bodies and testing laboratories. At any rate, it is vital to avoid a closed system without external controls. A fully or partially closed system (see Explanation 5, below) endangers international recognition since it could be revoked.

Explanation 5

This concept of a closed system may need some explanation. In some countries, most conformity assessment processes are done without proper feedback. The conformity assessment customer needs a certificate to submit to a controlling body. The service provider, aiming to reduce costs and increase the profit, does not fully carrying out its services (verification, testing, or certification).

Conformity assessment processes should be controlled by accreditation. On the other hand, accreditors may not do their job properly in an attempt to reduce costs. There does not exist in-country control for accreditation. Control is rather done through international peer-review mechanism. But for many countries, including Ukraine, supervision of accreditation by the international system does not include detailed and through monitoring. Once recognition is achieved, monitoring gets weaker. The result can be a system, in which things are not done properly, but presented as done properly. So, a closed system is formed where customers just need a “paper”, QA service providers try to lower their costs and therefore undermine the needed quality of their services, and no one is monitoring the system.

However, the major harm may be a failure to provide quality services to customers. In some cases, customers do not care about the quality of the service: all they need is a certificate. For high-value products, especially those that require advanced technology, the information on the certificate is more important than the certificate itself.

Added value to the economy and society

In addition to generating added value for its direct customers (those who need a certificate), NQI organizations can add value for customers for various other QA services in the areas of measurement infrastructure and some product certification. A huge investment has been made in metrology infrastructure and human capital. This investment is only used for conformity assessment processes, namely to see whether a product, material or a service is functioning according to the rules. If measurement infrastructure is fully occupied with these services, then there is no problem and utilization ratio of measurement infrastructure is very high. In this case, nation is getting what it has invested the measurement infrastructure.

If this is not the case, and the utilization rate is low, say 50 percent, then the question is what happens during the time when the infrastructure is not used. In addition to underutilization and its opportunity costs, there are issues such as maintenance, development of new systems, etc. One approach then would be to operate in a purely reactive mode and wait for the next customer. Another approach is to proactively use the infrastructure to add value to the economy and society. In advanced market economies, metrology institutes expend a considerable amount of resources to assist in development and production of new products from design to marketing, from research to testing. Ironically, this is not a burden on the metrology organization. On the contrary, technical and scientific staff find it more enriching (and if appropriate incentives are in place, financially rewarding) to engage in scientific and industrial research rather than simply do routine measurement-taking. Stimulating participation in research is a good mechanism to attract and retain more highly-qualified and creative staff.

In some countries, close cooperation with industry yields secondary benefits to customers, as repair and maintenance capabilities for delicate equipment are also increased with practice.

Roles of NQI Organizations

More active participation of NQI organizations in the technological and social development of the society, as well as in the development of new products, materials and services requires re-defining the roles of some of the NQI organizations. The decision-making process in terms of the management of core NQI organizations such as accreditation, metrology and standardization should be optimized. Overall coordination of all NQI activities including TR and market surveillance should be strengthened.

- MEDT TRD should enhance its coordination role directly or through an NQI Coordination Body, with the active participation of all NQI stakeholders. The secretariat function can be handled by the MIU or LMIU. Alternatively, all participating organizations can contribute in-kind to operate the system. Such coordination will not only play a steering role in NQI, but will also provide monitoring of various NQI operations, and prevent the proliferation of a “closed system” threat.
- MEDT TRD should not take part in the management of core NQI organizations (appointing directors, approving budgets, planning investments, planning work programs, managing human resources).
- It is suggested that the NSB operate a Quality and Training Center in order to provide a platform for know-how transfer in quality related areas. Quality managers of various organizations could use the Quality and Training Center to exchange views and share experiences. The NSB could take part in conformity assessment processes such as certification and testing. The NSB could, like many European standardization organizations, also participate in national and international projects, which will also help to draw more participants to technical committees.
- Similarly, NAAU could have a strong role in know-how transfer to the industry through regular trainings in the implementation of various TR and standards, especially those are used in accreditation such as the ISO 17025, ISO 9000, and ISO 22000 series. Specialized trainings could also be provided by sector committees.
- Metrology should have a completely new role and be proactive in designing and producing new products, materials and services. It should be optimized in order to handle these tasks better. Special emphasis should be given to product certification and accredited inspection services that can be used by various MSBs. Metrology centers should also contribute to the development of TR and standards; the organization of inter-laboratory comparisons and proficiency testing; and training in the areas of traceability, uncertainty evaluation, determination of calibration intervals, design and operation of secondary calibration, and verification and testing.

Next Steps

It is very important that all needed technical committees be established as soon as possible, to study and prepare a national quality policy and the reform implementation program.

Such reforms shall include short- and long-term actions. About US\$700,000 would be needed to implement eleven short-term recommendations consisting of 50 Quick Wins.

In addition, an investment of approximately US\$25 million should be in place in order to solve infrastructure problems, especially in metrology (including construction of a new metrology building and procurement of equipment), build capacity, and increase public awareness. At a later stage, additional investments of the same size may be needed to replace ageing equipment in metrology centers and procure new measurement systems.

The activities described above, if properly implemented, should raise the development level of Ukraine's NQI to that of similar systems in developed economies, with effectiveness above 80 percent and increased NQI contribution to GDP.

APPENDIX A: NQI LEGAL FRAMEWORK IN UKRAINE

The core of Ukraine's NQI legislation consists of seven laws related to or derived from WTO agreements, including the Code of Good Practice for Standards; and OIML documents:

- The Law "On State Market Surveillance and Control of Non-Food Products," in force since July 5, 2011;
- The Law "On General Non-Food Product Safety," in force since July 5, 2011;
- The Law "On Liability for the Damage Caused by a Defect in the Product," in force since September 16, 2011;
- The Law "On Accreditation of Conformity Assessment Bodies," in force since June 20, 2001 (with major amendments introduced in 2011 and 2015);
- The Law "On Metrology and Metrological Activity", in force since January 1, 2016;
- The Law "On Standardization," in force since January 3, 2015; and
- The Law "On Technical Regulations and Conformity Assessment Procedures" in force since February 10, 2016.

In addition to these main laws, a great deal of secondary legislation has been enacted, mostly in terms of governmental decrees. Major CMU decrees are as follows:

- CMU Decree № 96 dated January 27, 2016 "On approving of the Procedure of issuance or refusal of issuance of decision on designation, its renewal and issuance of its duplicate, expansion or reduction of area of designation, suspension and renovation of decision on designation and abolishment of this decision and ceasing invalid some Decrees;"
- CMU Decree № 95 dated January 27, 2016 "On approving the conformity assessment modules and rules for their usage with a purpose of developing conformity assessment procedures;"
- CMU Decree № 57 dated January 27, 2016 "On approving the Procedure of issuance, refusal of issuance, renewal and issuance of duplicate of decision on designation of certification body in the State Certification System, expansion of area of designation and cancellation of the decision on designation;"
- CMU Decree № 56 dated January 13, 2016 "On approving special requirements for designated conformity assessment bodies;"
- CMU Decree № 1184 dated December 30, 2015 "On approving the form and description of the mark of conformity with technical regulations, rules and conditions for its application;"
- CMU Decree № 1170 dated December 16, 2015 "On approving the Procedure of monitoring of compliance with the requirements to national accreditation body of Ukraine and amendments to item 3 of the Regulations of the Ministry of Economic Development and Trade of Ukraine;"
- CMU Decree № 1057 dated December 16, 2015 "On determining areas, in which central executive bodies carry out functions of technical regulation;"
- CMU Decree № 708 dated June 18, 2012 "On Approval of the Rules on Drafting Technical Regulations Developed on the Basis of the European Union Legislative Acts, which are to be approved by the Cabinet of Ministers of Ukraine;" and
- CMU Decree № 485 dated April 11, 2002 "On Approval of Rules on Determination of Value on Conformity Assessment Works in Legislative Regulated Field."

The functions of the authorized central executive body in the field of technical regulation are assigned to the MEDT TRD in accordance with the following Orders of the President of Ukraine:

- Order № 1085/2010 dated December 9, 2010;
- Order № 370/2011 dated April 6, 2011; and
- Order № 634/2011 dated May 31, 2011.

The Statute on the MEDT was enacted by CMU Decree № 459 dated as of August 20, 2014 (as amended by CMU Decree № 4 dated January 13, 2016). The MEDT is responsible for setting policy in the fields of technical regulation, standardization, metrology and metrological activity.

The NSB's role is defined by CMU Decree № 1163-p dated November 26, 2014 "On Determination of the State Enterprise which Performs the Functions of the National Standardization Body", which designates UkrNDNC as Ukraine's NSB.

NAAU operates pursuant to the Law on Accreditation. NAAU regulations are approved by MEDT Order № 646 dated May 29, 2012 (as revised by MEDT Order № 1305 dated November 05, 2013).

For the implementation of the Metrology and Metrological Activity, and elaboration of responsibilities in metrology, 38 secondary regulatory acts have been developed, of which the 22 listed below have been adopted:

- Act № 75 dated February 25, 2015 "On recognizing as invalid Decrees of the Cabinet of Ministers of Ukraine № 528 dated April 1, 1999 and № 32 dated January 15, 2005" (concerning aspects of metrological activity in scientific research and development);
- Act № 330 dated May 27, 2015 "On determining scientific metrological centers;"
- Act № 372 dated June 4, 2015 "On recognizing as invalid some decrees of the Cabinet of Ministers of Ukraine" (concerning the abolition of CMU Decree № 1300 dated August 17, 1998 "On approval of Procedure of importation of measuring instruments into the territory of Ukraine");
- Act № 374 dated June 4, 2015 "On approving the List of categories of legally regulated measuring instruments subject to periodic verification;"
- Act № 398 dated June 17, 2015 "On approving the Procedure and criteria for provision a status of national standards to standards;"
- Act № 474 dated July 8, 2015 "On approving the Procedure for submission of measuring instruments for periodic calibration, supply and maintenance support;"
- Act № 607 dated August 19, 2015 "On approving the Technical Regulation on bottles used as measuring tanks;"
- Act № 663 dated September 2, 2015 "On approving the Statute of the State Service of Standard Samples of Composition and Characteristics of Substances and Materials;"
- Act № 664 dated September 2, 2015 "On issues regarding the State Service of Universal Time and Standard Frequencies;"
- Act № 667 dated September 2, 2015 "On approving the Statute of the State Service on Food Products Safety and Consumers Protection" (concerning metrological control);
- Act № 807 dated October 7, 2015 "On amendments to the Procedure and criteria for provision a status of national standards to standards;"

- Act № 865 dated October 28, 2015 “On approving the Procedure of payment for works and services related to conformity assessment of legally regulated measuring instruments with requirements of technical regulations, verification of these instruments, which are in operation, and determining the value of such works and services;”
- Act № 1058 dated December 16, 2015 “On approving of criteria for assessing the risk of economic activities in the field of metrology and metrological activity and determining the periodicity of planned measures on metrological control of legally regulated measuring instruments that are in operation and number of packaged goods in packages, which are held by the State Service on Food Products Safety and Consumers Protection;”
- Act № 1062 dated December 16, 2015 “On approving the Technical Regulations on non-automatic weighing instruments;”
- Act № 1110 December 16, 2015 “On approving of the Procedure of monitoring compliance with rules and conditions of storage and application of national standards;”
- Act № 1113 December 16, 2015 “On approving of the Statute of the State Service of Standard References on Physical Constants and Characteristics of Substances and Materials;”
- Act № 1193 dated December 16, 2015 “On approving the Technical Regulations on certain goods packed in finished package by weight and volume;”
- Act № 1195 dated December 16, 2015 “On approving the Procedure of establishing inter-verification intervals for legally regulated measuring instruments by categories;”
- Act № 1152 dated December 23, 2015 “On special aspects of metrological activity in the field of defense;”
- Act № 94 dated January 13, 2016 “On approving the Technical Regulations on legally regulated measuring instruments;”
- Act № 117 dated January 24, 2016 “On approving the Procedure of issuing or denying issuing, renewal, issuing a duplicate, cancellation of certificate on authorization to carry out calibration of measuring instruments in use and which are used in the field of legally regulated metrology, and installation of fees for issuing certificate on authorization, its renewal and issuing of duplicate;” and
- Act № 163 dated January 24, 2016 “On approving the Technical Regulations on measuring instruments.”

Eight MEDT orders, seven of which are registered with the Ministry of Justice of Ukraine (**MoJ**) have been adopted:

- Order № 914 dated August 4, 2015 “On approving definitions of the basic SI units, names and definitions of the derived SI units, decimal multiples and partial of the SI units, allowed off-system units as well as their signs and Rules of measuring units’ application and spelling of names and designations of measuring units and symbols of values” registered with the MoJ on August 25, 2015 under № 1022/27467;
- Order № 1144 dated September 15, 2015 “On approving the Procedure of storage and application of national standards” registered with the MoJ on September 30, 2015 under № 1159/27604;
- Order № 1164 dated September 21, 2015 “On approving the Procedure of maintaining the State Register of scientific metrological centers, metrological centers and calibration

laboratories authorized to carry out verification of legally regulated measuring instruments that are in operation” registered with the MoJ on October 6, 2015 under № 1203/27648;

- Order № 1192 dated September 23, 2015 “On approving the criteria to be met by scientific metrological centers, public enterprises, which are under jurisdiction of the Ministry of Economic Development and Trade of Ukraine and carry out metrological activity, and calibration laboratories authorized to carry out verification of legally regulated measuring instruments that are in operation” registered with the MoJ on October 7, 2015 under № 1213/27658;
- Order № 1719 dated December 21, 2015 “On approving the Rules of time required for verification of legally regulated measuring instruments that are in operation” registered with the MoJ on January 14, 2016 under № 51/28181;
- Order № 1747 dated December 23, 2015 “On approving the Modal provisions on metrological services of the central executive bodies, other state bodies, bodies of enterprise associations, enterprises, institutions and organizations, which perform work in the field of legally regulated metrology, ceasing to be invalid some orders of the State Committee of Ukraine for technical regulation and consumer policy” registered with the MoJ on January 16, 2016 under № 79/28209;
- Order № 193 dated February 8, 2016 “On approving the Order of verification of legally regulated measuring instruments that are in operation and presentation of its results” registered with the MoJ on February 24, 2016 under № 278/28408; and
- Order № 792 dated 10.05.2016 “On approving the Regulations for scientific metrological centers and recognizing some orders as invalid.”

The Law on Technical Regulations and Conformity Assessment entered into force on February 10, 2016. This law establishes uniform legal and organizational principles for the development, adoption and application of TR and conformity assessment procedures and for the implementation of conformity assessment in accordance with European requirements and the provisions of the WTO Agreement on Technical Barriers to Trade. The law also sets 2018 as the deadline for cancellation of compulsory product certification.

Implementation of the Law on Technical Regulations and Conformity Assessment provides for the development of 31 secondary regulatory acts: 17 CMU Decrees (15 acts developed by the MEDT and two developed by other central executive bodies) and 14 Orders of the MEDT.

11 CMU Decrees have been adopted in respect of the Law on Technical Regulations and Conformity Assessment, namely:

- CMU Decree № 519 dated July 17, 2015 “On amendments to item 3 of the Procedure of funds provided by the state budget for implementation of measures for consumers’ protection, standardization, metrology, certification, conformity assessment and quality management;”
- CMU Decree № 898 dated November 4, 2015 “On amendments to the Decree of the Cabinet of Ministers of Ukraine of 18.06.2012 № 708;”
- CMU Decree № 1057 dated December 16, 2015 “On determining areas, in which central executive bodies carry out functions of technical regulation;”

- CMU Decree № 1170 dated December 16, 2015 “On approving the Procedure of monitoring of compliance with the requirements to national accreditation body of Ukraine;”
- CMU Decree № 1184 dated December 30, 2015 “On approving the form and description of the mark of conformity with technical regulations, rules and conditions for its application;”
- CMU Decree № 4 dated January 13, 2016 “On amendments to the Regulations of the Ministry of Economic Development and Trade of Ukraine;”
- CMU Decree № 56 dated January 13, 2016 “On approving special requirements for designated conformity assessment bodies;”
- CMU Decree № 57 dated January 27, 2016 “On approving the Procedure of issuance, refusal of issuance, renewal and issuance of duplicate of decision on designation of certification body in the State Certification System, expansion of area of designation and cancellation of the decision on designation;”
- CMU Decree № 95 dated January 27, 2016 “On approving the conformity assessment modules and rules for their usage with a purpose of developing conformity assessment procedures;”
- CMU Decree № 96 dated January 27, 2016 “On approving of the Procedure of issuing or denying issuing decisions on designation, its renewal and issuing its duplicate, expansion or reduction of area of designation, suspension and renovation of decision on designation and abolishment of this decision and ceasing invalid some Decrees;” and
- CMU Decree № 142 dated March 2, 2016 “On amendments to the Decree of the Cabinet of Ministers of Ukraine № 436 dated May 21, 2012.”

The following seven MEDT orders have been issued and registered with the MoJ to implement the Law on Technical Regulations and Conformity Assessment:

- Order № 1151 dated September 17, 2015 “On approving the application form for designation of certification body in the State Certification System” registered with the MoJ № 1179/27624 dated 02.10.2015;
- Order № 1282 dated October 8, 2015 “On approving the Procedure of formation and maintenance of technical regulations databases” registered with the MoJ on 27.10.2015 № 1309/27754;
- Order № 1454 dated November 17, 2015 “On approving the Regulations on the Appeal Commission for consideration of appeals against decisions of designated bodies and recognized independent organizations and the Procedure of consideration of appeals” registered with the MoJ December 4, 2015 under Nos. 1512/27957 and 1513/27958);
- Order № 224 dated February 10, 2016 “On approving the Procedure of formation and maintenance of the Register of designated conformity assessment bodies and recognized independent organizations and the Procedure of formation and maintenance of databases derived from designated conformity assessment bodies by the body that appoints” (registered with the MoJ on February 25, 2016 under Nos. 295/28425 and 296/28426);
- Order № 308 dated February 25, 2016 “On approving the List of national standards, compliance with which provides presumption of conformity of conformity assessment bodies and recognized independent organizations with special requirements to the designated conformity assessment bodies and recognized independent organizations;”

- Order № 686 dated April 14, 2016 “On approving the Plan of development of technical regulations in 2016;” and
- Order № 518 dated March 28, 2016 “On approving the Requirements to designated certification bodies in State Certification System.”

Finally, the following TR have been developed on the basis of EU legislation:

- CMU Decree № 1585 dated October 7, 2003 “On approving Technical regulations on conformity assessment modules;”
- Order of the State Committee of Ukraine for Technical Regulation and Consumer Policy № 289 dated December 24, 2004 “On approving Technical regulations on conformity assessment of packing (packing materials) and packing waste;”
- CMU Decree № 1764 dated December 10, 2006 “On approving Technical regulations on building materials, buildings and structures;”
- CMU Decree № 1103 dated September 5, 2007 “On approving Technical regulations on marine equipment;”
- CMU Decree № 1382 dated December 5, 2007 “On approving Technical regulations on sealed sources of ionizing radiation;”
- CMU Decree № 717 dated August 20, 2008 “On approving Technical regulations on detergents.”
- CMU Decree № 748 dated August 27, 2008 “On approving Technical regulations on hot water boilers fired with liquid and gaseous fuels;”
- CMU Decree № 761 dated August 27, 2008 “On approving Technical regulations on personal protective equipment;”
- CMU Decree № 787 dated 03.09.2008 “On approving Technical regulations on maximum energy consumption for refrigeration equipment;”
- CMU Decree № 856 dated September 24, 2008 “On approving Technical regulations on appliances burning gaseous fuels;”
- CMU Decree № 898 dated October 8, 2008 “On approving Technical regulations on equipment and defense systems for use in potential explosive atmosphere;”
- CMU Decree № 967 dated November 5, 2008 “On approving Technical regulations concerning transportable pressure equipment;”
- CMU Decree № 1057 dated December 3, 2008 “On approving Technical regulations concerning restriction of use of some dangerous substance in electric and electronic equipment;”
- CMU Decree № 1144 of December 27, 2008 “On approving Technical regulations concerning labeling of energy efficiency of lamps for household purpose;”
- CMU Decree № 13 dated January 14, 2009 “On approving Technical regulations concerning names of textile fabrics and textile products marking;”
- CMU Decree № 190 dated March 11, 2009 “On approving Technical regulations on no automatic weighing instruments;”
- CMU Decree № 268 dated March 25, 2009 “On approving Technical regulations on safety of simple pressure vessels;”

- CMU Decree № 332 dated April 8, 2009 “On approving Technical regulations on essential requirements for measuring instruments;”
- CMU Decree № 465 dated April 22, 2009 “On approving Technical regulations on lifts;”
- CMU Decree № 679 dated June 24, 2009 “On approving Technical regulations on radio and telecommunications terminal equipment;”
- CMU Decree № 785 dated July 29, 2009 “On approving Technical regulations on electromagnetic compatibility;”
- CMU Decree № 1076 dated October 14, 2010 “On approving Technical regulations on cableway installations for carriage of passengers;”
- CMU Decree № 1149 dated October 29, 2009 “On approving Technical regulations on low-voltage electrical equipment;”
- CMU Decree № 1262 dated November 25, 2009 “On approving Technical regulations on safety marks and protection of workers’ health;”
- CMU Decree № 193 dated March 1, 2010 “On approving Technical regulations of delivery of services related to passenger and loads transportation by railway;”
- Order of the State Committee of Ukraine for Technical Regulation and Consumer Policy № 487 dated October 28, 2010 “On approving Technical regulations on rules for food products labelling;”
- CMU Decree № 35 dated January 19, 2011 “On approving Technical regulations on safety of pressure equipment;”
- CMU Decree № 529 dated May 18, 2011 “On approving Technical regulations on ecological labeling;”
- CMU Decree № 632 dated June 9, 2011 “On approving Technical regulations on energy labeling of material that are used for production of basic components of shoes promoted for sail;”
- CMU Decree № 839 dated August 3, 2011 “On approving Technical regulations on pyrotechnic articles;”
- CMU Decree № 1147 dated November 9, 2011 “On approving Technical regulations on recreational crafts;”
- CMU Decree № 1367 dated December 28, 2011 “On approving Technical regulations on type approval of agricultural and forest tractors, trailers and changeable trailer machines, systems, components and separate technical units;”
- CMU Decree № 1368 dated December 28, 2011 “On approving Technical regulations relating to components and characteristics of wheeled agricultural tractors;”
- CMU Decree № 62 dated January 30, 2013 “On approving Technical regulations on machinery safety;”
- CMU Decree № 494 dated July 11, 2013 “On approving Technical regulations on the safety of railway transport infrastructure;”
- CMU Decree № 515 dated July 11, 2013 “On approving Technical regulations on safety of toys;”
- CMU Decree № 927 dated August 1, 2013 “On approving Technical regulations on requirements to motor petrol, diesel, marine and boiler fuel;”

- CMU Decree № 702 dated August 7, 2013 “On approving Technical regulations on energy labelling” (Technical regulation on energy labelling of energy consuming products);
- CMU Decree № 702 dated August 7, 2013 “On approving Technical regulations on energy labelling” (Technical regulation on energetic marking of household electrical refrigerators);
- CMU Decree № 702 dated August 7, 2013 “On approving Technical regulations on energy labelling” (Technical regulation on energetic marking of household washing machines);
- CMU Decree № 753 dated October 2, 2013 “On approving Technical regulations on medical devices;”
- CMU Decree № 754 dated October 2, 2013 “On approving Technical regulations on medical devices for laboratory in vitro diagnostic;”
- CMU Decree № 755 dated October 2, 2013 “On approving Technical regulations on active implantable medical devices;”
- CMU Decree № 514 dated July 17, 2015 “On approving Technical regulations on energy labelling of household dishwashing machines;”
- CMU Decree № 607 dated August 19, 2015 “On approving Technical regulations on bottles used as measuring tanks;”
- CMU Decree № 1193 dated December 16, 2015 “On approving the Technical Regulations on certain goods packed in finished package by weight and volume;” and
- CMU Decree № 1194 dated December 30, 2015 “On approving the Technical Regulations on safety of railway rolling stock.”