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ACTIVITY OF INTERNATIONAL AND REGIONAL ORGANIZATION FOR GLOBALIZATION OF THE WORLD ECONOMY

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Abstract: Paper considers the problems of globalisation of the world economy and the role of national metrological services, main directions activity of international and regional organizations in the field of metrology.

Keywords: globalisation, world economy, international and regional organizations, national metrological services.

1. INTRODUCTION

The providing of the protection of the interests of consumers and states as to problems of the quality and the safety of national product (processes, works and services) with the target of their safety and competitiveness on the world market, conditions for participating of the entities of employer's activity of many countries into international economic, scientific and technical collaboration and trade that is impossible without counting up-to-date metrological norms and rules, that are described in the numerous documents of different level.

The Article 2.4 of The Agreement on Technical Barriers to Trade (TBT), implemented within the World Trade Organization (WTO), makes an obligation for countries to base their national technical regulations on international documentary standards (norms) so as to harmonize the national requirements. It also requires signatories to pay attention at participation in international systems of conformity assessment and mutual recognition agreements (Article 6 of TBT).

In accordance with target, prescribed by WTO, the requirements of other bound international agreements concerning the elimination of commercial barriers, of notably non-tariff barriers as technical reason, the acceleration of the achievement of consistency is very necessary in the field of metrology on international, regional and national levels. However, on international and regional levels exists the allotment of warrants in sphere of metrology among several organizations. Simultaneously there is the tendency of the allotment of warrants and on national level among several organs that requires also bigger efforts for the matching in the field of metrology.

A Global Measurement System is a kind of network in which metrological tasks are solved according to the same criteria worldwide. In these processes considerably increases also the role of national metrological services in the ensuring of the mutual recognition of the results of the measurements of national metrological institutes (NMI) and the effective operation of national metrological systems (NMS) in the up-to-date stipulations of globalization of economy and international diversion of labor [1–5].

Taking into account this important scientifical and practical task in contemporary stipulations the ensuring of optimization NMS with maximally possible efficiency is needed. In this case the key elements of this optimization are affairs of the optimization of the national base of measurement standards, the activity of national services in field of legal metrology, the national normative base in the field of metrology, the national system of the conformity assessment, scientific and applied metrology, namely practically all composite multilevel NMS [6].

2. METROLOGICAL TASKS OF INTERNATIONAL AND REGIONAL ORGANIZATIONS

Metrology is one of the fields, where rational high extent rate international, regional and national coordination exists. The blocking of countries for areas assists common tendencies of global of the world's economy.

Modern metrology is marked by tight cooperation and by the partnership of the countries of world; because separate countries can not solve metrological tasks isolated one from another. Now in the countries of the world arises significant appreciable political enforcement concerning development of transparent and not discriminated procedures of measurement in accordance with Agreement TBT [3] with their further harmonization.

Agreement TBT accords promotion to stimulation to signing by members of agreement on the mutual acknowledgement of the conformity assessment, the development of the international systems of the conformity assessment. However, the conformity of concepts legal metrology, its requirements and procedures exist rather difficult and long-term process.

The international community has adopted a system of units, measurement standards and requirements for measuring instruments through treaty organizations. The international organizations have developed – or are currently developing – systems of mutual recognition or acceptance of the equivalence of measurements standards, of national

measurement capabilities, of competences of calibration laboratories and of legal metrology evaluations.

In Tables 1 and 2 activities of international and regional organizations in the field of metrology are shown.

This information concerns main tasks of international and regional organizations that carry out works in the field of metrology (01.01.2006 data). Full members of at least one international metrological organization (IMO) – the Metric Convention, OIML, IMEKO – are 66 countries (30 – European); associate members – other 44 countries, some of them full members of one these organizations. Namely, the big amount of countries, which in some forms are members pointed IMO, composes 110 countries, 38 of them represent Europe. It should be noted that the Metric Convention and OIML are intergovernmental organizations. Practically all these countries are members of ISO, however only 40 are full members of ILAC or IAF.

Table 1. Activities of international and regional organizations in the field of metrology

Direction of metrological activities	**Name of organization (number of Members – full/associated)**				
	International level	**Regional level**			
		Europe	**Asia**	**America**	**Africa**
Units of measurements and measurement standards	CIPM (51/16)	EUROMET (30/4)	COOMET[1] (11/3) APMP (21/3)	SIM (34/-)	SADCMET (14/4) MENAMET[2]
Legal metrology	OIML (59/50)	WELMEC (27/2) EMLMF[3]	COOMET/LMWG (11/3) APLMF (20/6) IOLMF[4] CIS (12/-)	SIM/LMWG (34/-)	SADCMEL (14/-)
Standardization in the field of metrology	ISO (100/46) IEC (52/11)	CEN (28/10) CENELEC (28/7) UNECE (55/-)	PASC[5] (22/-) CIS (12/-)	COPANT (28/7)	SADCSTAN (14/-)
Accreditation calibration laboratory and quality systems	ILAC (37/14) IAF (40/7)	EA (31/3) EUROLAB (22/2) EUROCHEM (31/-)	APLAC (20/-) PAC[5] (13/2)	IAAC (19/7) NACC[6]	SADCA (14/-)
Theoretical investigation and learning in the field of metrology	IMEKO (35/-)	…	…	…	SRCME (14/-)
Total:	**(66/44)**	**(30/3)**	**(31/4)**	**(34/-)**	**(14/4)**

Notes: [1] Euro-Asian organisation; [2] Middle East and Northern African organisation (information about members absence); [3] Euro-Mediterranean organisation; [4] Indian Ocean organisation (information about members absence); [5] Asia-Pacific organisation; [6] North American organisation (information about members absence)

Table 2. International and regional activities in the field of metrology

<table>
<tr><td colspan="4">International level</td></tr>
<tr><td colspan="2">CIPM – Comité International des Poids et Measures
OIML – International Organization of Legal Metrology
IMEKO – International Measurement Confederation</td><td colspan="2">ISO – International Organization for Standardization
IEC – International Electrotechnical Commission
ILAC – International Laboratory Accreditation Cooperation
IAF – International Accreditation Forum</td></tr>
<tr><td colspan="4">Regional level</td></tr>
<tr><td>Asia</td><td>Europe</td><td>Africa</td><td>America</td></tr>
<tr><td><u>Asia-Pacific Economic Cooperation (APEC):</u>
• APMP – AP Metrology Programme;
• APLMF – AP Legal Metrology Forum;
• APLAC – AP Laboratory Accreditation Cooperation.
PASC – Pacific Area Standards Congress;
PAC – Pacific Accreditation Cooperation
IOLMF – Indian Ocean Legal Metrology Forum

MENAMET – …</td><td>EUROMET – European Collaboration in Measurement Standards
WELMEC – European Cooperation in Legal Metrology
CEN – European Committee for Standardization
CENLEC – European Committee for Electrotechnical Standardization
UNECE – Economic Commission for Europe
EA – European Co-operation for Accreditation
EUROLAB – European Federation of National Associations of Measurement, Testing and Analytical Laboratories
EUROCHEM – network of analytical chemistry organizations in Europe</td><td><u>Southern African Development Community (SADC):</u>
• SADCMET – SADC Cooperation in Measurement Traceability;
• SADCMEL – SADC Cooperation in Legal Metrology;
• SADCSTAN – SADC Cooperation in Standardization;
• SADCA – SADC Cooperation in Accreditation
MENAMET – Middle East and Northern African Metrology Cooperation

IOLMF – …</td><td><u>Inter-American Metrology System (SIM)</u>:
• NORAMET – North American Metrology Cooperation;
• CAMET Central America Metrology Cooperation;
• ANDIMET – Andean Region Metrology Cooperation;
• SURAMET – American Metrology Cooperation;
• CARIMET – Caribbean Metrology Cooperation;
COPANT – Pan American Standards Commission
IAAC – Inter American Accreditation Cooperation
NACC – North American Calibration Cooperation

APMP, APLMF, APLAC – …
PASC, PAC – …</td></tr>
<tr><td colspan="2">COOMET – Euro-Asian Cooperation of National Metrology Institutions
CIS – Euro-Asian Inter-State Council on Standardization, Metrology and Certification</td><td colspan="2" rowspan="2"></td></tr>
<tr><td></td><td>EMLMF – Euro-Mediterranean Legal Metrology Forum</td></tr>
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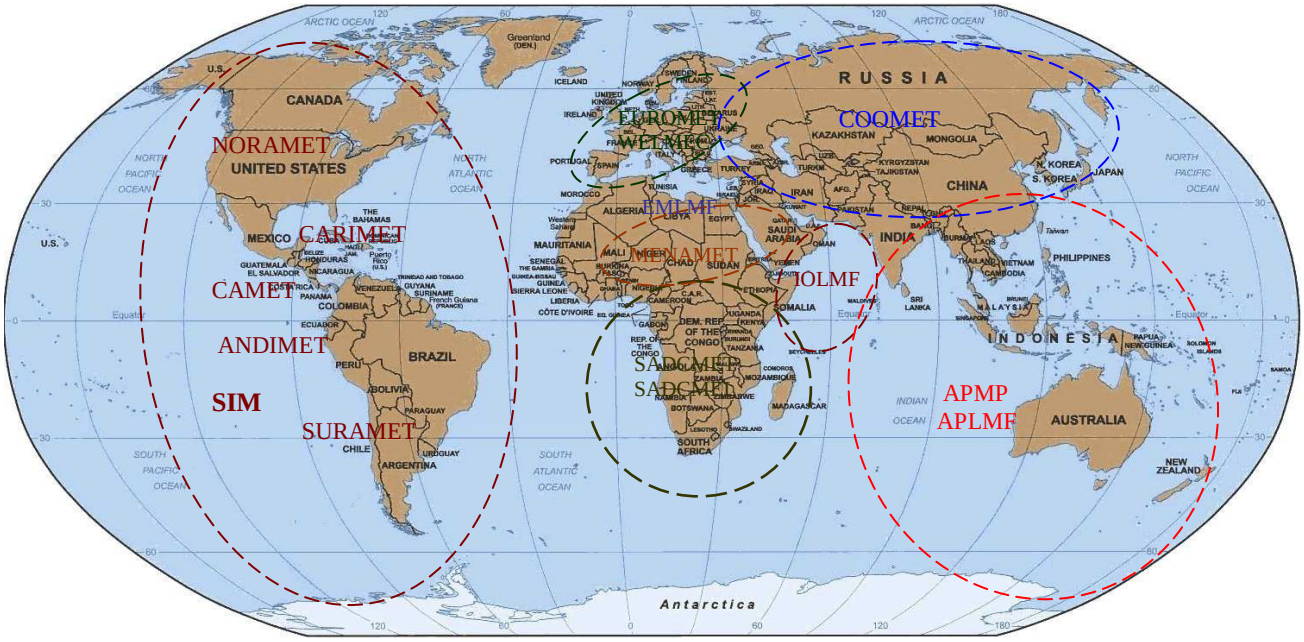

Fig. 1. Metrological RMO on the World map

On Fig. 1 metrological RMO on the World map are shown.

Practically all these countries take part in regional metrological organization (RMO) and also in IMO. The most advanced system of regional organizations that works with in the field of metrology is in Europe. On other continents such regional organizations are grouped in the context of collaboration in regional political and economic associations, for example: APEC, SADC, CIS.

Multilateral agreements assist mutual confidentiality: MRA (Mutual Recognition Arrangement) – in the context of the Metric Convention, ILAC; MAA (Mutual Acceptance Arrangement) – in the context of OIML; MRA (Mutual Recognition Arrangements) – in the context of IAF [7–9].

Agreement BIPM/MRA was signed by 38 NMI and by two international organizations in 1999. This Agreement signed 64 NMI, including 45 with 51 – full members of the Metric Convention and 17 – associate members now (01.01.2006 data). In 2000, ILAC members signed the Agreement ILAC/MRA, which now includes 49 national organs of accreditation from 40 countries, and also 4 regional organizations of accreditation (01.01.2006 data).

3. JOINT ACTIVITY OF INTERNATIONAL AND REGIONAL ORGANIZATIONS IN THE FIELD OF METROLOGY

In Table 3 joint activities of international and regional organizations in the field of metrology are shown.

Participation in agreement BIPM/MRA is possible through RMO if NMI is the associate member of the Metric Convention. BIPM created such common committees: Joint Committee of the Regional Metrology Organizations and the BIPM (JCRB) for implementation BIPM/MRA through RMO; Joint Committee on coordination of assistance to Developing Countries in Metrology, Accreditation and Standardization (JCDCMAS) for Developing Countries.

ILAC and IAF signed Memorandum about understanding with ISO (25.03.2004), where it is noted, that works of ILAC and IAF as to conformities of assessment will be based on the requirements of international standards and guides ISO/IEC. ILAC and IAF collaborate with

Table 3. Joint activities of international and regional organizations in the field of metrology

Direction of metrological activities	International level		Regional level	
	Organizations	Joint documents/using of documents	Organizations	Using of documents
Units of measurements and measurement standards	BIPM, OIML, ISO	SI/BIPM, ISO 31, ISO 1000	EUROMET, COOMET, SIM, APMP, SADCMET, …	SI/BIPM, VIM-93, GUM-93
Standardization in the field of metrology	BIPM, OIML, ISO, IEC	VIM-93, GUM-93, ISO 3930/OIML R99, ISO 31, ISO 1000	CEN, CENLEC, COPANT, …	VIM-93, GUM-93, ISO 3930/OIML R99, ISO 31, ISO 1000
Accreditation of calibration laboratory and quality systems	ISO, IEC	ISO/IEC 17025, ISO 9001, ISO 14000, ISO/IEC Guide 58	EA, APLAC, IAAC, NACC …	ISO/IEC 17025, ISO 9001, ISO 14000

Table 4. Direction of metrological activities and their main tasks

Direction of metrological activities	Main tasks of activity
1. Units of measurements and measurement standards (BIPM, EUROMET, COOMET, APMP, SIM, NORAMET, CAMET, ANDIMET, SURAMET, CARIMET, SADCMET, MENAMET)	● Establishment of units of measurements and requirements to standards for their realization; ● Coordination of projects of creation of standards; ● Carrying out of expertise in the field of primary and national standards; ● Creation of conditions for co-operation Members of organizations by separate project and ensuring information concerning resources and services of country-members
Legal metrology (OIML, WELMEC, COOMET/LMWG, APLMF, SIM/LMWG, SADCMEL, EMLMF, IOLMF)	● Definition of basic principles of the legal metrology; ● Unification of methods and rules of the legal metrology; ● Developing of projects typical laws and rules to measurement instruments and their using; ● Developing of recommendation to typical verification and calibration of measurement instruments
Standardization in the field of metrology (ISO/IEC, CEN/CENELEC, UNECE, PASC, COPANT, SADCSTAN)	● Standardization of units of measurement; ● Standardization of requirements to measurement instruments; ● Establishment of requirements to quality systems; ● Standardization of requirements to calibration laboratory
Accreditation of calibration laboratory and quality systems (ILAC, IAF, EA, APLAC, PAC, IAAC, NACC, SADCA)	● Establishment of requirements to accreditation of national bodes and calibration laboratory; ● Establishment of regional accreditation system of calibration laboratories; ● Certification or registration of quality system
Theoretical investigation and learning in the field of metrology in field of metrology (IMEKO, SRCME, RMO)	● Assistance of information exchange between scientists and specialists from different countries in the field of metrology; ● Definition main directions and methods of investigation in various field of measurement; ● Developing of modern theoretical and practical investigation and learning in various field of measurement; ● Raising the level of one's skill of metrologists in various field of measurement

Committee as to conformities assessment ISO/CASCO for many years.

The accreditation of independent laboratories and the NMI quality systems must be carried out in compliance to requirements of international standards ISO/IEC 17025, ISO 9001 and international guide ISO/IEC Guide 58.

Generally in the context of ILAC/MRA 4 regional organization for accreditation (EA, APLAC, PAC and IAAC) work, which signed this MRA.

In 1993, ISO, IEC, OIML, BIPM, The International Union of Pure and Applied Physics (IUPAP), The International Union of Pure and Applied Chemistry (IUPAC) and The International Federation of Clinical Chemistry (IFCC) developed “International Vocabulary of Basic and General Terms in Metrology” and “Guide to the Expression of Uncertainty in Measurement” [10, 11].

On Fig. 2 the Worldwide Certificates in Global Metrological System are shown.

4. MODERN TASKS OF NATIONAL METROLOGICAL SYSTEMS FOR GLOBALIZATION OF THE WORLD ECONOMY

Tasks of legal metrology and standardization in the field of metrology in NMS stand in close relation. National normative base in the field of metrology is to be formed as a result of satisfaction of the requirements of the legal metrology, and state of national standard base.

In witness of this statement is accepted EU Directive 2004/22/EC 31.03.2004 (special Directive relative to measurement instruments – MID). Main peculiarities of MID are: regulation of using of technical specifications in

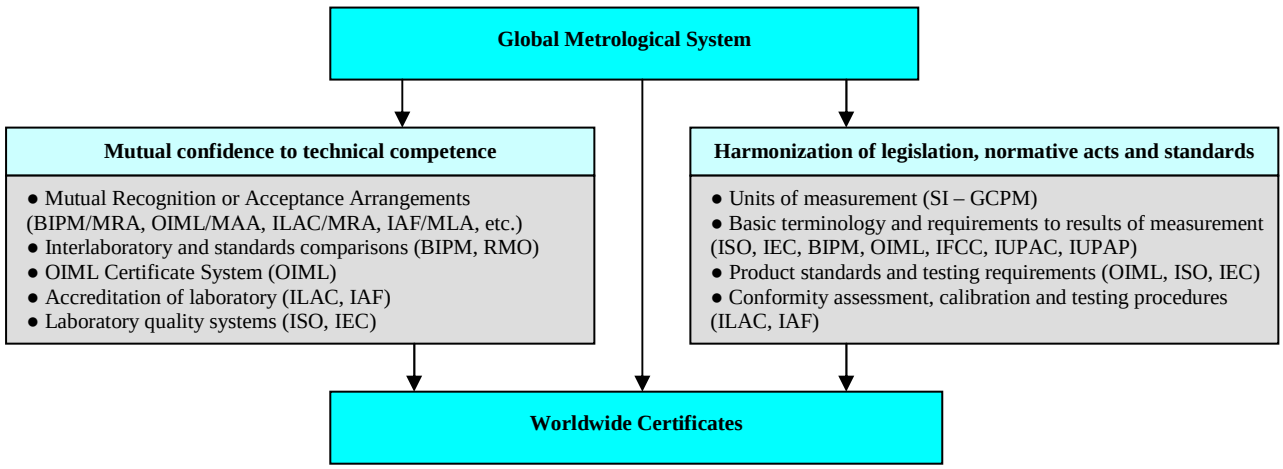

Fig. 2. The Worldwide Certificates in Global Metrological System

harmonized standards; using of standards on voluntary base; implementation of module approach for conformity assessment; establishment of 11 categories of measurement instruments for requirements of MID; using of MID EU countries-members in the legal metrology [12, 13].

Comparative analysis of adapted categories of measurement instruments OIML and EU had shown discrepancy therefore future harmonization of approaches of these organizations needed. On base of conducted analysis selection of main components of national normative base in the field of metrology is possible for guarantee of effective function of NMS. This system of normative documents must satisfy the level of national economy and it is multilevel hierarchy system. In general outline subsystem of their system is marked out for types of standardization objects.

Surroundings of NMS are aggregated with others global social and economic systems, that make external impact at NMS either impact or interplay of NMS. This impact has informatics' character. NMS as system has clear open character, because it has many impacts and interplay (Fig 3).

GMS is regarded as big system, in other words as integrated aggregate of interrelated and interplay components (parts) that have ability not as amount of ability of components. Components of GMS are objects of this system, but they do not demand separate investigation as a part of general system (Fig. 3).

Mathematical foundations of general systems theory may be to use for provide analysis of NMS [14].

5. CONCLUSION

1. Mentioned information shows, that not all of regional organizations have unidirectional activity – some of them carry out works for several directions and it composes their structural building. In the direction of units and measurement standards 6 RMO function, in legal metrology – 7 RMO, in standardization in the field of metrology – 4 regional organizations, in accreditation – 6 regional organizations.

2. Amount of countries which take part in RMO is 118, including 11 associate members, namely amount of countries that take part in work of RMO is practically the same, just like in the work in IMO.

3. The significance of the participation of national organs in regional organizations increases, taking into account the signing of multilateral agreements as to the affairs of the mutual acceptance of measurement standards, of the certificates of calibration, the accreditation of laboratories.

4. NMS is a big open system that has many impacts and interplays with other NMS and others global social and economic systems therefore for its investigation using of general systems theory is needed.

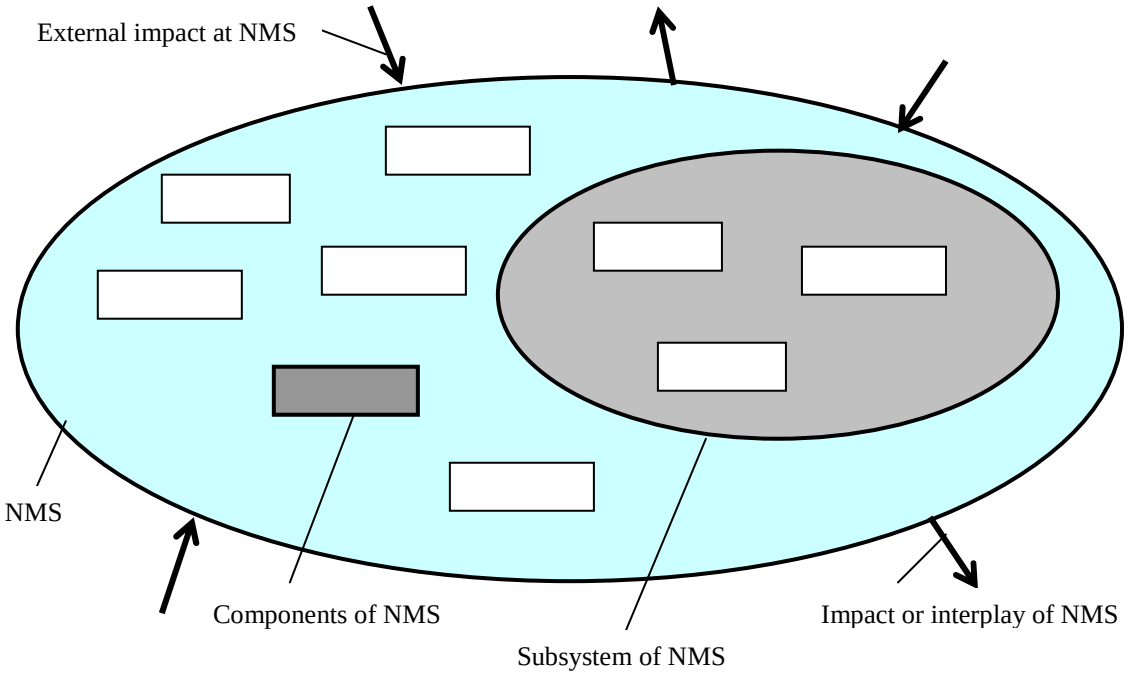

Fig. 3. Subsystem and components of NMS in influence of global social and economic systems

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