
Force, Mass & Torque. IMEKO TC3, 19th International Conference on

Role of the National Institute of Standards (NIS) in the Development of Nation

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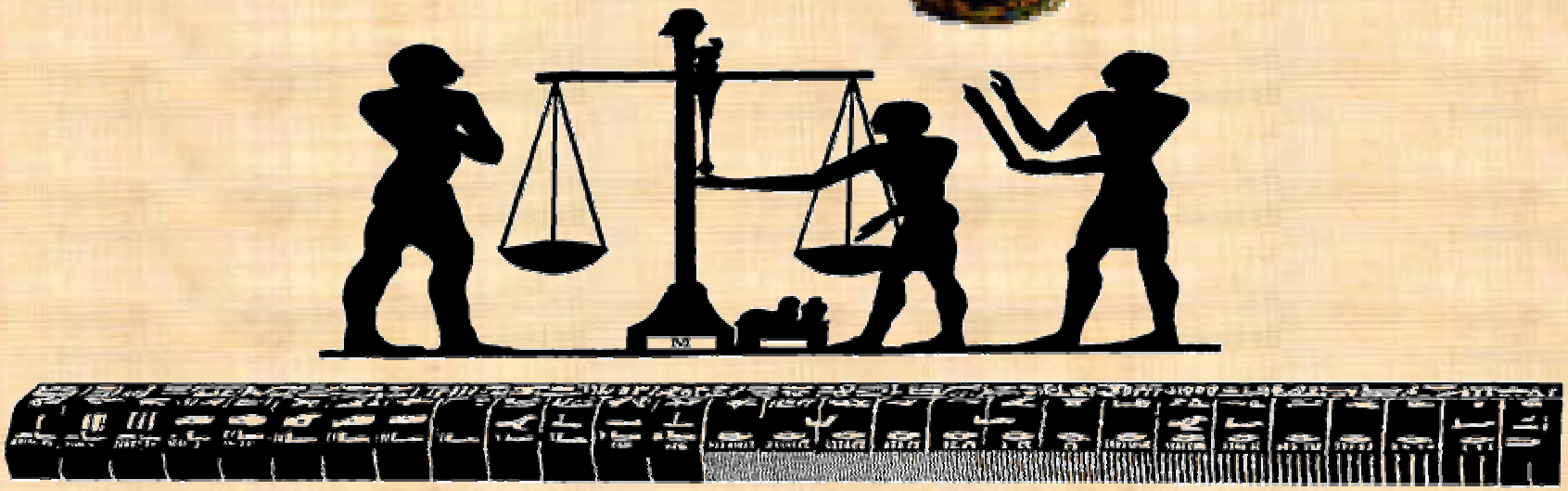
Vice Presedint (NIS)
President TQCC

National Institute of Standards

EGYPT



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About Egypt

Ancient Egyptian Metrology

Egyptian Quality System

NIS and its capabilities

EGYPT

Location: Northern Africa, bordering the Mediterranean Sea, between Libya and the Gaza Strip

Area: *total: 1,001,450 sq km*

Capital: *Cairo*

Government type: *Republic*

Land boundaries: *total: 2,665 km*
border countries: Gaza Strip 11 km, Israel 266 km, Libya 1,115 km, Sudan 1,273 km

Population: *70,712,345 (July 2002 est.)*

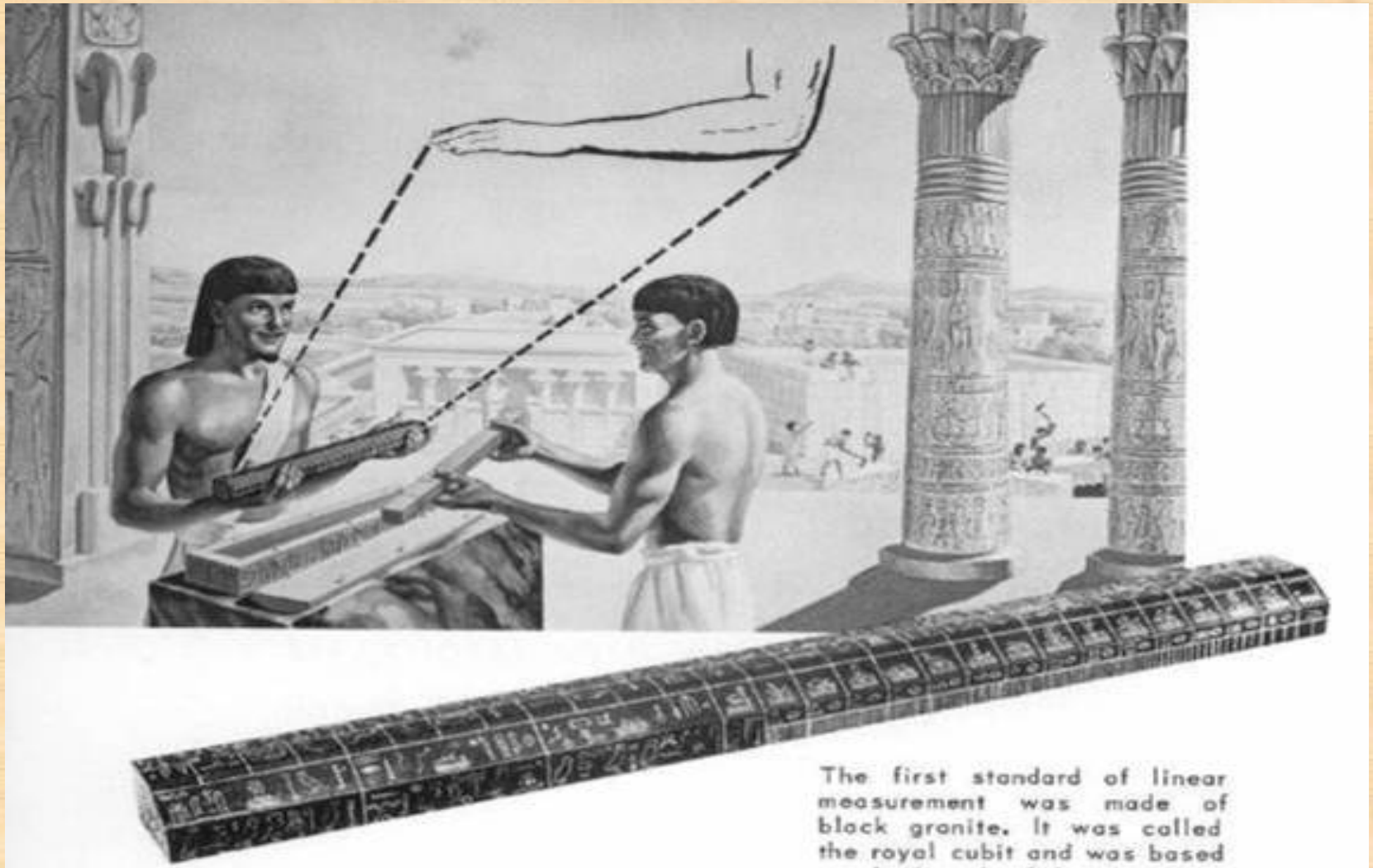
Religions: *Muslim (mostly Sunni) , Coptic Christian*

Languages: *Arabic (official), English and French widely understood by educated classes*

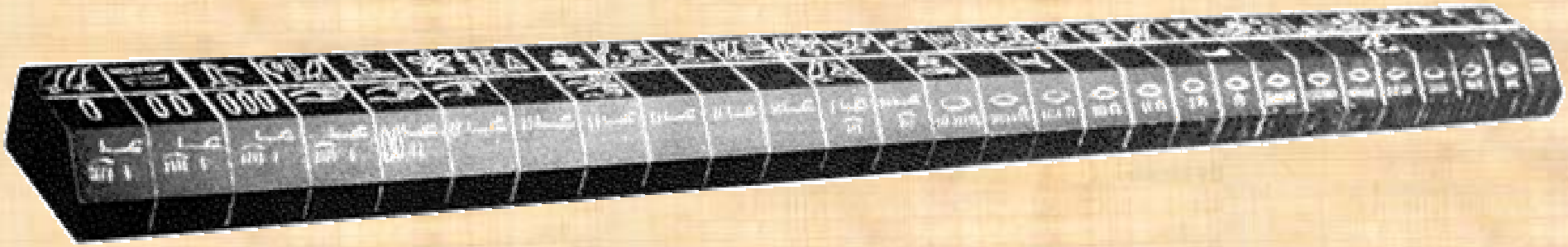
Climate: *desert; hot, dry summers with moderate winters*

Natural resources: *petroleum, natural gas, iron ore, phosphates, manganese, limestone, gypsum, asbestos, lead, zinc*

Ancient Egyptian Metrology



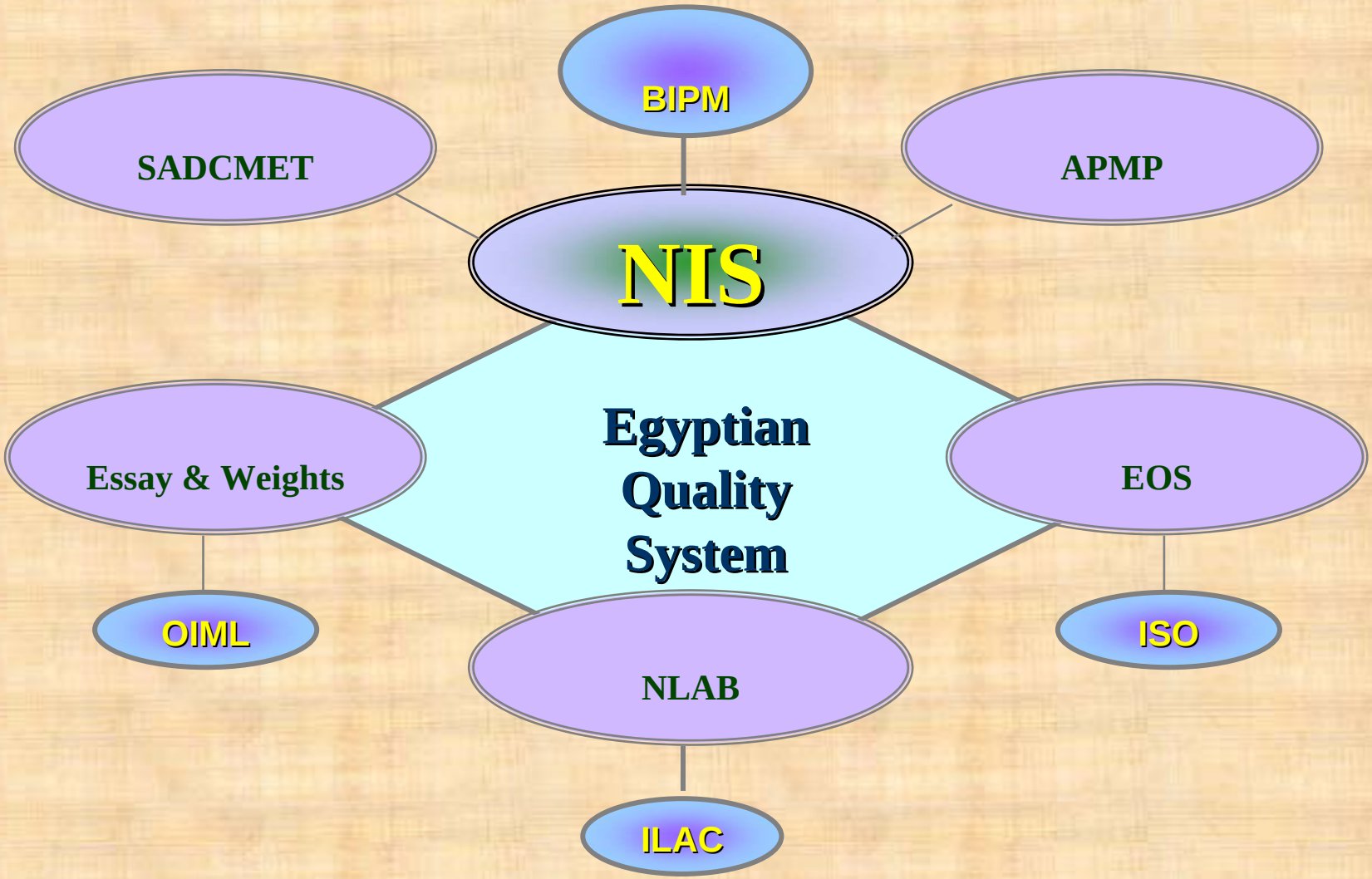
The first standard of linear measurement was made of black granite. It was called the royal cubit and was based on the length of the pharaoh's arm.

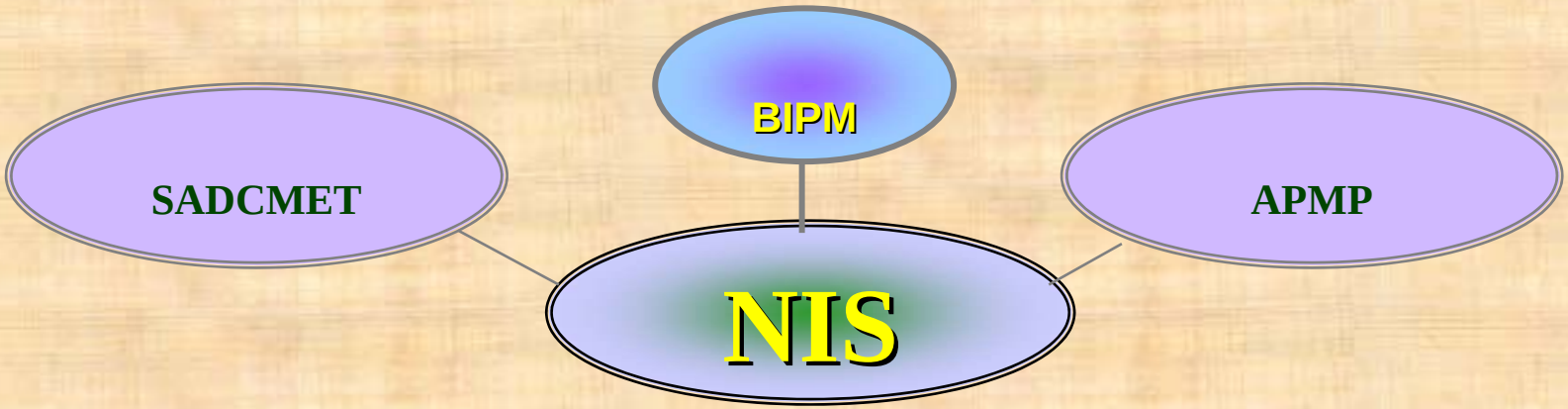


Background

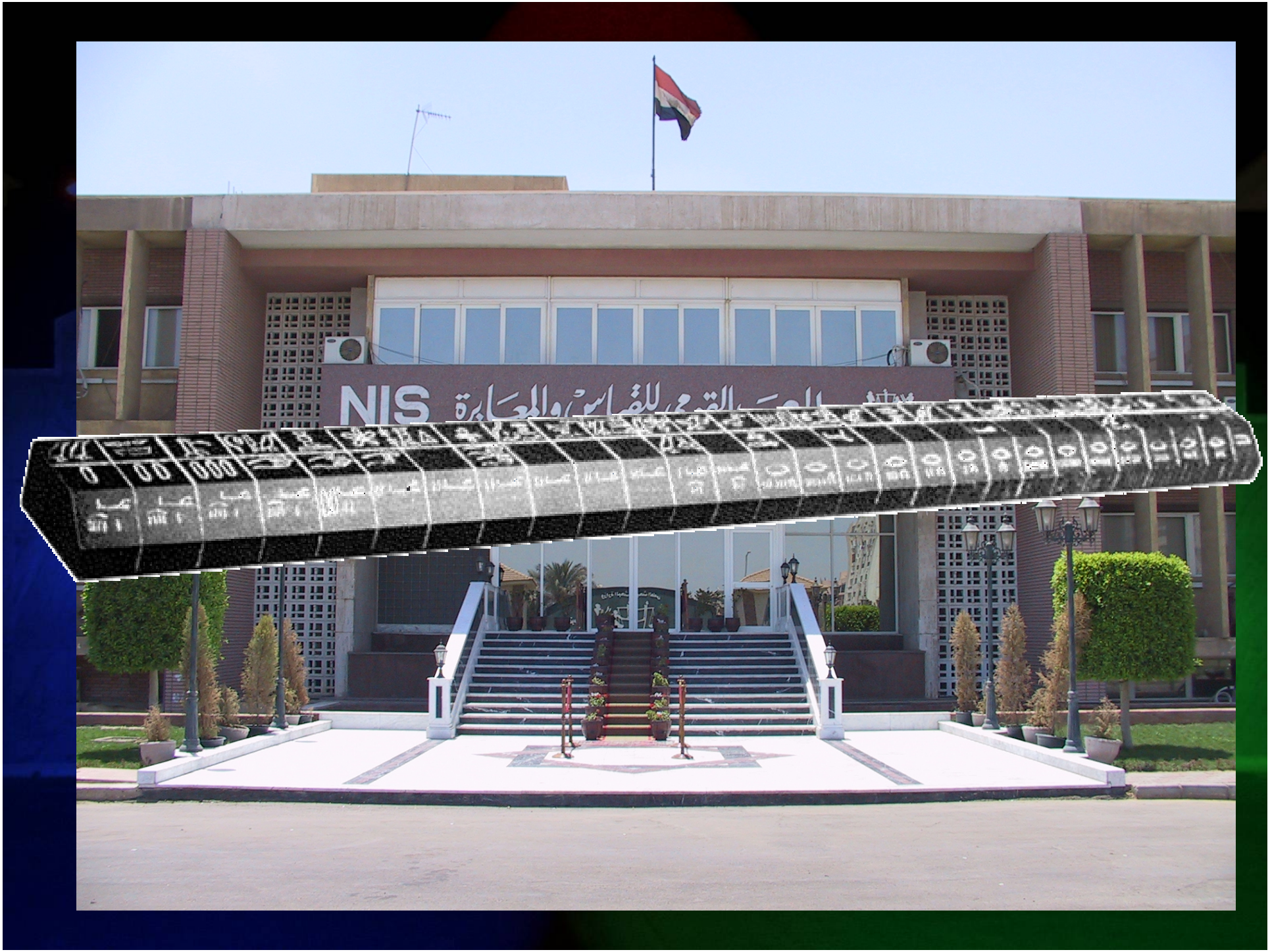
Five thousand years ago, The Egyptians laid the foundation for all what is embraced by modern dimensional measurements. They produce the master standard of linear measurement, the Cubit “Length of Royal forearm”. This standard was equivalent to the length of the forearm of the Pharaoh, about 20.63 inches long, and was known as the Royal Cubit. The Royal Cubit Master was made of black granite and placed in the custody of the royal architect. “Working” cubit sticks made of wood were duplicated from the Royal cubit and were used by artisans in building the Great Pyramid, tombs, and temples.

Egyptian Quality System




BIPM
SADCMET
APMP
NIS


NIS


NIS

About NIS

The National measurement system of Egypt instituted 3000 years B.C. and re-instituted in modern times in the first decade of the twentieth-century took its formal modern shape when National Institute for Standards was established in 1963.

The National Institute for Standards (NIS) was established in 1963 by a governmental Decree under The Ministry of Scientific Research. The principal functions of NIS are to maintain National /Primary Standards, provide tractability to laboratories in different fields. These laboratories disseminate the standards by further calibration of working standards which in turn are used for quality control and other purposes in such areas as defense, safety, health, legal metrology,..etc.

Functions & Objectives

- Realization and dissemination of SI Units.
- Maintaining the Egyptian National Measurement Standards.
- Offering Traceability of Measurement to the SI Units.
- Operate the national laboratory accreditation scheme
- Conduct Research & Development in Metrology and Advanced Measurement Technology.

Functions & Objectives

- Provide calibration services to end user in the area that are not available in other laboratory.
- Training courses in measurement technologies and related

  Subjects, consultancies and courses. These activities are all end

  user oriented and run on economic basis.
- To share, and organize international, regional and national metrology programs, quality and accreditation activities.
- To be an Internationally Recognized Institute for Meteorological Activities.

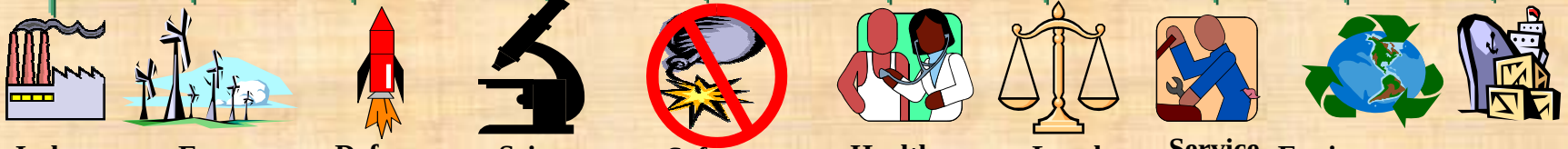
Links Between NIS and other Egyptian Organization

Ministry Of Scientific Research

NIS-Egypt
National Institute of Standards

Advise
- Measurements
- Standards
- Techniques
- Reference Materials

Services
- Calibration
- Tests
- Reference Materials
- Accreditation



Industry | Energy | Defence | Science | Safety | Health | Legal Metrology | Service Industry | Environment | Trade

NIS Clients

Science

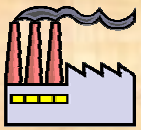
Legal Metrology

Service Industry

Energy

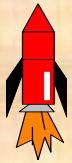
NIS Services :-

- *1400 clients.*
- *50 accredited laboratories*
- *Clients in 6 forigen counteries*



Industry

Environment



Defence

Trade

Safety

Health

International Relations of NIS

- NIS is the official representative of Egypt at the BIPM.
- NIS is an associate member at APMP.
- NIS is an associate member at SADCMET.
- NIS has MOU and Scientific corporation with :

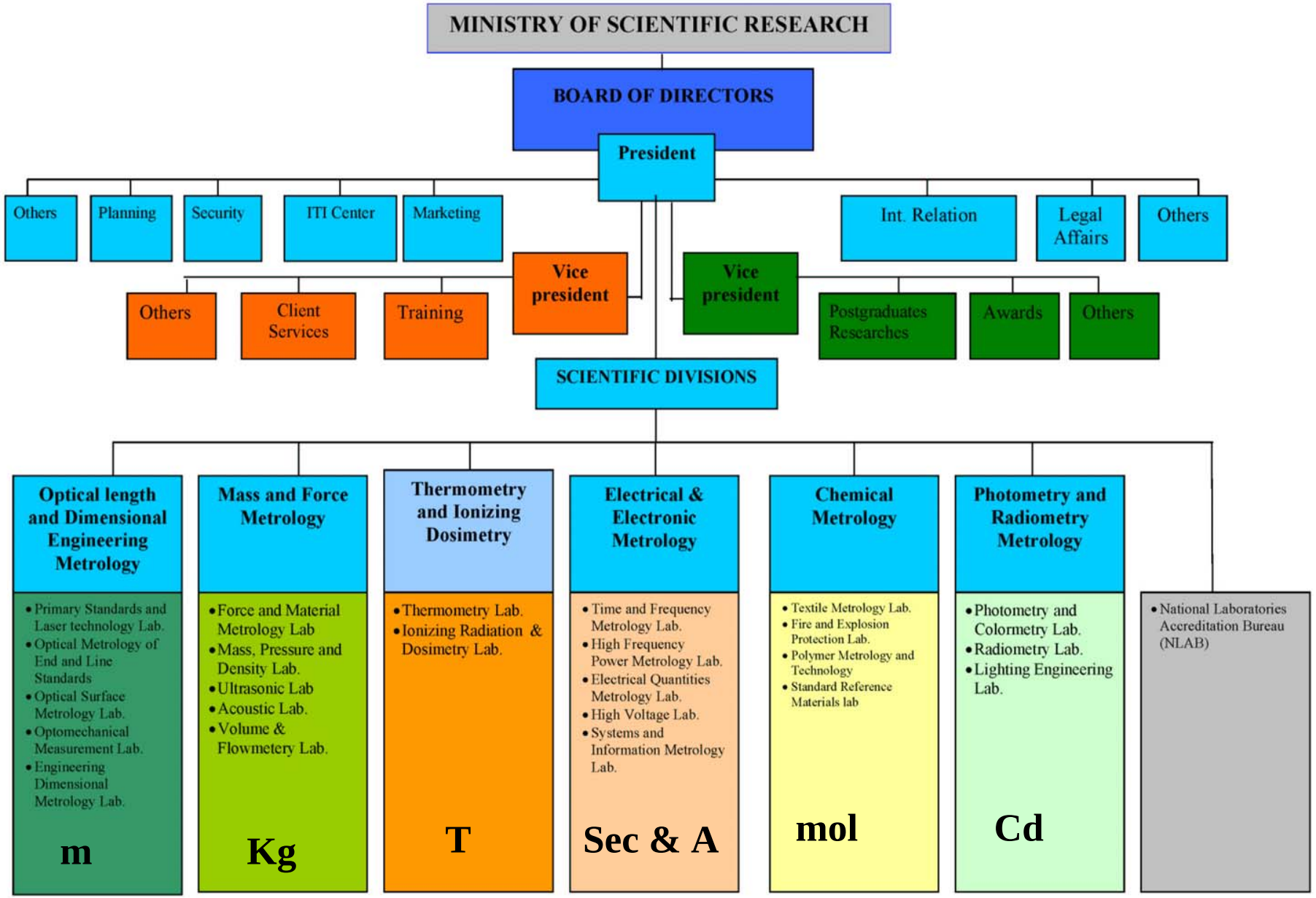
- PTB	Germany
- NIST	USA
- NPL	England
- LNE	France
- IMGC	Italy
- KRISS	Korea
- NRC	Canada
- NML	South Africa
- University of Waterloo	Canada
- University of Ilmenau	Germany

NIS - Human Resources

130 Research Staff (Ph.D.)

90 Research Assistants (M.Sc. & B.Sc.)

100 Technician


MINISTRY OF SCIENTIFIC RESEARCH
BOARD OF DIRECTORS
President
Others
Planning
Security
ITI Center
Marketing
Int. Relation
Legal Affairs
Others
Vice president
Others
Client Services
Training
Vice president
Postgraduates Researches
Awards
Others
SCIENTIFIC DIVISIONS
Optical length and Dimensional Engineering Metrology
• Primary Standards and Laser technology Lab.
• Optical Metrology of End and Line Standards
• Optical Surface Metrology Lab.
• Optomechanical Measurement Lab.
• Engineering Dimensional Metrology Lab.
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Mass and Force Metrology
• Force and Material Metrology Lab
• Mass, Pressure and Density Lab.
• Ultrasonic Lab
• Acoustic Lab.
• Volume & Flowmetery Lab.
Kg
Thermometry and Ionizing Dosimetry
• Thermometry Lab.
• Ionizing Radiation & Dosimetry Lab.
T
Electrical & Electronic Metrology
• Time and Frequency Metrology Lab.
• High Frequency Power Metrology Lab.
• Electrical Quantities Metrology Lab.
• High Voltage Lab.
• Systems and Information Metrology Lab.
Sec & A
Chemical Metrology
• Textile Metrology Lab.
• Fire and Explosion Protection Lab.
• Polymer Metrology and Technology
• Standard Reference Materials lab
mol
Photometry and Radiometry Metrology
• Photometry and Colormetry Lab.
• Radiometry Lab.
• Lighting Engineering Lab.
Cd
• National Laboratories Accreditation Bureau (NLAB)

Mass and Force Metrology Division

- Force and Material Metrology Lab
- Mass, Pressure and Density Lab.
- Ultrasonic Lab
- Acoustic Lab.
- Volume & Flowmetery Lab (under establishment)

Mass and Force Metrology Division

Force and Materials Lab.

The laboratory acquires the primary standard of Force, 3 dead weight machines covering the range of 0.5 KN up to 5 MN. These are the only standards of Africa and the Middle East. The laboratory provides force calibration services to a Varity of sectors within Egypt and the Arab World.

Mass and Force Metrology Division

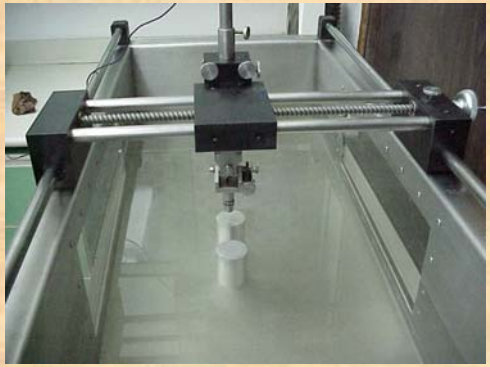
Mass, Density and Pressure Lab.

The laboratory maintains the national standard Kilogram (Platinum-Iridium) No. 58. It also maintains other national standards in the field of volume, density and Pressure. It carries out researches on the above fields to develop the procedures, increase the accuracy and to lower the uncertainty of measurements. It Takes part in the International Interlaboratory Comparisons e.g APMP and NIST

Mass and Force Metrology Division

Ultrasonic Lab.

The ultrasonic laboratory is devoted to work on the basic and applied research work. It provides consultations on non-destructive evaluation (NDE) services for materials and components.
Moreover, the department carries out calibrations of ultrasonic Medical instruments and Ultrasonic transducers.



Mass and Force Metrology Division

Acoustics Lab.

It maintains standards on audible sound levels and carries out measurements on sound distribution, vibration time, impact sound *insulation and sound absorption properties of acoustic materials and noise measurements, its level and frequency spectrum. Calibration of acoustical instruments are also carried out.*

Electrical and Electronic Metrology Division

- *Time and Frequency Metrology Lab.*
- *Electrical Quantities Metrology Lab.*
- *High Voltage Metrology Lab.*
- *Microwave Metrology Lab.*
- *System and Information Technology Lab.*

Electrical and Electronic Metrology Division

Time and Frequency Metrology Lab.

The national time scale is compared with the international time scales by means of Global Positioning System (GPS) satellites. Two cesium clocks have been operated continuously, traceable to NIST to contribute to the generation of the international atomic time scale TAI computed by BIPM. Traceable calibrations of frequency sources, frequency related parameters and time standards of other Egyptians scientific organizations, military and industrial departments are provided by different methods according to accuracy required.

Electrical and Electronic Metrology Division

Electrical Quantities Metrology Lab.

The *laboratory* maintains the national standards of Voltage, Resistance, Capacitance and Inductance, AC-DC voltage and current transfer. The primary standard for d.c. electromotive force comprises 22 Weston normal cells maintained at an ambient temperature of 30 ^{o}C. The primary standard of resistance are comprised of five 1 ohm standard resistors maintained at an ambient temperature of 23 ^{o}C.

Electrical and Electronic Metrology Division

High Voltage Metrology Lab.

The *laboratory* maintains the national standards for High Voltage and Current. The facilities covers High voltage up to 200 KV AC, 140 KV DC, 140 KV impulse and up to 5000 A. The laboratory carry out calibration of measuring transformers, Power and Energy Equipment

Electrical and Electronic Metrology Division

Microwave Metrology Lab.

This Laboratory is the national laboratory interested in establishing the national measurement standard in Radiofrequency and microwave. The principle function of this laboratory is to maintain the national standard of power in the range from 10 MHz up to 18 GHz.

Electrical and Electronic Metrology Division

System and Information Technology Lab.

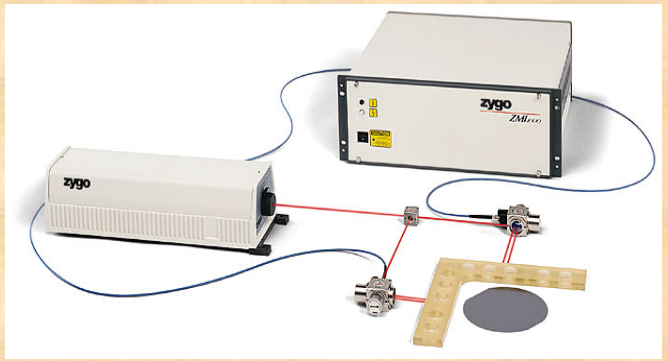
SIT is aiming to give support to raise the software industry in Egypt and advancing the state of the art of Information Technology in Metrology

Length Primary Standard

The laboratory realize the unit of length according to the internationally agreed definitions. It acquires two He-Ne Iodine stabilized lasers. It calibrate laser frequency at 633 nm, wavelength of different lasers and spectral lamps, laser power and energy meters and study of hyperfine structure of spectral lines.

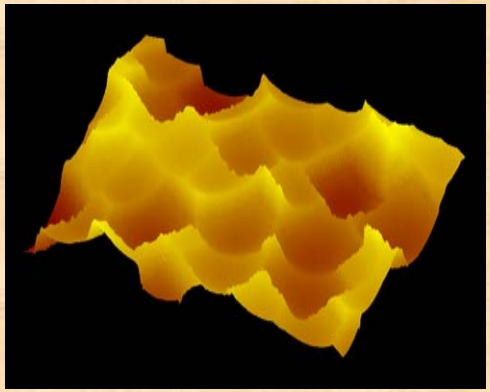
End and Line Standards

The laboratory has been equibed with laser sources calibrated against the primary He-Ne Iodine Stabilized laser. It can calibrate short gauge blocks up to 200 mm using Koster comparator and up to 1 meter using meter-comparator. Also, measurements of line standards carried out by CLC20 upgraded with laser displacement Interferometer



NIS Laboratories

Surface Optical Metrology

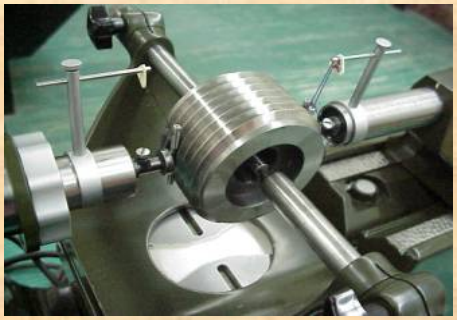


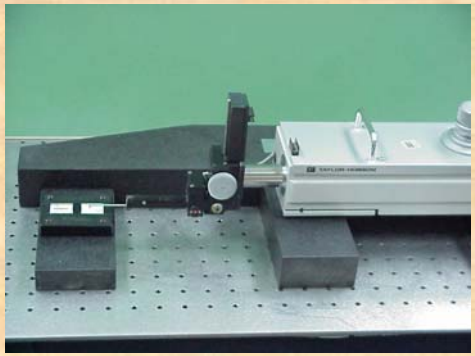
The Laboratory aquires AFM, STM, Interference Microscope, Laser Interferometer, Transmission Flats and Transmission spheres. With such facilities the laboratory can study the surface Topography, Microtopograph, Roughness and Microroughness for surface areas 1nmX1nm up to 100mmX100mm.

Also, can measures step height and radius of curvature of spherical objects. Testing of complex lenses are, also, available.

Dimensional Engineering Metrology Lab.

The laboratory performs both length and dimensional measurements of objects. Examples are: gauge block calibration by comparison, measurement of surface texture, angular measurement, gears, screw threads and limit gauges.





Photometry and Radiometry Metrology Division

- *Photometry and Colormetry Lab.*
- *Radiometry Lab.*
- *Lighting Engineering Lab*

These *laboratories* are responsible for realizing and maintaining the national Radiometric and Photometric scales. It also tests and calibrates light sources (lamps) and photometric instruments. Special facilities are maintained for measuring spectrophotometric and colorimetric properties of materials.

Thermometry and Ionizing Radiation Division

- ***Thermometry Lab.***
- ***Ionizing Radiation & Dosimetry Lab.***

Thermometry and Ionizing Radiation Division

Thermometry Lab.

The laboratory is responsible for realizing and maintaining the necessary standards for accurate measurement of the thermal quantities.

It maintains the International Temperature Scale and the Viscosity Scale. The department calibrates instruments for the measurement of temperature and viscosity and perform tests on thermal properties of materials.

Thermometry and Ionizing Radiation Division

Ionizing Radiation Lab.

The laboratory is concerned with carrying out measurement techniques and calibration procedures for many types of radiation sources, measuring and detection instruments (X-ray, γ-ray, α-β particles and neutrons).

Chemical Metrology Division

- *Polymer Metrology and Technology Lab.*
- *Fire and Explosion Protection Lab.*
- *Textile Metrology Lab.*
- *Air pollution Lab.*
- *Standard Reference Material Lab. (under establishment)*

Chemical Metrology Division

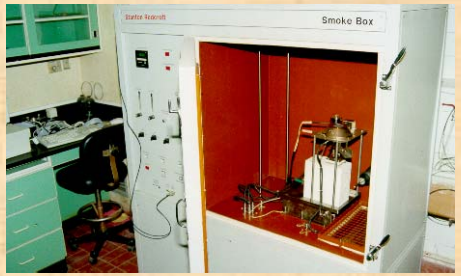
Polymer Metrology and Technology Lab.

The *laboratory* services rubber and plastic industries with reliable and accurate testing activities. It can provide standard reference polymer materials to adjust the mechanical measurements.

Chemical Metrology Division

Fire and Explosion Protection Lab.

This *laboratory* has the primary objective to test materials to assure that the modifications to the product will manifest the intended fire performance without significant reduction of their physical properties, resulting in new improved fire safe products for domestic and international markets.



Chemical Metrology Division

Textile Metrology Lab.

This *laboratory* provides functions and activities for measuring the chemical, physical and mechanical properties of textiles, carpets and polymers, such as tensile strength and elongation percent, crease, recovery, tearing, bursting, and surface morphology, color measurements, fastness and fading.

Chemical Metrology Division

Air pollution Lab.

The Air pollution lab. undertakes the responsibility of serving the National Project of Environmental Information and Monitoring Program (EIMP) in air pollution.

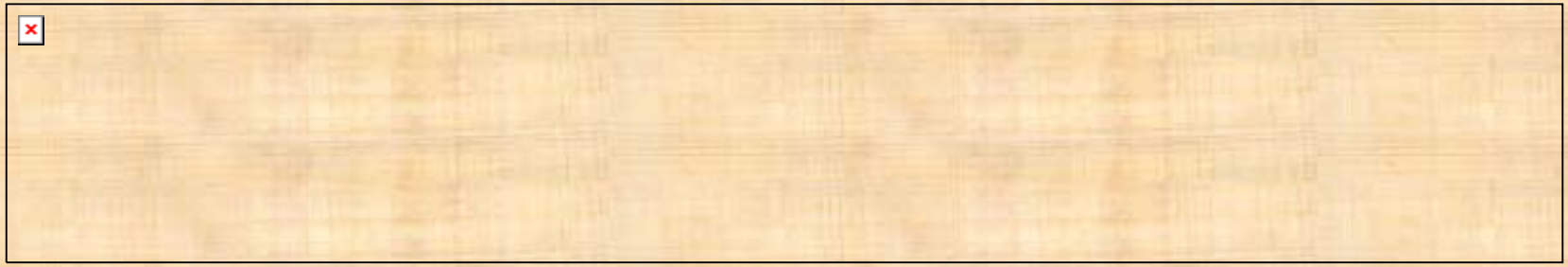
National Laboratory Accreditation Bureau (NLAB)

NLAB is the Egyptian National Laboratories Accreditation Bureau. It is a non-profit organization governed by a Board of Advisors. NLAB was established in 1996 to grant accreditation to those laboratories that demonstrate technical competence using sound quality system. NLAB provides personnel training as well as promotion of the awareness on calibration criteria, traceability and accreditation through a number of training programs.

TOTAL QUALITY CONSULTANCY Center (TQCC)

- **Established 1996 as the business arm of the National Institute of Standards.**
- **Expertise for consultation is drawn from within NIS and other Institutions, public and private sectors as well as regional and forigen sources.**
- **Several important projects were undertaken in the field of laboratory planning - calibration and testing and ,training.**

Thank You



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