



Ministry of Science & Technology  
Government of Pakistan

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# Workshop on Productivity, Quality & Innovation (PQI)

*(Presentation by MoST)*

January 10, 2017

## Vision of MoST

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- Acquire World Class Capabilities in Scientific & Technological Research
- Use Science & Technology as an Engine for Economic Development
- Improve Quality and Productivity in Industrial processes
- Absorb proven technologies to meet national needs
- Exploitation of indigenous resources for industrial promotion / growth

## Mandate of S&T DIVISION

As per Rules of Business

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The Ministry of Science and Technology (MoST) has been functioning since 1972. It is the national focal point and enabling arm of Government of Pakistan for

- Planning, coordinating and directing efforts;
- To initiate and launch scientific and technological programs and projects as per national agenda for sound and sustainable S&TR base for the socio-economic development,
- To achieve the vision for a better Pakistan, in terms of the mandate contained in Schedule-II of the Federal Government Rules of Business 1973.

## Organizations of MoST

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### Academic

- National University of Sciences & Technology (NUST) (1991)
- COMSATS Institute of Information Technology (CIIT) (1998)

### Research & Development

- Pakistan Council of Scientific & Industrial Research (PCSIR) (1953)
- National Institute of Oceanography (NIO) (1981)
- Pakistan Council of Research in Water Resources (PCRWR) (1996)
- Center for Applied Molecular Biology (CAMB) (1996)
- Council for Works & Housing Research (CWHR) (1964)
- National Institute of Electronics (NIE) (1979)
- Pakistan Council for Renewable Energy Technologies (PCRET) (2001)

## Organizations of MoST...

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### Policy Making

- Pakistan Council for Science & Technology (PCST) (1961)
- Pakistan Science Foundation (PSF) (1973)
- Pakistan Engineering Council (PEC) (2007)

### Service Provider

- Pakistan Standards and Quality Control Authority (PSQCA) (1996)
- Pakistan National Accreditation Council (PNAC) (1998)
- Science & Technological Development Corporation (STEDEC) (1987)

## National Science, Technology and Innovation Policy 2012

The ST&I policy was launched on 23<sup>rd</sup> November, 2012 after approval from Cabinet, Council of Common Interest (CCI) and the Prime Minister.

The main focus of the Policy is on:

- **ST&I Planning and Management Structure** i.e. Human Resource Development, Indigenous Technology Development, Technology Transfer & Creation of Absorptive Capacity and International Cooperation
- **and R&D Thrust areas** Including MSTQ, Environment, Health & Pharmaceuticals, Energy, Agriculture & Livestock, Minerals, Electronics, Space Technology, Material Sciences, Nanosciences & Nanotechnology, Laser & Photonics, Engineering etc.
- **One of the Policy Action is**, declaration of the political will that S&T capacity building would be a central pillar of national development strategy and the **R&D expenditure would be enhanced to 1.0% of GDP by 2015 and 2.0% by 2020**

**ECNCST has recently recommended implementation strategy to this effect. Funds of Rs. 84 bn are required to implement.**

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## Thrust Areas of ST&I Policy

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- Metrology Standards Testing and Quality (MSTQ)
- Environment
- Health & pharmaceutical
- Energy
- Biotechnology and genetic engineering
- Agriculture & livestock
- Water
- Minerals
- Ocean resources
- Electronics
- Information & communication technology
- Space technology
- Material science
- Engineering sector

## 6<sup>th</sup> Meeting of ECNCST - 2016

### Important Areas of Recommendations

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- Government to raise the national R&D spending **up to 1% by 2018** and **2% of the GDP by the year 2023**
- Promotion of R&D in industry and engaging industry & civil society in patronage of R&D activities
- Uniform salary structure for scientists, engineers and technicians of R&D organizations and performance based promotions
- Communication strategy to create enabling environment for promoting scientific mindset and culture in the society
- National Research Agenda

## National STI Strategy and Action Plan

## National Quality Policy (NQP)

Recently, MoST has drafted National Quality Policy (submitted to Cabinet for approval) with following objectives:

- To ensure that goods and services emanating from or traded in Pakistan are designed, manufactured and supplied in a manner that match the needs, expectations and requirements of the purchasers and consumers as well as those of the regulatory authorities in the local as well as in the export markets, and;
- To contribute to safety around homes, public and work places and help protect the environment within Pakistan.

## 2017 – Year of Productivity, Quality & Innovation (PQI)

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Ministry of Planning, Development & Reform, under National Vision 2025 has planned to celebrate Year 2017, the Year of Productivity, Quality and Innovation (PQI).

MoST is one of the member of Core Committee on PQI Initiative.

### PQI Enablers of MoST

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Presently three S&T organizations are actively involved in activities directly related to PQI vision with focus on export enhancement and increasing trade:

- Pakistan Standards and Quality Control Authority (PSQCA),
- Pakistan National Accreditation Council (PNAC) and
- National Physical and Standards Laboratory (NPSL), PCSIR

## Pakistan Standards & Quality Control Authority (PSQCA)

Established as a body corporate through Act-VI of 1996 with general direction and administration through a Board of Directors headed by Minister for Science & Technology

### Main Objective:

- Enhance the competitiveness of industry in local as well as global market
- Development of Metrology, Standards, Testing and Quality (MSTQ) infrastructure under the WTO regime

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## PSQCA Milestones

- |  |       |
|--|-------|
| 1. National Standards formulated to-date :                   | 6081  |
| 2. ISO/IEC Standards adopted to date:                        | 21000 |
| 3. Products under Compulsory Certification<br>Marks Scheme : | 78    |
| 4. Certification Marks License issued :                      | 418   |
| 5. Quality Assessment Inspections :                          | 375   |

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## Pakistan National Accreditation Council (PNAC)

NAC was established through a notification in 1998 with prior approval of the Cabinet. Presently PNAC acts as a sub ordinate office. Establishment of PNAC as a body corporate through an Act of Parliament is under process.

### Objectives

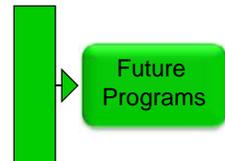
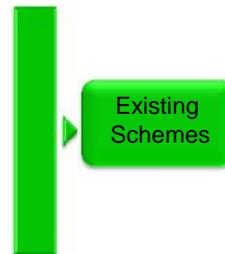
- Accredit conformity assessment bodies such as laboratories to international requirements.
- Formulate and implement Quality Policy & Plans.
- Create awareness on quality issues to meet WTO requirements.
- Facilitate exporters, regulators, industrialists & consumers.

## PNAC Functions

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### Accreditation of

- Laboratories (ISO/IEC 17025)
- Certification Bodies (ISO/IEC 17021)
- Inspection Bodies (ISO/IEC 17020)
- Medical Laboratories (ISO 15189)
- Halal Certification Bodies (PS 4992:2010)
  
- Personnel Certification (ISO/IEC 17024)
- Product Certification (ISO/IEC Guide 65)
- Proficiency Testing Providers (ISO/IEC 17043)



## Schemes already launched and their status on accreditation

### Provides Accreditation on:

- Test/ Cal Labs (ISO/IEC 17025 since 2002)
- CBs on QMS/ EMS (ISO 17021 since 2002)
- Medical Labs (ISO 15189 since 2006)
- Inspection Bodies (ISO 17020 since 2009)
- Halal CB (PS 4992 since 2012)
- Product certification (ISO 17065 since 2015)
- PT providers (ISO 17043 since 2015)
- Personal CBs (ISO 17024 since 2016)

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## NATIONAL PHYSICAL AND STANDARD LABORATORY (NPSL)

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NPSL as a national metrology lab was established in 1974 as a mono functional unit of PCSIR. Establishment of NPSL as a body corporate through an Act of Parliament is under process.

### **Functions:**

To implement and operate a unified & coherent national measurement system as per international requirement and practice for quality assurance and management system and to support the legal metrology in the country.

## NPSL – MAJOR ACHIEVEMENTS

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- Member of International Bureau of Weights and Measures (BIPM) since 1987 and member of Asia Pacific Metrology Programme (APMP) since 1998.
- Establishment of unbroken chain of traceability of measurement standards
- Achieved international recognition in its measurement services through signing of MRA with International Committee for Weights and Measures CIPM-MRA, Paris, France.
- Nationally accredited laboratory conforming to ISO/IEC 17025:2005 from PNAC.

## NPSL – MAJOR ACHIEVEMENTS (Cont...)

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- Established Proficiency Testing Provider Laboratory in 2016.
- Providing internationally traceable calibration / testing services to public /private sector industries (more than 2000 certificates are issued annually) in the field of physical & chemical metrology.
- Disseminating internationally traceable measurement capabilities to Provinces (Weight & Measurement Departments) to support legal metrology.
- Providing training to industrial sector in the field of calibration and ISO:17025 accreditation.
- A bill has been drafted and submitted to Federal Government to re-designate NPSL as independent National Metrology Institute of Pakistan at par with international obligation.

## NPSL – Future Plans

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- Enhancing the capacity / capability for developing / production of working / secondary standards to support industrial sectors testing / calibration laboratories and legal metrology infrastructure in Pakistan.
- Increasing interaction with local industries / stakeholders to support the certification and enhance the quality to facilitate the export/import of goods.
- Enhancing the capabilities / competencies of metrologists and laboratories to enable NPSL to participate in Key Comparison activities and entered to MRAs with regional metrology bodies and NMIs.
- Preparation of Certified Reference Material (CRM) for different matrices used for testing/analysis of consumer products.

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## Major Development Initiatives of MoST Related to PQI

## Major Development Initiatives of MoST (Cont...)

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- **Development of pilot plants** for translating lab. scale development processes, their optimization and transformation for commercial production. PCSIR, has developed following facilities/plants:
  - **Peshawar:** Herbal, Mineral and Food
  - **Lahore:** Pharmaceutical, Phosphate, High Quality Refractory Bricks & Ceramic Material, Fermentation, Fruits & Vegetable Dehydration and Food Processing
  - **Karachi:** Chemical, Fish, Pharmaceutical, Tenekil

## Major Development Initiatives of MoST (Cont...)

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- State of art Laboratories of PCSIR at various locations have been established to offer accredited testing services to Public and Private Sector entities as below:
    - Textile Laboratories (ISO-17025)
    - Food Laboratories (ISO-17025)
    - Microbiological Laboratories (ISO-17025)
    - Metrological Services (ISO-17025). 69 Sets of Reference Measurement Standards have been purchased and installed in NPSL in various fields of Metrology.
- In addition to above existing PCSIR have been upgraded to make them at par with international working standards. Technology Business Incubator (TBIs) have also been established to facilitate tenants.

## Major Development Initiatives of MoST (Cont...)

National Institute of Electronics (NIE) has established a Pilot Production Line to manufacture SMT LED panels and electronics boards. The Production Line will be used to manufacture LED lights and circuit boards of different kinds i.e. laptops, mobiles, calculators etc. NIE has also established a centre for quality testing of electronics products.

Pakistan Council for Renewable Energy Technologies (PCRET) indigenously produced third generation solar cells in its labs using organic materials which is a milestone achievement in the field of indigenous solar photovoltaic technology. PCRET also signed MOU's with some private stake-holders for commercialization of PCRET designed renewable energy products.

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## Major Development Initiatives of MoST (Cont...)

### Establishment of Technology Parks

- NUST – Feasibility Study has been completed. PC-I under preparation.
- CIIT – Feasibility Study is underway.

The technology park will provide cohesive environment for University – R&D Institution – Industry Collaboration with the intent of creating high technology economic development and advancing of knowledge.

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## Major Development Initiatives of MoST (Cont...)

### Certification Incentive Program for SMEs

Certification program for SMEs is underway in order to:

- Guide and support SMEs for exploring and adopting new trends and requirements of intentional competitiveness, improved industrial productivity and quality according to the requirements of internationally recognized standards and guidelines.
- Provide incentives to more than 2025 SMEs in developing a certification framework for meaningful participating in global supply chains, enhancing export trade and to improve business practices.
- Promote linkages between MoST, R&D organizations and Academia with SMEs.
- Create awareness in Pakistani manufacturers, exporters and traders regarding the importance of certification through workshops & training sessions. At least 1600 to 2200 persons will benefit through these programs.
- Educate Pakistani manufacturers, exporters and traders through Compliance Training sessions. At least 650 persons from related quarters will be trained.

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## Major Development Initiatives of MoST (Cont...)

### Technology Incubation Centres/ Technology Business Incubators (TBIs)

have been established in NUST, CIIT and PCSIR to encourage entrepreneurship to translate new ideas to commercially viable products. These organizations produced hundreds of trained manpower through a number of professional and technical training programmes / courses in various disciplines to contribute significantly in the industrial development of the country.

## Major Development Initiatives of MoST (Cont...)

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### Science Talent Farming Scheme has been initiated:

- To identify the young students (**300 each year**), interested and passionate towards science through appropriate selection criteria.
- To groom and support the selected students all the way to the highest degrees by progressively exposing them to advancements in science and mathematics through inquiry based learning approach.
- To provide better educational opportunities by establishing National Science School (NSS).

## Major Development Initiatives of MoST (Cont...)

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### □ **Establishment of Pakistan Halal Authority**

The parliament has enacted Pakistan Halal Authority Act 2016. This Ministry is in process to develop infrastructure to establish the Authority to enhance the national share of international halal products market.

## New/ Planned Initiatives

### Biotechnology Driven Economic Development

Estimated Cost: Rs. 985.516 Million

- The project aims to enhance capacities and capabilities of Biotechnology Centers of organizations under MoST and is inline with the priority areas of present Government.
- Through this project efforts will be made to establish strong coordination and collaboration between researchers and end users to enhance indigenous development of technologies.

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## New/ Planned Initiatives

### Nanotechnology Driven Economic Development

Estimated Cost: Rs. Rs. 2455.875 Million

- The project aims to enhance capacities and capabilities of Nanotechnology Centers of organizations under MoST and is inline with the priority areas of present Government.
- Through this project Development on the forefront of Nanotechnology will be initiated. Investigation of new novel materials for use in bio, microfluidic and chemical sensor devices using magnetic and semiconductor nanomaterials will be done.
- Development of prototype sensor network and Integration of organic and inorganic nanomaterials in devices for nanosensors, e.g., for photocatalysis will be achieved

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## New/ Planned Initiatives

### Development of Hydrogen Fuel Cell Technologies, Islamabad

Estimated Cost: Rs. 809.655 Million

- Hydrogen and fuel cell technology will be developed and demonstrated for its commercialization and application as energy sources.
- To carry out applied research on manufacturing and development of low and high temperature fuel cells and their components.
- Utilizing hydrogen and various hydrocarbons such as methane, etc. to demonstrate the onsite electricity generation by SOFCs and MCFCs.
- Fuel Cell Technology will be developed and prototype will be demonstrated to prove its efficiency and workability. Furthermore, Alkaline Fuel Cells (AFC), Phosphoric Acid Fuel Cells (PAFC), Proton Exchange Member Cells/Polymer, Electrolyte Fuel Cells (PEM), Solid Oxide Fuel Cells (SOFC) low temperature, Molten Carbonate Fuel Cells (MCFC), Lithium-ion batteries and others will also be developed.

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## New Initiatives Under PQI

Recently, under directions of PQI Core Committee, MoST is working on the preparation of:

- A Joint PC-I proposal by SMEDA and PCSIR on Productivity Enhancement and Technical Audit of SMEs.
- A Joint PC-I by PSQCA & PNAC on Developing Testing Facilities in selected industrial clusters.
- A Joint PC-I by PCST & HEC on Need Assessment of Technical Manpower and Development of Training Curriculum.

# CHECKLIST FOR WAY FORWARD

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## 1. MECHANISM IN PLACE $\delta$

Activation of national 'Think Tank' i.e. National Commission on S&T (NCST)

## 2. CREATE WORK $\delta$

Something need to be done, to achieve, to be measured and appreciated.

## 3. IMPROVE INFRASTRUCTURE $\delta$

Upgrade equipment, buildings and improve methodology for sharing of facilities.

## 4. ATTRACT MANPOWER ?

The best workforce put to work for industrialization and economic good.

## 5. UPGRADE TO ESTABLISH "NUCLEI" OF EXCELLENCE ?

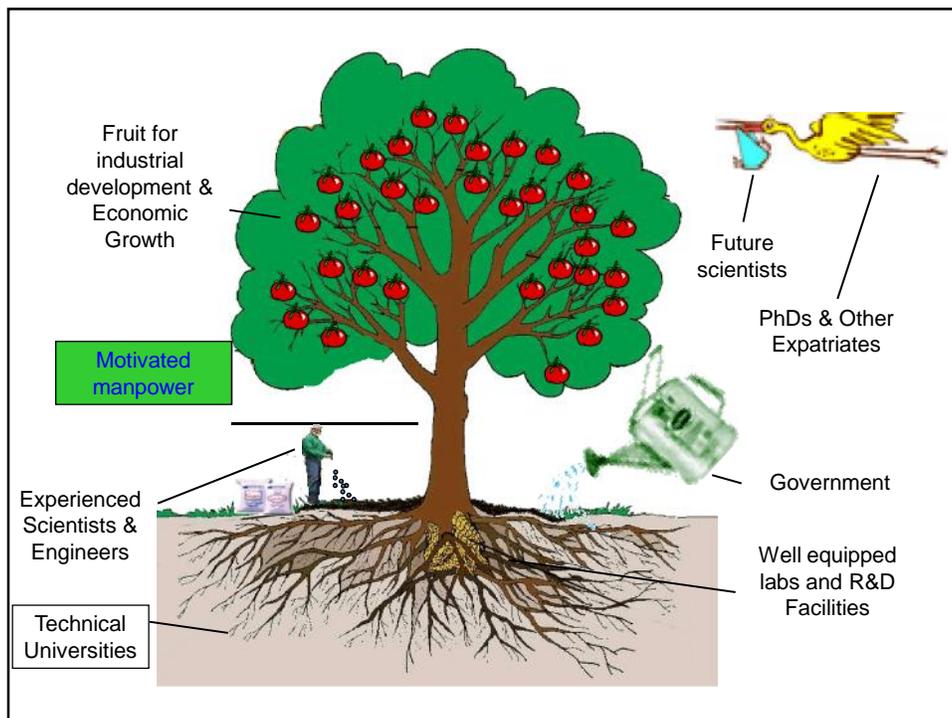
Some departments within the existing organizations can be quickly upgraded to small pockets of excellence.

## 6. GROW TO LARGE CENTERS OF EXCELLENCE ?

All S&T organizations need to transform into centers of excellence.

### THE ULTIMATE AIM

*Indigenous Industrialization / Import Substitution / Knowledge Based Economy*



**Thank you for your attention !**

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