



***the COMSTECH 10-Year
Programme for OIC States;
and
CERN and Pakistan***

**The 2nd International Network for
Government Science Advice Conference:
Brussels, 29-30 September, 2016**

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(OIC Ministerial Standing
Committee on S&T Cooperation)**



The Issues for Developing Countries

- Advising your own government is difficult.
- Advising a group of countries is even more so.

Relevance ? Stakeholders ? Jurisdiction ?

EU is different

- Impact will Depend Upon:
 - The Nature of the work which must follow
 - Advising only ? (foresight, trends, pick the winners ?)
 - Steering ? AND / OR Monitoring ?

Who will fund the programme ?



Science, Technology and Innovation(STI): The Magic Wand Hypothesis

STI alone is not a magic wand.

- **Economic advancement : Extremely complex process**

Basic Lesson from Growth Accounting Studies for Latecomers: Not possible to replicate exactly those who have gone before.

- **If one country succeeds in an innovation-driven growth path, others will follow; Conditions for entry however will be different**
- **Concept of congruence of “social & technological capabilities” for latecomers**



Core Issue: Managing Technology in the Knowledge Based Economy

- **Must be Clear whether we are looking for economic outcomes of research.**
- **Must remember: the reward systems of academic research are different from that of the entrepreneur**
- **Also: IT Sector is not a good example to follow**
- **Core lesson from East Asia:**
 - **SMEs** emerging as Major Players in the global supply chain. State policies were crucial
- **During 1970s-80s, It was noticed that manufacturing can be done anywhere .., Now designing can be done in many places outside the traditional centers.**



OIC: Organisation of Islamic Cooperation, 57 Countries.

1.6 billion people; Some states classed among LDCs

- **COMSTECH is the Ministerial Standing Committee of the OIC on S&T, with its HQ in Islamabad, Pakistan (One of four such Committees)**
- **Chairman: President of Pakistan**
- **Has a Coordinator General, Executive Committee of 9 members, (Ministerial Level); and a General Assembly of all Ministers of Science/Higher Education.**
- **Funding: Voluntary Contributions from Member States**
- **Main Contributor: Pakistan**
- **Fast Growing Education / Science Infrastructure / Output**



Mandate of COMSTECH

1. **Assess Human / Material Resources** of Member States
- Identification of their S&T Needs
2. **Enhancing Cooperation and Coordination** in S&T
 - Building Collective Competence
 - Building Indigenous CapabilitiesMutual Assistance
3. **Creation of an Effective Institutional Structure** for Planning , R&D, and Monitoring of S&T Activities
4. **Building Collaborations** : Regional, and International

>> **Small Example of Sudan and PAKISTAN** <<



How COMSTech Works

- ❑ Research Grants & Travel Support
- ❑ Advanced Training Workshops in Emerging Sciences and Technology + **Design of S&T policies**,
- ❑ Institution Building,
- ❑ Networks (13) in Key Thematic Areas,
- ❑ Literature Search Service

SOME PARTNERS: IDB, TWAS, IFS, WHO-EMRO, LINDAU NOBEL LAUREATES GROUP

Research Grants, (typically US\$ 12,000 per scientist)		
Period	Countries	Projects
2011-2016	44	259



Advanced Training Workshops/Conferences

2011-16: 47 courses in emerging areas of S&T
1253 participants (**26 countries**);
514 keynote speakers (~ 40% from Advanced Countries)

Capacity Building in Policy Formulation, Foresight, and Implementation Strategies (Scientists/ Managers)

Period	Events	Participants	Countries	Resource Persons
2011-15	11	323	24	69
1996-2015	23	683	31	152

Financial Assistance for Conf. / Workshops in OIC States
198 events; **108** in Pakistan, **90** in 31 OIC states



Advanced Trainings only in 2016

Three Hands-on Training Workshops Completed. Six more by December 2016

#	Title	Countries	Participants
1	Integrating Clinical Pharmacy Education, Practice & Research: Bridging the Gap;	8	39
2	Application of Nuclear Radiation (Agriculture, Medicine, Non Destructive Testing, Safety and Nuclear Regulatory Practices) ... with IAEA	10	35
3	Genomics and Genome Editing	13	33
Total		31	107

**Fifteen Thematic Areas Identified for 2016-17
('Science Communication' in Jan 2017)**



COMSTECH Directory of Active Scientists of OIC Countries(2012)

Size: 16 volumes, (21,997 pages)

- **A Major Resource for the Scientific Community**
- **Provides Internationally Abstracted Information**
 - **Emerging Areas in Basic and Applied Sciences**
 - **Arranged according to fields and sub fields.**
 - **This publication is helping to create joint programs and collaborations among the OIC scientific community.**

This database is now being updated.

Available at: www.comstech.org.



The COMSTECH 10-year Plan for Development of Science & Technology in OIC Countries

- **New Relationship Between Science & Society**
 - **Key Objective: Build a Scientific Culture.**
..... generally absent in most OIC Countries
- **Components of the Plan:**
 - **Emerging Sciences & Technology: Basic Sciences**
 - **Focused Exchange of Scholars, an Internal ToT**
 - **Some 'Big' Science / Multinational Programmes**
 - **Venture Capital for Hi tech Start ups**
- **Implementation Strategy: < Steering Committee >**
 - **Thematic Groups**
 - **Costs, Timelines**

- **Infrastructure & Research** in universities & res. centres
 - **'Mother' Institutes** as major nodes in the program
 - **Ibn al Haitham Programme:** Mobility within OIC and outside:
 - High Performance Computer Facilities: Simulation / Modelling

- **Projects with Economic and Industrial Outcomes**
 - Hi-Technology Start-ups, Bio-Med. Equipment, Modern Teaching Aids, Storage Technologies for Ren. Energy
 - Training of Technicians : Different and Higher Skills

- **Some Joint Multinational Science Programmes:**
 - Climate, Astronomy & Space Sciences, Oceanography, etc
 - Glaciology / Glacier Melting -The Karakorum Anomaly
 - Space Sciences: Small Sats. , Resource Mapping Sat. (1)
 - Synchrotron Light Sources



Some Work in Progress

- **Renewable Energy (RE) Profile of OIC Countries:**
 - **Mix / efficiency (solar, wind, biomass, nuclear, hydro)**
 - **Planned, Installed and / or Under Construction**
 - **National Policies (Feed in Tariffs and Incentives)**
 - **Cost of Electricity Generation / Local Capabilities in RE**
- **Will fund **Storage Technology** Programmes**
- **Science Profile of the OIC Countries:**
 - **Strengths of a Country (Area / Field, etc)**
 - **Institutes, Groups, Leading Researchers,**



Some MoUs with Int. Organisations

1. Lindau Nobel Committee /Foundation:
 - **COMSTech** : **20 Science PhD students** or post docs &
 - **15 Economists** from OIC states to Lindau
2. Pakistan Govt.: 100 students/year (LDCs), starts 2017.
3. Directly with OIC Member States
4. Under Negotiation: **IIASA** in Vienna, **CERN**, Geneva ?

Looking for more international partners



TYPICAL IMPLEMENTATION MECHANISM

Members	STEERING COMMITTEE, Chaired by COMSTECH					
Core Members	IAS	ISESCO	COMCEC	COMIAC	OIC Sectt.	IDB
Regional Advisors	Five Leading Scientists (One each from W. Africa, MENA, C. Asia, S. Asia, S.E Asia)					

THEMATIC GROUPS: Experts from Member States / OIC Organs

Basic & Applied Sciences	ICT & Cyber-security	Food, Water, and Agriculture	High Performance Computer Centres (HPCCs)	Technical & Vocational Education	Harmonisation of Trade Laws & Industrial Standards
Groups for Big Science Projects				Intra-OIC Accreditation Universities and Mobility of Scientists	Venture Capital & Soft Loans for Hi-Tech start-ups
<ul style="list-style-type: none"> • Space • Oceanography • Earth Sciences 	<ul style="list-style-type: none"> • Climate Change • Synchr. • Astronomy 	Joint Manufacture: <ul style="list-style-type: none"> • Power Plants • ICT • Lab. Eqpt. 			



CERN and Pakistan

❑ Particle Detectors:

- R&D on Particle Detectors: RPCs, Gas Electron Multipliers (GEM) at NCP and PINSTECH.

❑ Grid Computing:

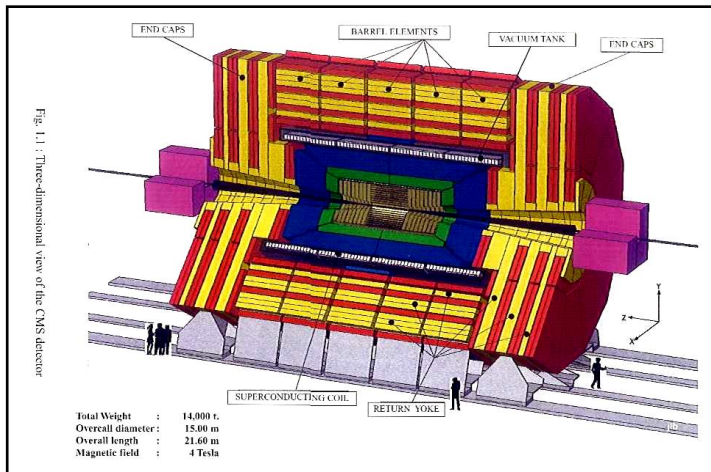
- The Global LHC Computing Grid (WLCG); nodes at NCP and COMSATS in collaboration with CMS and ALICE.

➤ Accelerator Technology:

- Design and Manufacture of SC Magnets ... sextupole magnets for SESAME accelerator in Jordan
- Working with RF acceleration groups: CLIC & LINAC 4

Pakistan's first Synchrotron: Approved in Principle

Some Outcomes in Pakistani S&T : The Large Hadron Collider (LHC), Geneva



Transporter ,
13 T



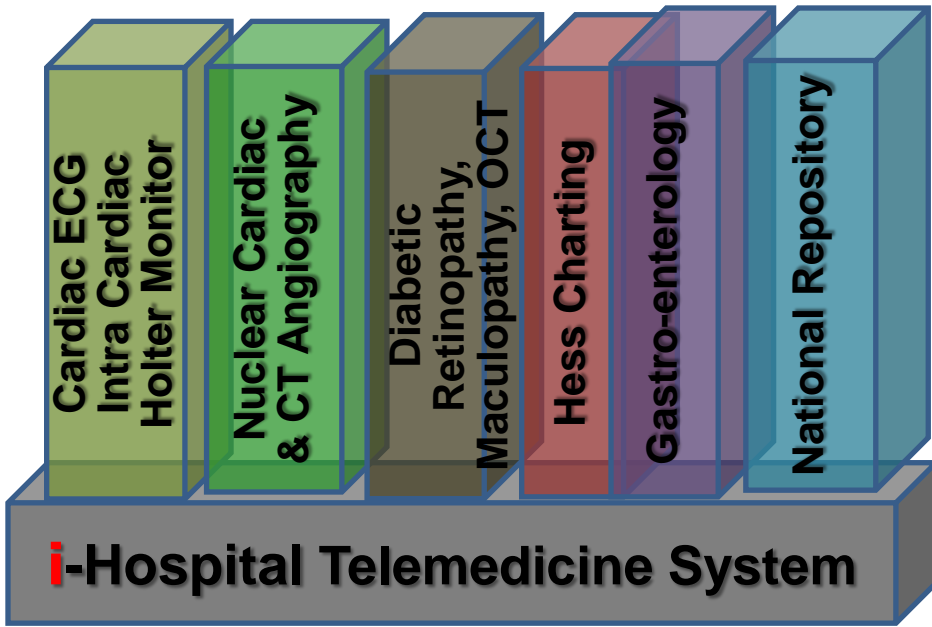
CMS Magnet Feet, ~ 28 T



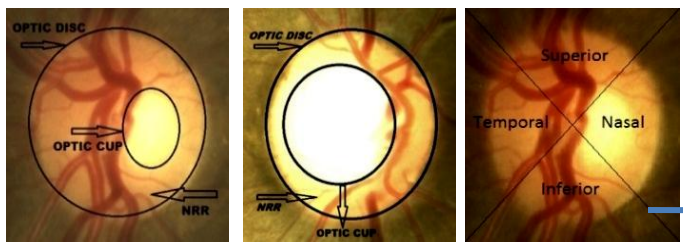
Detector Position Monitoring System for CMS at CERN's LHC:
40 Laser Systems; designed and manufactured in Pakistan



ICT Products from One Institute

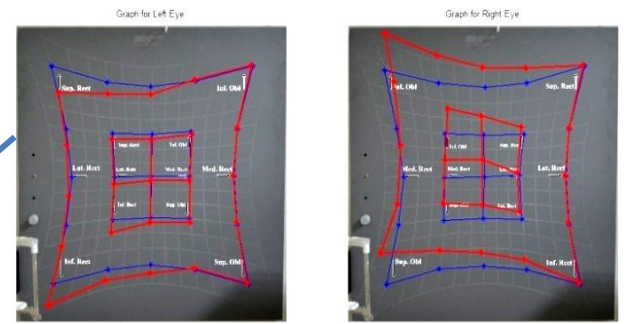


ECG Machine



Glaucoma Detection Using Fundus Image Processing

ICT R&D Fund: \$500m +



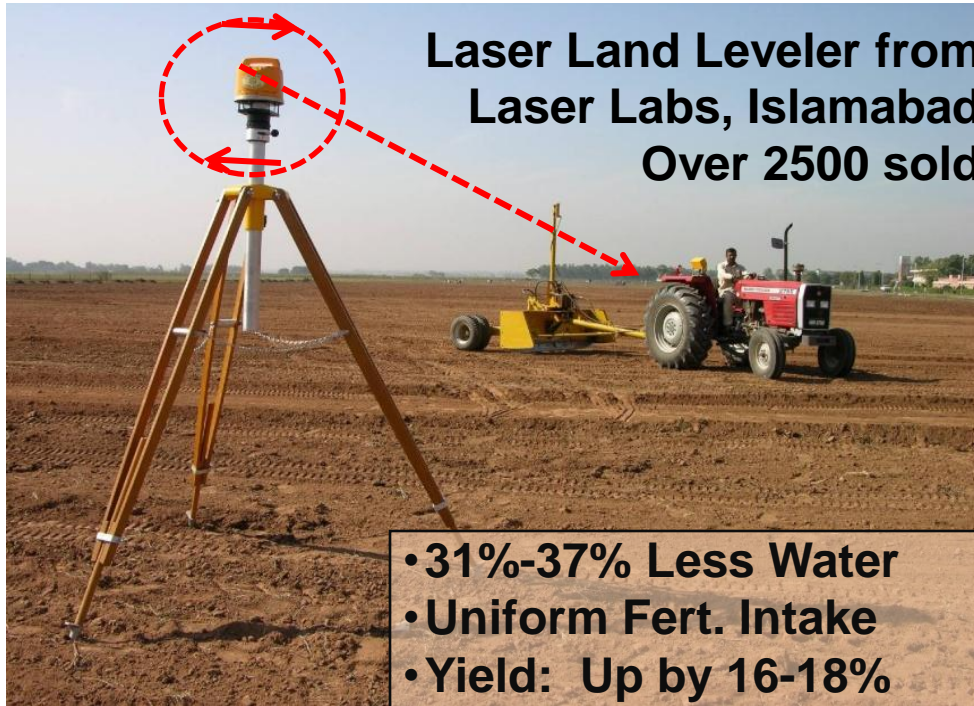
HESS Charting: Image Processing

Small charge on every mobile phone call (115 m mobile phones)



COMSTECH

Some Examples of Pakistani STI



**Pakistani Laser
Industry: ~ US\$ 150m**



Lasers for Univ.



Laser Crystals

Fed its people Most of the time.

- **The Case of Cotton (from 3 m bales to 15 m bales)**
- **Wheat ... 25% of new seed from just one Agric. Res. Instt.**
- **Space Based Crop Estimation**
- **National Gene Bank**

Some Facilities for NPPs

Machining up to:

- D x L (m): 16 m x 12m
- Height 6.5 m
- Weight 320 Tons
- Accuracies in microns.



16 m Dia.
Vertical
Lathe



12 m Boring &
Milling
Machine



Turbine Blade
Carriers

Evaporator for
Desalination Plant



Heat
Exchangers
/ Air Coolers



D x L (m) : 3.2 x 16.4
Wt = 50 ton;
1,600 m³/day