Million problems, Billion minds

The second largest population of the world which will soon be the youngest aspires and deserves a much better quality and security of life.

Engineering can and should provide solutions for societal needs, challenges and aspirations.
All IITs & IISc

A national movement providing an opportunity for the higher echelon institutes in India to integrate with all grass root level institutes, industry and organizations, mutually complement and deliver what the country demands and aspires.
10 Domains identified for interventions that have the largest impact on quality of life
Ten Technology Domains/Themes of IMPRINT

- Healthcare Technology
- Computer Science and ICT
- Energy Security
- Sustainable habitat (urban/rural) design
- Nano-Science and Technology
- Water and River Systems
- Advanced Materials
- Manufacturing Technology
- Defense and Security
- Environment and Climate Change

- IMPRINT is the Indian blueprint of the GRAND CHALLENGES of USA
- IIT Kanpur is the NODAL Institute with all IITs and IISc as partners
HEALTHCARE

Objective:
Making health care effective and affordable for all

Themes:
- Campaign on health and healthy living
- Affordable diagnostic tools and imaging
- Prosthesis and implants
- Innovative devices, embedded systems
- Point-of-care diagnosis
- ICT solutions for healthcare
- Regenerative medicine
- Surgical and operative solutions
- Traditional healthcare
- Reducing communicable diseases
- Healthcare management and legal issues
- Accelerating healthcare innovation
INFORMATION AND COMMUNICATION TECHNOLOGY

Objective:
Global leadership in information and communication technology

Themes:
- Data acquisition and processing
- Communication
- Computation
- Computational infrastructure

The four thematic layers of computational and communication components
Objectives:
Attain energy security and make alternative and renewable energy affordable

Themes:
- Fusion technology
- Clean coal technology
- Renewable energy
- Hydrogen based energy
- Energy storage
- Energy systems & efficiency
- Revise energy strategy
Objective:
Affordable and sustainable habitat for all

SUSTAINABLE HABITAT

Themes:

• Architecture & built forms
• Urban planning & design
• Physical infrastructure
• Housing for all
• Social infrastructure
• Water & sanitation
• Transportation
• Smart city
• Energy & environment
• Governance
Objective: Nanotechnology product development for improving quality of life
WATER RESOURCES AND RIVER SYSTEMS

Objective:
Address critical challenges of water resources and river systems

Major Themes –
• River Basins
• Water in Urban Systems
• Water in Rural Ecosystems
• Water & Agriculture
• Water & Industry
• Spatial Real-time Data & Infra

Complementing Science and Technology Measures –
• Valuing Water
• Governance
• Knowledge & Capacity Development
Objective:
Achieve leadership in hardware through advanced materials

ADVANCED MATERIALS

- **Structural Materials**
  - Steel
  - Light alloys
  - Advanced composite materials
  - Particulate materials
  - Ultrahigh temperature materials

- **Functional Materials**
  - Electronic materials
  - Energy materials
  - Optoelectronic materials and devices
  - Smart materials
  - Earth abundant element based functional materials.

- **Emerging Materials**
  - Nanomaterials
  - Biomaterials and devices
  - Polymeric and soft materials
  - Glassy and amorphous materials
  - Bio-inspired and patterned functional materials.

- **Integrated Computational Materials Engineering (ICME)**
Objective:
To improve the competitiveness of Indian manufacturing industry

Manufacturing Processes
- Processes for Shape Changes
- Processes for Property Change

Verification of Manufactured Parts

Manufacturing Equipment and Tooling

Enabling Technologies

Manufacturing Strategies
Objective:
Lend an edge and indigenise the country’s security and defence capabilities

SECURITY AND DEFENCE

- Combat Engineering Systems
  - Aircrafts and Submarines
  - Battle Tanks
  - Autonomous Systems
  - Armaments and Engineering Support Systems
- Cyber security
- Electronics and Communication Systems
  - Hardware Design
  - System Software
  - Application Software
- Strategic Materials
  - Thorium technology
  - Smart materials
  - Rare earths
Objective:
Growth and prosperity without adverse impact on environment

ENVIRONMENTAL SCIENCE AND CLIMATE CHANGE

- Climate science
- Monsoon prediction
- Ocean studies
- Air pollution
- Aerosols and climate
- Water resources and pollution
- Forests and climate change
- Glacier retreat
- Capacity development
Synergy with National Missions
Science-Engineering-Technology

path to prosperity

Science
Know-why

Unravel Nature
Curiosity/need inspired act
Discovery

Technology
Know-what sells

Multiple copies
Innovation

Engineering
Know-how

Man made replica
Invention

SOCIETY
Modern Innovation Eco-System

Industry produces/provides solutions as Viable Technology

Academia creates/disseminates Knowledge

Research Labs pursues Innovation in S - E - T

Society consumes and demands
Way Forward

• Engineering challenges under 10 domains
• 10 domains x 10 themes x 10 targets x 10 topics x 100 partners = $10^6$ problems

• New research road map

• Translation of knowledge to opportunities and wealth

• Enhanced funding for research projects (Rupees 1000 crores to begin with)

• Convergent action by different government departments

• Active industry participation
Million problems, Billion minds