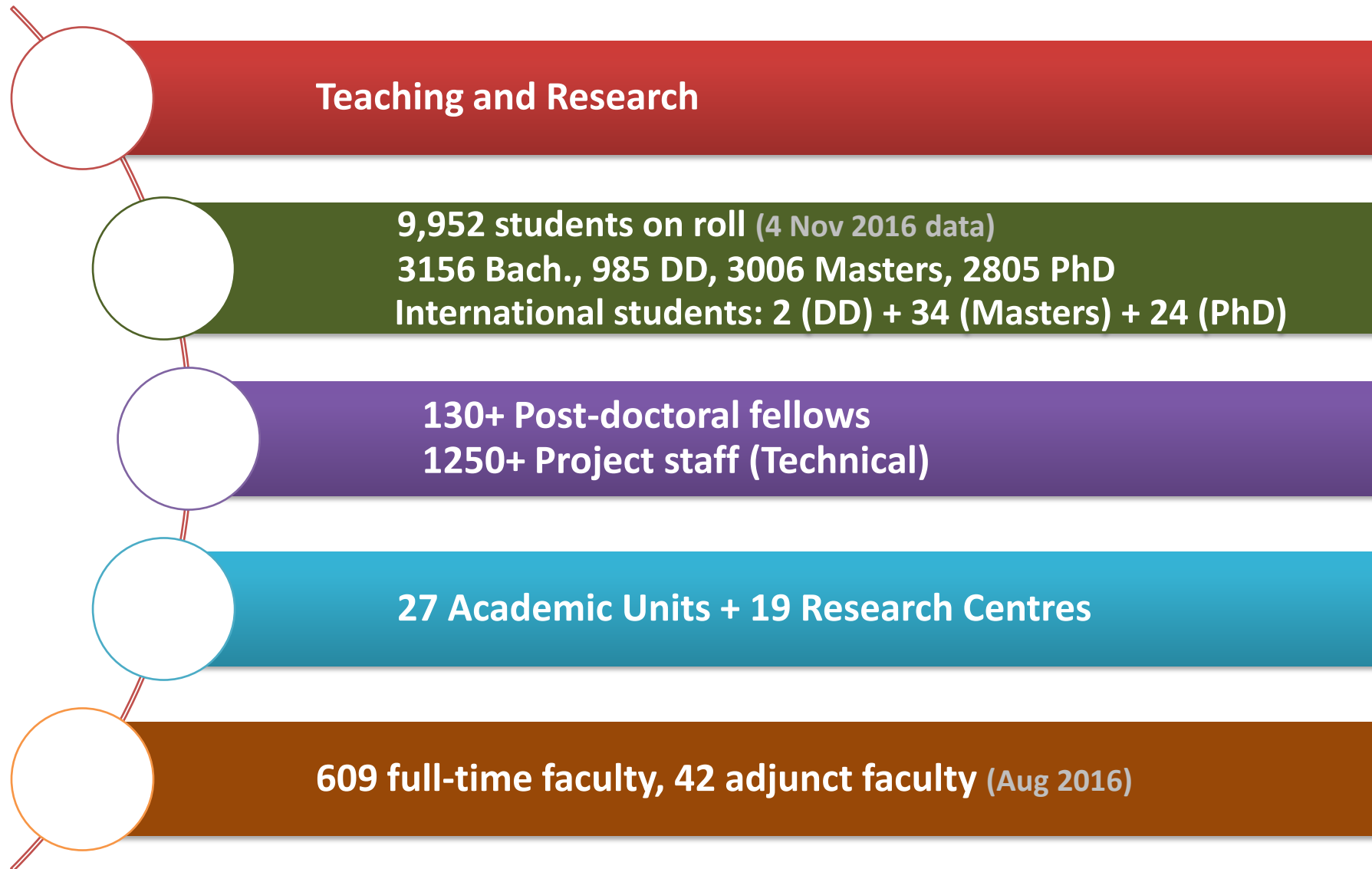




# **Industrial Research and Consultancy Center Indian Institute of Technology Bombay**

**December 2016**

# IIT Bombay at a glance



# Academic units @ IIT Bombay

- Department of Aerospace Engineering
- Department of Biosciences & Bioengineering
- Department of Chemical Engineering
- Department of Chemistry
- Department of Civil Engineering
- Department of Computer Science & Engineering
- Department of Earth Sciences
- Department of Electrical Engineering
- Department of Energy Science and Engineering
- Department of Humanities and Social Sciences
- Department of Mathematics
- Department of Mechanical Engineering
- Department of Metallurgical Engg. & Materials Sci.
- Department of Physics
- Center for Environmental Science & Engineering
- Center for Policy Studies (IDP)
- Center for Research in Nanotechnology & Science
- Center for Technology Alternatives to Rural Areas
- Center for Urban Science and Engineering
- Center of Studies in Resources Engineering
- IDP in Climate Studies
- IDP in Education Technology
- IDP in Industrial Engg. & Operations Research
- IDP in Systems & Control Engineering
- IITB Desai Sethi Centre for Entrepreneurship (IDP)
- Industrial Design Center
- Shailesh J. Mehta School of Management

# Academic programs and degrees

**Applied Statistics & Informatics**

**Chemistry**

**Geology**

**Geophysics**

**Mathematics**

**Physics**

**Aerospace Engineering**

**Chemical Engineering**

**Civil Engineering**

**Electrical Engineering**

**Mechanical Engineering**

**Design**

**Education Technology**

**Entrepreneurship (minor)**

**Humanities & Social Sciences**

**Management**

**Policy Studies**

**Biomedical Engineering**

**Biotechnology**

**Climate Studies**

**Computer Science & Engineering**

**Energy Science & Engineering**

**Environment Science & Engineering**

**Geoinformatics & Natural Resources Eng.**

**Industrial Eng & Operations Research**

**Metallurgical Eng & Material Science**

**Nanotechnology & Science**

**Systems and Control Engineering**

**Technology & Development**

**Urban Science & Engineering**

**BTech, BS, PhD, MTech, MSc, MDes, MMgmt, MPhil**

**Dual degree programs (BTech+MTech, MTech+PhD, MTech+MSc, MSc+PhD,)**

**Minors and Honors for BTech students**

# Research Centers @ IIT Bombay

- Biomedical Engineering and Technology Incubation Centre [RGSTC, Maharashtra Govt + DST]
- Centre for Aerospace System Design & Engineering [ARDB + MoD]
- Centre for Formal Design and Verification of Software [DAE]
- **Centre for Computational Engineering and Science [DAE]**
- Centre of Excellence in Nanoelectronics [MCIT]
- Centre of Excellence in Steel Technology [MoSteel]
- **Centre of Propulsion Technology [DRDO]**
- **Forbes Marshall Energy Efficiency Laboratory [Industry]**
- Geospatial Information Science and Engineering (@CSE) [DST]
- National Centre for Aerospace Innovation and Research [DST, NAL, HAL, Boeing, DMG Mori, Sandvik, DelCam]
- National Centre for Mathematics (with TIFR) [NBHM, DAE]
- National Centre for Photovoltaic Research and Education [MNRE]
- National Centre of Excellence in Technology for Internal Security [MEITY]
- National Mission on Education through ICT [MHRD]
- National Solar Thermal Research, Testing and Simulation Facility [MNRE]
- Power Anser Laboratory [TCS + TCE]
- Tata Center for Technology Development [Tata Trusts]
- Tata Teleservices - IIT Bombay Centre of Excellence in Telecommunication [Tata Teleservices]
- Wadhvani Research Center for Bioengineering [Alumnus]

**Exploratory, with seed funding**  
**Healthcare Research Consortium**  
**IITB + Hospitals + Corporates**



# Research Centers @ IIT Bombay

**GISE**  
Advanced Research Lab

 **Healthcare  
Research  
Consortium**

**Tata Centre**  
Technology and Design, IIT BOMBAY

**National Solar Thermal Research,  
Testing and Simulation Facility**

 **NCAIR** NATIONAL CENTRE FOR  
AEROSPACE INNOVATION AND RESEARCH

**Forbes Marshall Energy Efficiency Laboratory**

**National Centre for Mathematics**  
A joint center of TIFR and IIT Bombay

  
**WADHWANI  
FOUNDATION**

**IITB-TTSL**  
Center  
for  
Excellence in Telecom

**CA/DE**

 **National Mission on Education  
Through ICT**



**CoPT**

**CCES**

  
**CoEST**  
Centre of Excellence in Steel Technology

**Centre for Formal Design  
and  
Verification of Software**

  
**NCPRE**

 **NCETIS**  
National Center of Excellence in  
Technology for Internal Security  
Indian Institute of Technology Bombay

# Research & Development @ IIT Bombay

**1141 (928 Journals + 213 Conference proceedings)**

- Number of research publications upto July 2016

**82**

- Number of companies incubated so far

**101 (78 Indian + 23 Foreign)**

- Number of patent applications filed upto Nov 2016

**34 (29 Indian + 4 Foreign)**

- Number of patent applications granted upto Nov 2016

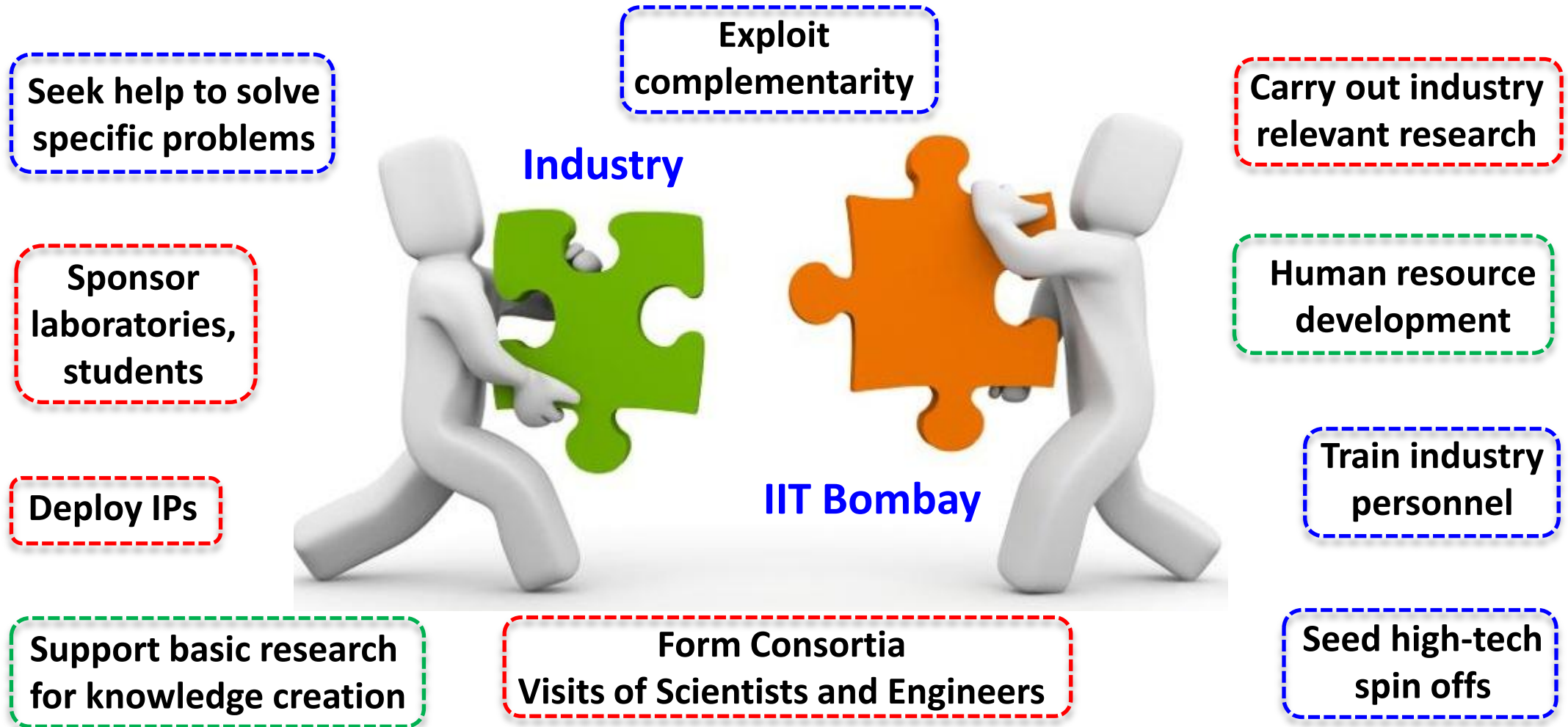
**325**

- Number of PhD degrees awarded in 2016

**2190 (1073 UG + 1117 PG)**

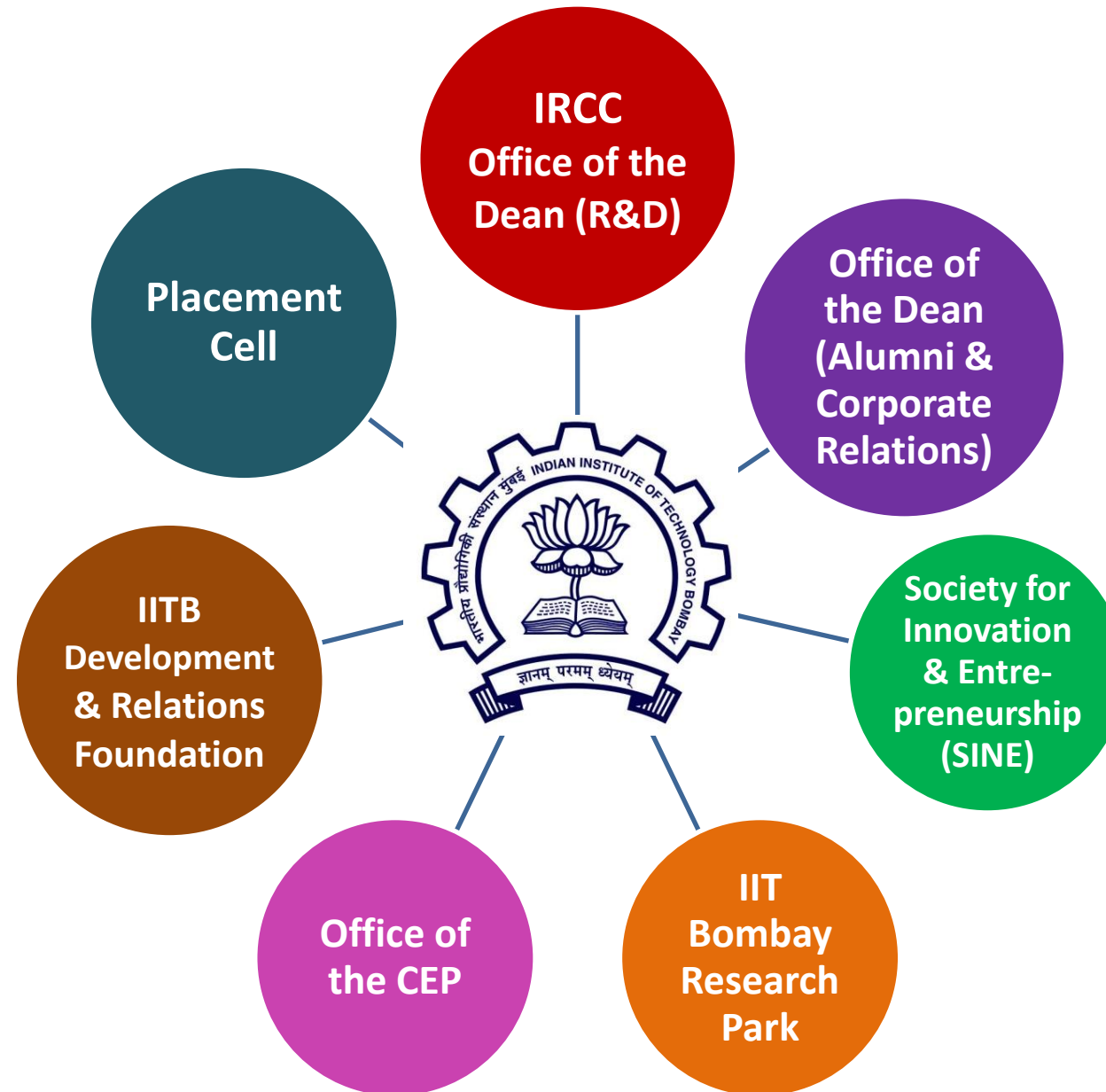
- Number of other degrees awarded in 2016

# Partnership with Industry





# Industry Collaboration



# Industry Collaboration (contd.)

## **Industrial Research & Consultancy Centre (IRCC)**

- Office of the Dean (R&D)
- Nodal unit that manages and coordinates all R&D activities at IITB including sponsored and consultancy projects, IP protection, technology transfer, dissemination

## **Office of the Dean (Alumni & Corporate Relations)**

- Promotes and strengthens engagement with Alumni and Corporations
- Manages utilisation and enhancement of IITB's endowments and gifts from well-wishers

## **IIT Bombay Development & Relations Foundation**

- Engages in developing a strategy to identify, engage and maintain active relationship with alumni
- Works with the IITB Alumni Association to oversee and support the work of global alumni chapters

## **IIT Bombay Placement Cell**

- Responsible for campus placements at IITB
- Excellent infrastructure to support every stage of placement process

# Industry Collaboration (contd.)

## **IIT Bombay Research Park**

- Establish an innovation hub through industry-academia collaboration
- Enable 2-way flow of knowledge & resources
- Creation of joint IITB-Industry R&D groups for stronger impact

## **Office of the CEP (Continuous Education Program)**

- Assists working professionals in widening their knowledge base and improving skills
- Helps make Indian industries globally competitive by providing training in critical and cutting edge areas

## **Society for Innovation & Entrepreneurship (SINE)**

- Technology business incubator of IITB
- Platform to support technology start-ups founded by IITB community and/or based on IITB technologies

# Modes of Industry Interaction

## Consultancy Projects (through IRCC)

- Short term projects to solve specific problems of industry, lasting 1-2 years
- Expected results at the end of the project are jointly defined at the beginning

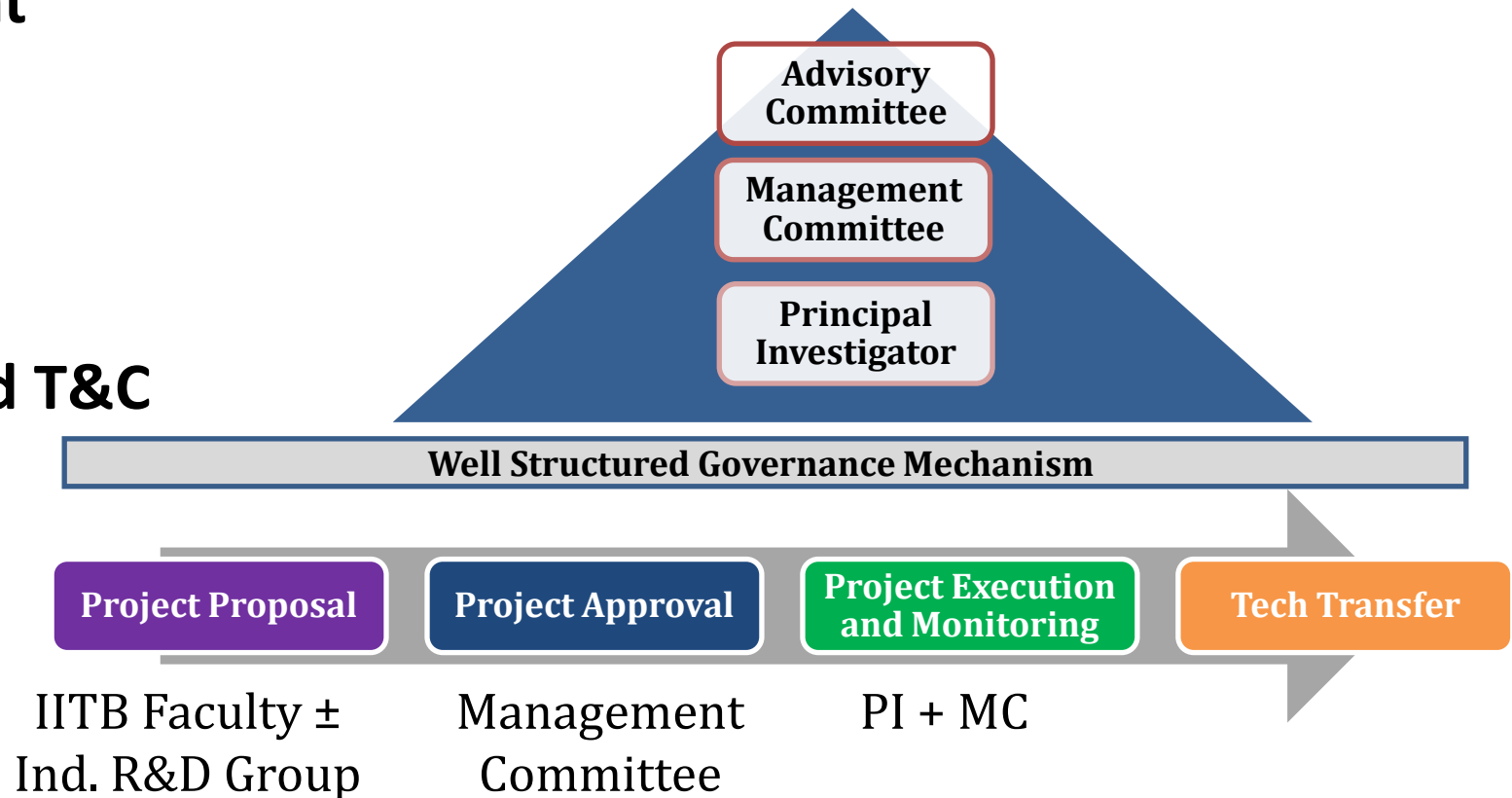
## Sponsored Projects (through IRCC)

- Long term projects for knowledge generation in current, emerging and futuristic areas, lasting 2-5 years
- Deliverables include IP generation, manpower and publications

# Modes of Industry Interaction (contd.)

## Industry – IIT Bombay Research Cell (through IRCC)

- Long term
- Broad areas by Industry
- Fixed funding commitment
- On-the-fly access to data
- Project cycles
- IP: Joint ownership
- Licensing: mutually agreed T&C





# Modes of Industry Interaction (contd.)



## Vision

- Achieve recognition for innovation, entrepreneurship and research excellence through industry-academia collaboration

## Mission

- Establish an innovation hub via industry-academia collaboration
- Enable two-way flow of knowledge and resources
- Create joint IITB-industry R&D groups for stronger impact
- Provide a platform for fostering entrepreneurship



Through the office of the Professor-in-Charge, IIT Bombay Research Park

# Modes of Industry Interaction (contd.)

## Sponsor PhD and Masters Students

[through IRCC & Academic Office]

- Jointly promote research and manpower development
- INDUSTRY can sponsor students to work in an area of its interest
- Sponsorship includes monthly stipend (amount not less than that given by Govt. funding agencies) and a contingency grant

## Sponsored Research Laboratory

[through IRCC or Dean (ACR)]

- INDUSTRY can sponsor a research facility or a laboratory in an area of interest and help in building the infrastructure at IITB
- Such facilities and laboratories will be shared with the sponsoring industry and may also be open to others on a case-to-case basis

# Modes of Industry Interaction (contd.)

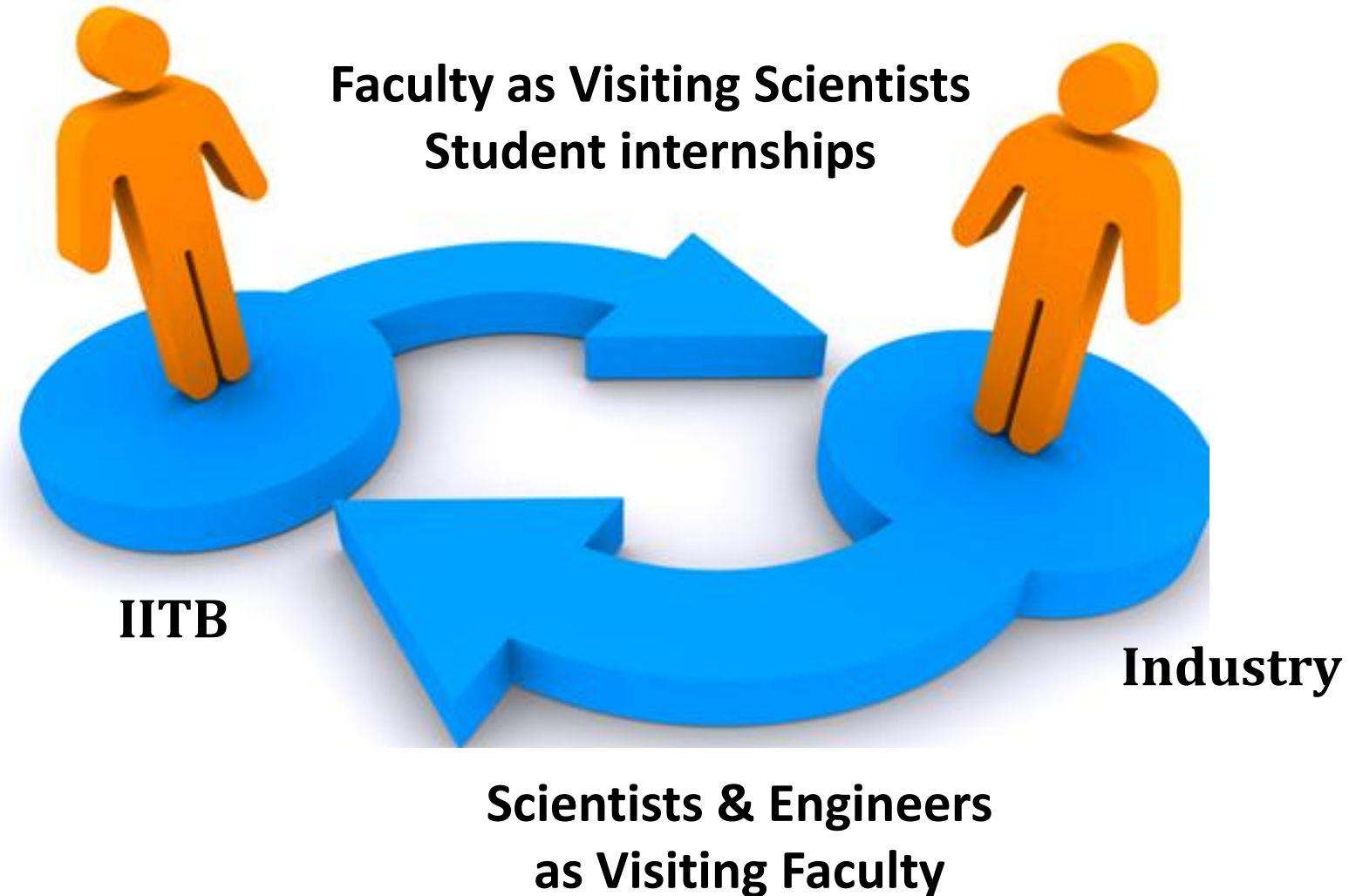
## Chair Professorships (through IRCC)

- **INDUSTRY** can sponsor 'INDUSTRY Chair Professor', a distinguished academic position in the Institute
- Selection of IITB faculty for this Chair Professorship will be as per IITB norms
- **INDUSTRY** can have representation in the selection committee
- ~20 chairs established currently with donations from alumni & industries

## Pre-Competitive Consortia (through IRCC)


- Enables resource pooling for research in emerging areas
- Partner with IITB through a consortia for mutual benefit of all stakeholders
- Industry - Academia - Govt. consortia also possible

# Modes of Industry Interaction (contd.)



# Modes of Industry Interaction (contd.)

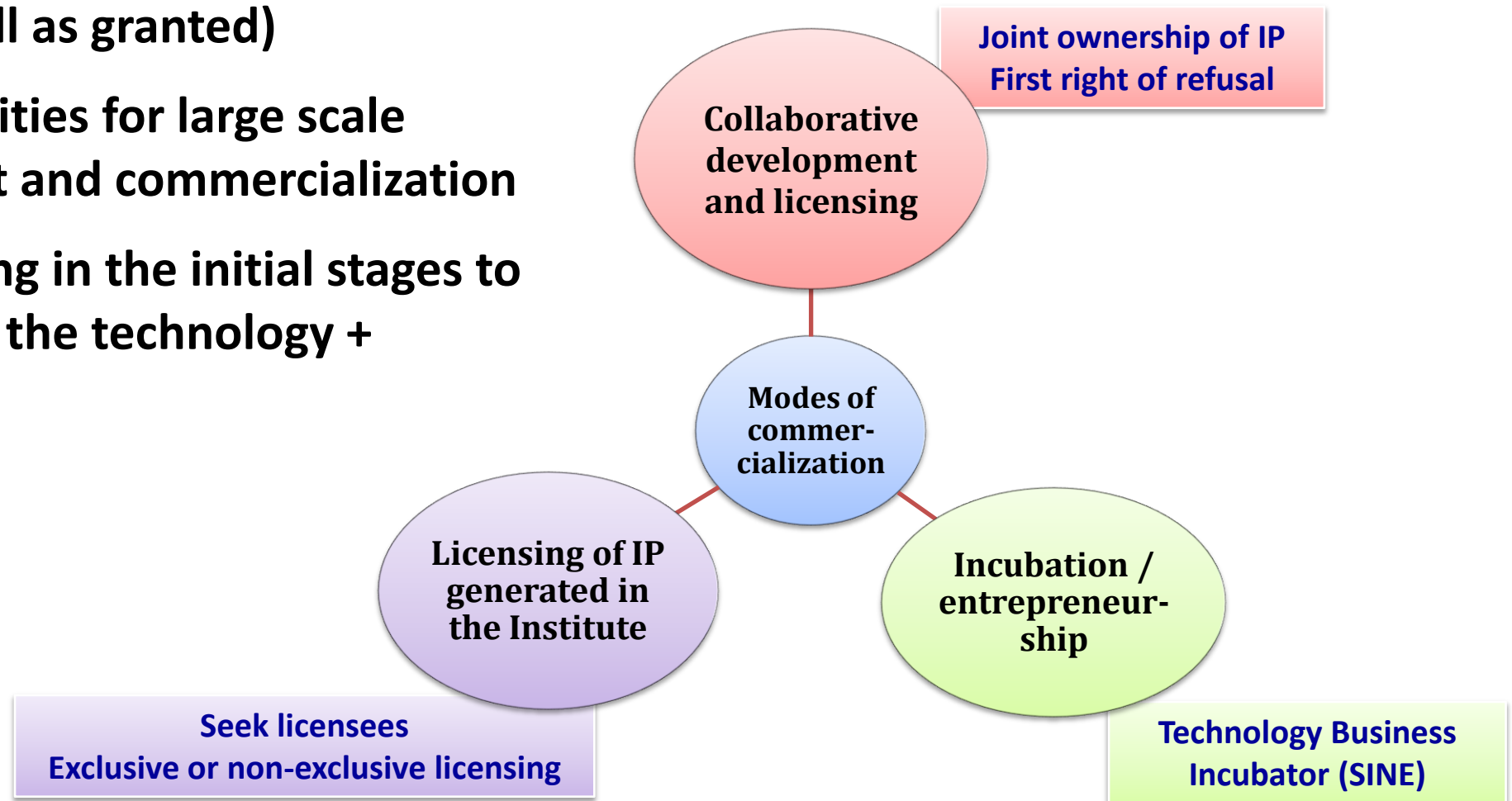
## Continuing Education Program Through Professor-in-Charge, CEP

- 
- Widen knowledge base, improve skills of working professionals
  - Provide training in critical areas
  - Can be short term or long term
  - Slow paced to accommodate other commitments
  - Can be in-house or @ IITB
  - Towards making the Indian industry globally competitive
  - Foster learning as a vehicle for innovation and growth
  - Open new areas of cooperation & collaborations
  - Strengthen industry – IITB interactions



# Commercialization of IIT Bombay IP

- IIT Bombay has several patents (filed as well as granted)
- Seeking entities for large scale deployment and commercialization
- Hand-holding in the initial stages to understand the technology + nuances



# Society for Innovation and Entrepreneurship (SINE)



- **Technology Business Incubator of IIT Bombay set up in 2004; a not-for-profit entity**
- **Facilitates conversion of IIT Bombay R&D into commercial entities**
- **Helps in building business models / plans, fund raising, approaching clients**
- **Governing Board members includes IIT Bombay faculty and industry experts**
- **Incubate companies that have a potential to create economic growth and/or have a strategic or social value**
- **Intellectual property created by IIT Bombay faculty, students, staff, alumnus**

# Shailesh J. Mehta School of Management (SJMSOM)

**Equipped with R&D strengths in the following broad areas of Management:**

## **Economics**

- Economic Environment of Business
- Industrial Economics
- Economics of Industrial and Urban Pollution
- Policy Analysis

## **Finance Management & Accounting**

- Corporate Finance
- Capital Markets
- Mergers and Acquisitions
- Security Analysis and Portfolio Management
- Corporate Disclosures
- Corporate Governance
- Indian Business Model
- Financial Inclusion

## **General Management**

- Entrepreneurship
- Intellectual Property Management
- International Business - Emerging Economies
- Innovation Management
- Knowledge Economy
- Management of New Ventures and SMEs

## **Human Resource Management**

- Organizational Behavior
- Entrepreneurial Management
- Leadership and Performance Management
- Knowledge Management
- Positive Organization Behaviour
- Spirituality and Yoga in Management

# Shailesh J. Mehta School of Management (SJMSOM)

**Equipped with R&D strengths in the following broad areas of Management:**

## **Operations Management**

- Production Planning
- Manufacturing Strategy
- Quality Engineering and Management
- Supply Chain Management
- Discrete Optimization
- Warehouse Logistics
- Project Management
- Technology Management

## **Strategic management**

- Industrial Competitiveness
- Growth Strategies
- Strategic Transformation

## **Quantitative Techniques and Applied Operations Research**

- Pattern Recognition
- Statistical Quality Control
- Supply Chain Modeling
- Fuzzy Optimization and Multi-objective Decision-making

## **Marketing Management**

- Market Research and Consulting
- Consumer Research
- Branding
- Competition Research
- Marketing Communications
- Media Studies

# Shailesh J. Mehta School of Management (contd.)

- SJMSOM offers Master of Management and PhD programmes
- Has recently launched an Executive MBA, jointly with the Washington University at St. Louise, USA
- Offers in-house training similar to CEP



हिन्दुस्तान पेट्रोलियम



IndianOil





# Industrial Engineering and Operations Research (IEOR)

- ❑ To improve productivity - streamlining process flow and plant layout
- ❑ Improve supply and value chain operations
  - Inventory management
  - Logistics (both inbound as well as distribution)
  - Improved service levels, particularly for service industries

[www.ieor.iitb.ac.in](http://www.ieor.iitb.ac.in)

*Thank You*

**Industry Liaison team - [industry@ircc.iitb.ac.in](mailto:industry@ircc.iitb.ac.in)**