Minutes of the 46th meeting of the Council of IITs held on January 7th, 2013

The 46th meeting of the Council of the Indian Institutes of Technology (IITs) was held under the chairmanship of Dr. M.M. PallamRaju, Minister of Human Resource Development on 7th January, 2013 at IIT Delhi. The list of participants is at **Annexure–I**.

At the outset, the Chairman welcomed all the participants. He emphasized that both the quality and quantity of faculty were key to improving the standards of technical education in the country.

The issues discussed and decisions taken are summarized below.

Item No. 46.1: To confirm the minutes of the (i) 43rd meeting held on 14.9.2011; (ii) 44th meeting held on 12.5.2012; and (iii) 45th meeting of the IIT Council held on 27.6.2012.

Decision Taken:The Minutes were confirmed.

Item No. 46.2: To Report Action Taken on the Minutes of the (i) 43rd meeting held on 14.9.2011; (ii) 44th meeting held on 12.5.2012; and (iii) 45th meeting of the IIT Council held on 27.6.2012.

1. The Chairman expressed concern that the representatives of the Ministry of HRDwere often not able to attendBoG meetings as the number of institutions had greatly increased in the last 4/5 years.He stressed upon the necessity ofMinistry's representation on the BoG so that its point of view could be expressed. Dr. Anil Kakodkaralso observed that on a number of occasions, Ministry's representatives on the Board made useful suggestions.

The issue of Directors' performance review was also discussed.

Decisions taken:

i. The Finance Committee meetings of a group ofIITs could be held in New Delhi over 2/3 days so that the Ministry's representative could attend them. The IIT Council Secretariat needs to coordinate in this regard.

ii. Participation of the Ministry's nominees may be ensured by means of videoconferencing, which has been validated by Department of Legal Affairs (DoLA).

iii. Performance review of Directors would be done once in a year based on the vision and mission of the Institute. The performance review report would be submitted to the IIT Council. The Chairman said that each IIT could evolve a matrix for evaluation and a template on core issues could be considered.

2. Prof. M.M. Sharma, Chairman, BoG, IIT Madras sought clarification on the issue of relaxation in the requirement of 10 years of experience as a professor in a reputed educational institution for selection of Directors of IITs, in case of an outstanding candidate(s).

Decisions taken:

i. It was decided that teaching experience was critical to the post of a Director; however in the case of an outstanding candidate the SCSC would have the authority to relax the ten year requirement after proper recording of reasons in writing.

ii. To ensure wide circulation of information, it was reiterated that the advertisement for the selection of Director of an IIT would be published on PanIIT, IIT Council websites and in leading International Journals.

Item No. 46.3: To report changes in the Membership of the Council

The Council welcomed the new members and placed on record its appreciation for the service rendered by the outgoing members. The Chairperson and the Council made a special mention and placed on record the contribution of former Chairperson Sh. KapilSibal towards improving the functioning of the IIT system. The list of outgoing and new members is placed at **Annexure-II**.

Item No.46.4: To report the reconstitution of the Standing Committee of the Council (SCIC)

The Council took note of the re-constitution of the Standing Committee of the IIT Council vide notification dated 30.11.2011, under sub-rule (d) of rule 5 of the Council (Institutes of Technology) Rule 1962.(**Annexure-III**)

Item No.46.5:Ratification of appointment of Directors of IIT Mandras, IITKanpur and IIT Kharagpur

The Council ratified the appointmentof Prof. Bhaskar Ramamurthy as Director, IIT Madras; Prof.Indranil Manna as Director, IIT Kanpur and Prof. S.K. Som as Director (Offtg.), IIT Kharagpur.

Item No.46.6: Approval of the list of eminent persons sent by the IITs for nomination as Council nominees on the BoG.

The Council approved the list of eminent persons forwarded by the Chairman, BoG, IIT Patna, IIT Rajasthan, IIT Gandhinagar, IIT Bhubaneswar, IIT Hyderabad, IIT Guwahati and IIT (BHU) Varanasi.(**Annexure-IV**)

Item No.46.7: To consider the recommendation of the 1st meeting of the second re-constituted Standing Committee of the Council (SCIC)

The minutes of the SCIC,in its meeting held on 5th November 2012,were discussed and the council approved its recommendations (**Annexure-V**). These are briefly summarizedas follows.

i) External Peer Review of IITs would be carried out on a periodic basis, once in every five years by a Review Committee of five eminent persons from Industry and Academia. Besides this, each IIT would conduct an in-house department-wise review. The Chairman emphasized that the review would specifically include parameters related to (a) International Comparability (b) Outreach to community(c) Commitment to National Goals (d) Sustainability (e) linkages with industry and economic development. As per the suggestion of Smt. Vasanthi Stanley, Hon'ble Member of Parliament, the term 'Industry'would be defined clearly. International review methodologieswould be considered. The review process would be rigorous and transparent. An advisory would be issued by the Ministry of HRD based on the broad framework recommended by SCIC at **Annexure-V-i**. It would incorporate the suggestions of the Hon'ble Chairman and the members. The review process should start at the earliest.

ii) Fee for UG students of IITs would be revised to Rs.90,000/- per annum from Rs.50,000/- per annum. The revised rates would be applicable for the new entrants for UG programs from the academic year 2013. The fee structure would be reviewed every year.

iii) The council approved in totothe recommendations of the SCIC to implement the 1st Reportof the Empowered Task Force on the Kakodkar committee on measures to augment PhD as detailed in **Annexure–V-ii.**

iv) The recommendations of SCIC on the Green Technologies and Sustainability Agendawere approved. Each IIT would establish a Green Office, which would carry out Green Audit of its curriculum and itsinstitutional management practices, such as energy, water, waste,constructionprojects, natural resource (forest, water etc) and biodiversityconservation. Inclusion of sustainable technologies and environment sensitization would be included in courses in the curriculum. Institutions could network to evolve a green agenda in making IITs models of green Habitats. (**Annexure – VI**)

v) It was also decided that IITs would strive towards greater community outreach. Every student would be required to complete at least one project of technology application relevant to local neighborhood development relevant to his/her area of expertise/concern. On campus, exemplary labourpractices would be put in place.

vi) Transparencyin processes for projects and procurement alongwith performancewould be ensured specially through the institutional and Council websites.

Item No.46.8: To consider IIT, NIT Joint Scheme for Trainee Teacher Award

An updated copy of the scheme was circulated during the meeting.

Dr. Anil Kakodkar Chairman NIT Review Committee highlighted the salient features of the scheme. The representative of the Finance Ministry pointed out that the Scheme has some financial implications which may require consultation / approval of the concerned unit of the Ministry of HRD / Finance.

Decision Taken: The Council approvedthe IIT, NIT Joint Scheme for Trainee Teacher Award (**Annexure- VII**). It was, however, suggested that instead of "Trainee Teacher", "Faculty Trainee" would be a better nomenclature under this Scheme.

Item No.46.9: Conversion of ISM Dhanbad into an IIT

The issue was discussed and it was felt that therewere two aspects of this proposal; one is the need to increase funding to the institution and second to be included in the group of IITs to benefit from the brand name. At the same time, the Council felt that ISM Dhanbad had its unique distinctive individuality. Smt. Vasanthi Stanley, Hon'ble Member of Parliament, suggested forming a committee to look into the conversion of ISM Dhanbad into an IIT.The representative of the Finance Ministry also pointed out that the proposal has financial implications connected with additional outlay whichwould need consideration in the Ministry of Finance.

Decision Taken:The Council decided to form a committee to examine afresh the proposal of ISM Dhanbad for conversion into IIT.

Item No.46.10: To consider the report of the Task Force constituted by the MHRD for Prevention of Suicide and Promotion of Wellness in the Central Government Funded Technical Institutions

The Council considered the recommendations of the Task Force.(**Annexure-VIII**) Hon'ble Member of Parliament Vasanthi Stanley said that among other reasons strained interpersonal relations of the students prompted a number of suicide cases and that there was a need to focus on sports, arts and other extra-curricular activities as well.

Decision Taken: The recommendations of the Task Force were accepted. It was suggested thatCounselor's Office should be integrated into Wellness Centre.

Item No.46.11: Discussion on Governance Structure and changes in the Institutes of Technology Act – recommendations of the Kakodkar Committee

The IIT Directors desired some time, at least three months, to discuss the issues ofgovernance, financial autonomy and the amendments to the Act. Secretary (HE) suggested that first the issues of financial autonomy, and governance should be decided and thereafter the amendments in the Act could be carried out.

Decision Taken: Consideration on this item was deferred to the next meeting of the Council.

Item No.46.12: Presentation to be made by each IIT Director highlighting accountability mechanism, innovation, significant achievements, implementation of recommendations of the Kakodkar Committee and suggestions, if any

The Directors of IIT Bombay, IIT Delhi, IIT Madras, IIT Kanpur, IIT Guwahati, IIT (BHU) Varanasi, IIT Gandhinagar andIIT Bhubaneswar made presentations on various initiatives taken by their institute. The Chairman said the Directors of remaining eight IITs would make the presentation in the next meeting of the Council.

Item No. 46.13 Presentation by DRDO on IITs- Defence linkages

Dr. V. K. Saraswat, Scientific Advisor to RakshaMantri made a presentation on potential areas of partnership in research as wellas on promoting and institutionalizing IIT-DRDO linkages with a view to contributing effectively to national security goals. (**Annexure - IX**)

The DRDO made the following suggestions.

i. Each IIT to have a JRC (Joint Research Centre) and identification of islands of excellence where both DRDO scientists &IIT faculty can work together (IIT(M) – RIC model)

ii. DRDO to extend its facilities to IIT researchers and/ create a research center for academician in each lab.

iii. IITs to recognize DRDO labs as research centres for Ph.D. programs and DRDO scientists as external research supervisors.

iv. IITs to offer adjunct professorship to serving/retired scientists of DRDO

v. DRDO to sponsor research scholarship to Ph.D. students working on defence related projects

vi. A joint working group may be established to arrive at a good working model with liberalized administrative procedures for joint fast-track research.

vii. A steering committee could be set up at the level of the Secretary to review progress.

viii. A high level council of ministerial level to bring all the entities on common platform with common goal of research for meeting national defence/security/civil society & industry needs.

Decision taken: A joint committee would be set up to examine and suggest a road map for potentialcollaboration. The decision on the composition of the committee would be taken by the Chairman

The meeting ended with a vote of thanks to the Chair.

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Top

Annexure –I

List of Participants

46th Meeting of the Council of IITs held on 7th January, 2013 under the Chairmanship of Hon'ble HRM.

Sl.No.	Name and Designation
1	Dr. M. MangapatiPallamRaju, Hon'ble Minister of Human Resource Development
2	Smt. Vasanthi Stanley, Hon'ble Member of Parliament (RajyaSabha)
3	ShriJanardhanaSwamy, Hon'ble Member of Parliament (LokSabha)
4,	Shri Ashok Thakur, Secretary (HE), MHRD, New Delhi
4	Dr. Anil Kakodkar, Chairman, Board of Governors, IIT Bombay
5	Dr. Vijay P. Bhatkar, Chairman, Board of Governors, IIT Delhi
6	Dr. R.P. Singh, Chairman, Board of Governors, IIT Guwahati
7	Prof. M. Anandakrishnan, Chairman, Board of Governors, IIT Kanpur
8	Prof. M.M. Sharma, Chairman, Board of Governors, IIT Madras
9	ShriAnaljit Singh, Chairman, Board of Governors, IIT Roorkee
10	Dr. Lalji Singh, Chairman, Board of Governors, IIT (BHU), Varanasi
11	Shri S.K. Roongta, Chairman, Board of Governors, IIT Bhubaneswar
12	ShriB.V.R. Mohan Reddy, Chairman, Board of Governors, IIT Hyderabad
13	ShriAjaiChowdhry, Chairman, Board of Governors, IIT Patna
14	Prof. Goverdhan Mehta, Chairman, Board of Governors, IIT Jodhpur
15	Shri M. Natarajan,Chairman, Board of Governors, IITMandi
16	Prof. Devang V. Khakhar, Director, IIT Bombay
17	Prof. R.K. Shevgaonkar, Director, IIT New Delhi
18	Prof. GautamBarua, Director, IIT Guwahati
19	Prof. Indranil Manna, Director, IIT Kanpur
20	Prof. BhaskarRamamurthi, Director, IIT Madras
21	Prof. PradiptaBanerji, Director, IIT Roorkee
22	Prof. DhananjaiPandey, Director, IIT (BHU), Varanasi
23	Prof. Sudhir K. Jain, Director, IITGandhinagar
24	Prof. Anil K. Bhowmick, Director, IIT Patna
25	Prof U.B. Desai, Director, IITHyderabad

26	Prof. M.K. Surappa, Director, IIT Ropar
27	Prof. MadhusudanChakraborty, Director, IIT Bhubaneshwar
28	Prof. Prem Kumar Kalra, , Director, IIT Jodhpur
29	Prof. Timothy Gonsalves, Director, IIT Mandi
30	Prof. PradeepMathur, Director IIT Indore
31	Prof. Ashok Misra, Former Director, IIT Bombay & India Intellectual Ventures, Bangalore
32	Prof. S.K. Joshi, Former Director, IIT Roorkee& National Physical Laboratory, New Delhi
33	ShriTarun Das, Chief Mentor, Confederation of Indian Industry, Gurgaon
34	Shri A.K. Arora, Scientist 'F', Deptt. of Electronics and Information Technology, New Delhi **(on behalf of Shri J. Satyanarayana, Secretary)**
35	ShriVineet Joshi, Chairman, CBSE
36	Smt. Amita Sharma, Additional Secretary (TE), MHRD, New Delhi.
37	Shri R.D. Sahay, Joint Secretary (IITs), MHRD, New Delhi
38	Smt. Anu J. Singh, Joint Secretary & Financial Advisor, MHRD, New Delhi
39	ShriAlok Mishra, Director, MHRD, New Delhi
40	ShriYatendra Kumar, Under Secretary, MHRD
41	Shri R.A.S. Khushwaha, Asst. Project Officer, Secretariat of Council of IITs

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Top

Annexure-II

Outgoing Members
Sh. KapilSibal, Former Hon'ble Minister of Human Resource Development
Sh. R.P. Aggarwal, Former Chairman, BoG, IIT Delhi
Prof. P. Rama Rao, Former Chairman, BoG, IIT Bhubaneswar
Dr. G. Madhvan Nair, Former Chairman, BoG, IIT Patna
Dr. R.A. Mashelkar, Former Chairman, BoG, IIT Gandhinagar
Sh. AjaiChowdhry, Former Chairman, BoG, IIT Hyderabad
Prof. M.S. Ananth, Former Director, IIT Madras
Prof. Sanjay G. Dhande, Former Director, IIT Kanpur
Prof. DamodarAcharya, Former Director, IIT Kharagpur

New Members

Dr. M. MangapatiPallamRaju, Hon'ble Minister of Human Resource Development
Dr. Vijay P. Bhatkar, Chairman, BoG, IIT Delhi
Dr. S.K. Roongta, Chairman, BoG, IIT Bhubaneswar
Dr. AjaiChowdhry, Chairman, BoG, IIT Patna
Dr. Lalji Singh, Chairman, BoG, IIT (BHU), Varanasi
Dr. Baldev Raj, Chairman, BoG, IIT Gandhinagar
Prof. B.V.R. Mohan Reddy, Chairman, BoG, IIT Hyderabad
Prof. Bhaskar Ramamurthy, Director, IIT Madras
Prof. Indranil Manna, Director, IIT Kanpur
Prof. S.K. Som, Director (Offtg.), IIT Kharagpur
Prof. DhananjayaPandey, Director, IIT (BHU), Varanasi
Prof. Ashok Misra, Former Director, IIT Bombay
Prof. S.K. Joshi, Former Chairman, BoG, IIT Roorkee

SECRETARIAT OF COUNCIL OF INDIAN INSTITUTES O

New Delhi, the 30th November, 2011

No.19-3/2011-TS.I. In pursuance of sub-rule (d) of the rule 5 of the Council (Institutes of Technology) Rules, 1962 and in modification of the notification No. 13-1/2004-TS.I dated 14th August, 2006 published in the Gazette of India (Part III Section 4) dated 2nd—8th September, 2006, the Council hereby sets up a Standing Committee of the Council as follows, namely:—

Sl. No.	Particulars	Chairman/ Member	Term
(i)	Chairman, Board of Governors of one of the Indian Institutes of Technology	Chairman	By Rotation (3 years)
(ii)	Five Directors of the Indian Institutes of Technology (IITs)	Members	By Rotation* (2 years)
(iii)	Director General, Council of Scientific and Industrial Research (DG, CSIR)	Member	Ex-Officio
(iv)	Chairman, UGC	Member	Ex-Officio
(v)	Chairman, AICTE	Member	Ex-Officio
(vi)	Secretary, Ministry of HRD, Deptt. of Higher Education, Govt. of India	Member	Ex-Officio
(vii)	Financial Advisor, Ministry of HRD, Deptt of Higher Education, Govt. of India	Member	Ex-Officio
(viii)	Secretary of the Council of IITs	Member Secretary	Ex-Officio
(ix)	Director of IIT	Co-Convener/ Secretary	By Nomination (2 years)

2. (a) Term of the Chairman shall be three years or till he holds his office, whichever is earlier. The Directors of IITs will be members for 2 years or till they hold their offices, whichever is earlier.

(b) The Chairman, shall be a nominee of the Chairman of the Council of Indian Institutes of Technology (IITs).

4—439-GI-E-2011

(c) For the purpose of giving representation to the various IITs on the Standing Committee, the members at Sl. No. 1(ii) above, i.e. five Directors of the Indian Institutes of Technology, shall be nominated by the Chairman of the Council of IITs, on rotational basis in an alphabetical order on the basis of the places of location of IITs (*viz. IIT Bombay, IIT Delhi, IIT Guwahati, IIT Kanpur, IIT Kharagpur, IIT Madras and IIT Roorkee).

(d) Chairman of the Council of IITs shall nominate any Director of IITs as Co-Convener/Secretary.

(e) Chairman of the SCIC may invite the two Directors of the new IITs as special invitees till these institutes are incorporated in the Institutes of Technology Act, 1961. Thereafter, these could be nominated as members under Sl. No. 1(ii) above, in addition to five already nominated.

3. The terms of reference of the Standing Committee shall be as under :—

(i) to recommend guidelines and regulations regarding empowerment of Chairman of the Council to deal with specific matters as well as matters of emergency on behalf of the Council in consultation with the Standing Committee;

(ii) to advise the Chairman of the Council whether an item requires urgent consideration by him;

(iii) to finalize agenda items for the consideration of the Council;

(iv) to advise the Chairman of the Council on specific items within his purview as well as any emergency matters that any be referred to him;

(v) to draft resolutions which would empower the Council to make statutes of common policy covering all IITs;

(vi) to formulate guidelines on items/issues to be considered and approved by the Standing Committee on behalf of the Council;

(vii) to recommend the structure of the Council's Secretariat for consideration of the Government; and

(viii) to screen all proposals coming within the purview of the Council Under Section 33 of the Institutes of Technology Act, 1961 (59 of 1961) and make appropriate recommendations to the Council.

(ix) to follow up on the recommendations of the Kakodkar Committee Report.

ASHOK THAKUR
Special Secy.

प्रबन्धक, भारत सरकार मुद्रणालय, फरीदाबाद द्वारा मुद्रित एवं प्रकाशन नियंत्रक, दिल्ली द्वारा प्रकाशित, 2012
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List of Eminent Persons for consideration for appointment as Members , Board of Governors of IIT - PATNA

	Names of suggested for new members	
1	Prof. AmitabhaGhosh	Former Director, IIT Kharagpur, BESU, Shibpur, PO. : Botanic Garden, Howrah
2.	Prof. GautamBarua	Director, IIT Guwahati , Guwahati
3	Prof. K.K. Aggarwal	A-3/512, Milan Vihar Apts., I P Extension, 72 Patparganj, New Delhi
4.	Dr. Sriman K. Bhattacharya	Former HOD(Civil Engg.) IIT Kharagpur, Central Building Research Institute, RoorkeeUttarakhand
5	Prof. S. K. Dube	Former Director, IIT Kharagpur, Centre for Atmospheric Sc., IIT Delhi, HauzKhas, New Delhi
6	Prof. Ajay Chakrabarty	Vice-Chancellor, Birla Institute of Technology, Mesra Ranchi, Jharkhand
7	Prof.Souvik Bhattacharyya	Vice-Chancellor, Jadavpur University, Kolkata
8	Prof. Javedlqbal,	Director, Institute of Life Sc., University of Patna Campus, Hyderabad.
9	Mr. T.K. Mukherjee	Managing Director, Phoenix Yule (P) Ltd., Kolkata
10	Shri R. Prasad	Member, Competition Commission of India The Hindustan Times House, K.G.Marg, N.Delhi
11	3) Dr. R. Mukhopadhyay	Director & Chief Executive-HASETRI JK Tyre, Jaykaygram, P.O.: Tyre Factory Kankroli, Rajsamand (Rajasthan)
12	Dr. Surendra U. Kulkarni	Research Director & Site Head, SABIC Technology Center, Bangalore
13	Dr. T. Mukherjee	Former Deputy Managing Director Tata Steel, Burmamines PO: Jamshedpur
14	Mr. S.K. Sarkar	Managing Director, Pulsar Rubber Mfg. Co. Pvt. Ltd., P.O : Ganganagar, 24 Parganas (North), Kolkata
15	Dr. Baldev Raj	Director, Indira Gandhi Centre for Atomic Research, Kalpakkam
16	Mr. SwaminathanSivaram	Director, National Chemical Laboratory, Dr. HomiBhabha Road, Pune
17	Dr. A.R. Upadhya	Former Director, National Aerospace Laboratories (NAL), PB 1779, Bangalore
18	Dr. N.M. Mathew	Director (Retd.), Rubber Research Institute of India, Nagathil', Cheeranchira, PO: Changanacherry (Kerala)
19	Dr. Srikumar Banerjee	Chairman (Retd.), Atomic Energy Commission of India, Secretary (Retd.) of D/o Atomic Energy (DAE), AnushaktiBhavan, CSM Marg, Mumbai
20	Dr. G. Sundararajan	Director, International Advanced Research Centre for Powder Metallurgy & New Materials , Balapur, P.O. Patna (A.P.)

List of Eminent Persons for consideration for appointment as Members , Board of Governors of IIT - Rajasthan

Sl.No	Name	Details
1	Mr. KiranKarnik , Former	President of NASSCOM, Q2 HauzKhas Enclave, New Delhi - 110016
2	Prof. Ajay K Sood,	Department of Physics, Indian Institute of Science (IISc.) , Bangalore- 560012
3	Prof. Ashutosh Sharma,	Department of Chemical Engineering, IIT Kanpur - 208016
4	Dr. Pankaj Chandra	Indian Institute of Management, Bannerghata Road, Bangalore-560076
5	Mr. D.R.Mehta,	Founder & Chief Patron, BhagwanMahavirViklangSahaytaSamiti, 13a -Gurunanak Path, Main Malviya Nagar, Jaipur (Rajasthan)
6	Prof. H.P. Kincha,	Chairman, Karnataka Innovation Council, R.No.218 (2nd Floor) Vishal Soudha, Dr. B.R. AmbedkarVeethi, Bangalore
7	Dr. KishanLal,	President, INSA, National Physical Lab., Dr. K.S.K. Road, New Delhi
8	Dr. K Vijay Raghvan,	Director, National Centre for Biological Science Tata Institute of Fundamental Research, GKVK, Bellary Road, Bangalore
9	Prof.S.K. Sopory	Vice Chancellor, Jawaharlal Nehru University, New Delhi
10	Dr. MustansirBarma,	Director, Deptt. of Theoretical Physics, TIFR, Mumbai
11	Dr. Baldev Raj ,	Indira Gandhi Centre for Atomic Research (IGCAR) Kalpakkam (T.N.) **Presently Chairman, BoG, IIT Gandhinagar**
12	Mr. K.P. Singh	Chairman, DLF Limited, DLF Center, SansadMarg, New Delhi -110001 **Presently Member of existing BoG.**
13	Mr.Ashank Desai,	Chairman, Mastek Limited, SDF-IV, SEEPZ, Andheri (E), Mumbai .**Presently Member of existing BoG.**
14	Mr. Rajiv Sinha,	Joint Managing Director, D.C.M. Sriram Consolidated Limited , Kanchanjanga Bldg., 18-Barakhamba Road, New Delhi

List of Eminent Persons for consideration for appointment as Members , Board of Governors of IIT –Gandhinagar

	Names of suggested new members	
1	Prof S P Sukhatme	Former Director, IIT Bombay & Former Chairman, Atomic Energy Regulatory Board, Mumbai-400 076
2	Prof Surendra Prasad	Former Director, IIT Delhi, Professor (Elect. Engineering) Indian Institute of Technology, -Delhi
3	Prof Deepak B. Phatak	Subrao M. Nilekani Chair Professor, KanwalRekhi School of Information Technology, IIT-Bombay
4	Prof S C Sahasrabudhe	Director, DhirubhaiAmbani Institute of Information and Communication Technology, Gandhinagar
5	ShriPrashantTiwari	Managing Director, USV Ltd., BSD Marg, Govandi Station Road, Govandi, Mumbai
6	ShriArvind K Singhal	Chairman and Managing Director, Technopak Advisors, DLF Cyber City Phase II, Gurgaon (Haryana)
7	Shri Raj Pawar	Chairman & Co-Founder, NIIT Group, NIIT Ltd. , 85, Industrial Area, Sector-32, Gurgaon-122001
8	Shri Kamal Nanavaty	President-Strategy Development, M/s. Reliance Industries Limited, Cuffe Parade, Mumbai-400005

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List of Eminent Persons for consideration for appointment as Members , Board of Governors of IIT –Bhubaneswar

Education		
1	Prof. P. Balram	Director, Indian Institute of Science, Bangalore
2	Sh. T.V. Mohandas Pai	Chairman, MEMG International India Pvt. Limited Bangalore (presently the Member, BoG, Bhubaneswar)
3.	Prof. A.K. Mahapatra	Director, All India Institute of Medical Sc. (AIIMS) Patrapada, Bhubaneswar
4	Prof. Ramakrishna Ramaswamy	Vice chancellor, University of Hyderabad, Hyderabad
5	Dr. Krishna N. Ganesh	Director, Indian Institute of Science & Education & Research, Pune.
6	Prof. Deepak Pental	Director, Centre for Genetic Manipulation of Crop Plants, University of Delhi, New Delhi **(Member on BoG, IIT Delhi)**
7	Dr. Taraprasad Das	Dr. L.V. P. Eye Institute, Patia, Bhubaneswar
8	Prof. Anil K. Gupta	Director, Wadia Institute of Himalaya Geology, Dehradun (Uttarakhand)
9	Prof. AmitavaGhosh	Emeritus Professor, Bengal Engg. &Sc.University, Shibpur, Howrah (W.Bengal) **(Recently nominated as Member on BoG, IIT Patna)**
10	Prof. Dattagupta,	VC, Visvabharati University, Santiniketan, Bengal
11	Dr.V Chandrasekhar	Dean (Faculty) IIT – Kanpur
12	Prof. P.P. Chakrbarti,	Dean SRIC, IIT- Kharagpur
Science including Social Science		
1	Dr.ShaileshNaik	Secretary, Ministry of Earth Sciences, Chairman, Earth Commission, New Delhi
2	Dr. M Ravichandran	Former Director (INCOIS), Indian National Centre for Ocean Information Services, Hyderabad
3	Dr. Ramesh Chandra Budhani	Director, National Physical Laboratory, New Delhi
4	Prof. B.K. Mishra	Director, Institute of Mineral and Material s Technology (IMMT) CSIR, Bhubaneswar
5	Prof. A.S. Kiran Kumar	Director, Space Application Centre , ISRO, Ahemdabad
6	Prof. Mirnal Kumar	Jackson Chair Prof. in Applied Sc. Seismology, Univ. of Texas at Austin, USA , Director, NGRI, Hyderabad
7	Prof. N Sathyamurthy	Director, IISER, Mohali (Punjab)
8	Director	National Aerospace Laboratories, Bangalore
9	Dr.G.Malakondaiah	Defence Metallurgical Research Laboratory, Hyderabad
10	Prof. Dr. Indranil Manna	Director, Central Glass and Ceramic Research Institute, Kolkatta.**(Prof. Manna is now Director IIT-Kanpur)**
11	Prof. S. Parsuraman,	Director, Tata Institute of Social Sc., Mumbai
12	Prof.ShekharChaudhury	Director, Indian Institute of Management, Kolkata
Engineering		
1	Dr. S. Srikanth	Director, National Metallurgical Laboratory, Jamshedpur
2	Prof. S.K. Bhattacharya	Director, Central Building Research Institute (CBRI),Roorkee
3	Dr. N. Murugesan	Director General, Central Power Research Institute, Bangalore
4	Sh. S .Ramadorai	Vice Chairman, Tata Consultancy Services, Mumbai

5	Sh. Ram VinayShahi	Chairman, Energy Infratech Pvt. Ltd. New Delhi
6	T. Venugopalan	Chief Technology Officer, Tata Steel, Jamshedpur
7	ShSushil Kumar Roongta	MD, VedanataAlumnium Ltd. Mumbai (Recently nominated as Chairman , BoG, IIT-Bhubaneswar)
8	Sh. RabindraNathNaik	CMD, Power Grid Corporation of India Limited, New Delhi
9	Sh. Ravi Kant	Vice Chairman, Tata Motors Ltd., Mumbai
10	Sh. B Muthuraman	Vice Chairman, Tata Steel Ltd., Mumbai**(IIT Member on BoG, Madras)**
Industry		
1	Sh. VenuSrinivasa	Chairman and Managing Director, TVS Motor Companay, Chennai
2	Sh. Ramanath S Mani	Chairman, M/S Energys Software Pvt.Ltd. Chennai
3	Sh. Sunil Bharti Mittal	Chairman and Managing Director, Bharati Enterprises Ltd., New Delhi
4	Sh. R. Gopalkirshnana	Executive Director, Tata Sons Limited, Mumbai
5	Dr. Swati A Piramal	Vice Chairperson, Piramal Health Care Limited Mumbai
6	Sh. Prem Chand Godha	Chairman and Managing Director, IPCA Laboratories Limited, Mumbai
7	KiranMazumdar Shaw	Chairman and Managing Director, BIOCON Ltd., Bangalore
8	S. Gopalakrishnan	Co-Founder and Executive Co-Chairman, Infosys, Bangalore
9	Sh. BajrangLalBagra	Chairman-cum-Managing Director, NALCO , Bhubaneswar
10	Dr. Vijay Kelkar	Chairman, National Stock Exchange of India Ltd.
11	Sh. H.M. Nerurkar	MD , Tata Steel Limited, Jamshedpur
12	Sh. Hironori Kanyama	President & CEO, Honda Siels Cars Ltd., Greater Noida Industrial Development Area

120 74

List of Eminent Persons for consideration for appointment as Members, Board of Governors of IIT –Hyderabad

	Names of suggested new members	Details
1	Prof. Indira J Parikh,	Founder & President, Foundation for Liberal and Management Education, 401-Phoenix Commercial Complex., 4th Floor Bund Garden Road, Opp: Residency Club, Pune -411001
2	Prof. M. Vijayan	Honorary Professor / Distinguished Biotechnologist Molecular Bio-physics Unit , II Sc. Bangalore
3	Sh.B.V.R.Mohan Reddy	Chairman and Managing Director, Infotech Enterprises Ltd. Hyderabad
4	Shri G.V. Prasad,	Vice Chairman and CEO Dr. Reddy's Laboratories Limited Hyderabad
5	Mr. Suresh Rajpal	Chairman & CEO, Visnova Solutions
6	Mr. Pradeep Gupta	Cyber Media (India Limited), Gurgaon
7	Mr. SaurabhSrivastava	Delhi Blue Apartments, Near SafdarjungHosital, New Delhi – 29
8	Mr. T.V. Mohandas Pai	Director, Manipal Universal Learning Bangalore
9	Prof. A.V. Rmanai	Sr. Vice President (R&D) TTK Prestige, Bangalore
10	Mr.T.K.Kurian (TK)	Chief Executive Officer of IT Business and Executive Director, WIPRO Limited, Bangalore.
11	Dr. K Mohandas	Vice Chancellor, Kerala University of Health and Allied Sciences, Thrissur.
12	Dr. V.Sumantran	Vice Chairman, Ashok Leyland Limited , Chennai (T.N.)
13	Ms. Reema Gupta	Associate Director, Indian School of Business, Hyderabad
14	Mr. Som Mittal	President, NASSCOM, New Delhi

~~123~~ ~~124~~ 75

List of Eminent Persons for consideration for appointment as Members , Board of Governors of IIT –Guwahati

	Names of suggested new members	Details
1	Prof. AsisDatta	Professor Emeritus, Jawaharlal Nehru University, New Delhi.
2	Prof. PrabhatPatnaik	Professor (Rett.), Jawaharlal Nehru University, Vice Chairman, Kerala State Planning Board, Thiruvanathapuram, Kerala
3	Prof. K.P. Singh	Director, Institute of Technology Banaras Hindu University, varanasi.
4	Prof. VishwanathSinha	Former Deputy Director, IIT Kanpur, The LNM Institute of Information Technology Jaipur
5	Dr. P.G. Rao	Director, North-East Institute of Science and Technology, Jorhat
6	Dr. Bhupti Das	Former Chairman & Managing Director, Numaligarh Refinery, Guwahati
7	Prof. D.N. Buragohain	Former Director, IIT Guwahati, Pune
8	Mr. Rajeev Takru.	Director, McleodRussel India Ltd, Kolkata
9	Mr. S.K. Ghosh	Director, Indian Oil Corporation Ltd. New Delhi
10	Mr. Prabir Kumar Dutta	Former Chief Secretary of Assam, Guwahati
11	Prof. N.K. Chaudhury	Former VC, Gawahati University, Guwahati
12	Prof. Vinod Singh	Director, IISER Bhopal
13	Prof. KulenduPathak	Former VC, Dibrugarh University, Guwahati
14	Prof. K.L. Chopra	Former Director IIT Kharagpur, New Delhi
15	Mr. HemenBarooah	Managing Director, Barroahs and Associates, Kolkata
16	Mr. D.N Choudhury Guwahati	Former justice, Guwahati High Court,

Nominees for Board of Governors
Indian Institute of Technology (Banaras Hindu University), Varanasi – 221 005

S.No.	Name	Specialization	Address/Contact
1	Prof. Pankaj Chandra	Production & Operation Management	Director, Indian Institute of Management, Bannerghatta Road, Bangalore – 560 076 Ph.(080) 26993001/26993002
2.	Shri Vish L. Narayanan	Electrical Engg	Alumni 1986 Batch Presently Senior Director (Operations) General Motors Corportion, Detroit, Michigan, USA Mobile: 001.248.318.3548 e-mail: vish.narayanan@gmail.com
3.	Prof. Vinod K. Singh, *FNA*	Synthetic Organic Chemistry	Director, Indian Institute of Science Education and Research, Transit Campus, ITI Campus (Gas Rahat) Building, Govindpura, Bhopal – 460 023 Ph.(0755) 2601096; Fax. (0755) 4092392 e-mail: (Secretary): mayank@iiserb.ac.in
4.	Prof N. Sathyamurthy, *FNA*	Chemistry (Molecular Reaction Dynamics & Potential Energy Surfaces)	Director, Indian Institute of Science, Education & Research, MGSIPAL Complex, Sector 26. Chandigarh – 160 019 Ph. & Fax : (0172) 2790188 e-mail: nsath@iisermohali.ac.in
5.	Dr. Dipankar Banerjee, *FNA*	Physical Metallurgy	Former Distinguished Scientist & Chief Controller, R&D, DRDO, presently Professor Department of Materials Engg., IISc. Bangalore – 560 012 Ph: (080) 22932558; Fax: (080) 23606742 Mob: 07259185940 e-mail: dbanerjee@materials.iisc.ernet.in
6.	Prof. Ajay K. Sood, *FNA*	Physics	Department of Physics, Indian Institute of Sc. Bangalore – 560 012 Ph: (080) 22932558; Fax: (080) 23602602 e-mail: asood@physics.iisc.ernet.in
7.	Dr. P. Chaddah, *FNA*	Condensed Matter Physics	Director,UGC-DAE Consortium for Scientific Research, University Campus, Khandwa Road, Indore – 452017 Ph.(0731) 2463945, Fax: (0731)246 2294 e-mail: chaddah@csr.res.in
8.	Prof. Sanjay Govind Dhande	Mechanical Engineering	Former Director, IIT-Kanpur – 208 016 58 Buena Monte' Panchavati, Pashan Pune MH 411 008 e-mail: sgd@iitk.ac.in/sgdhande1@gmail.com
9.	Prof. V.D. Sharma, *FNA*	Mathematics	Institute Chair Professor 203, Deptt. of Mathematics, IIT-Bombay Mumbai – 400 076 Ph. (022) 25767482: Fax: (022) 25723480 e-mail: vsharma@math.iib.ac.in
10..	Dr. Baldev Raj, *FNA*	Materials Characterization & Technology Management	President Research, PSG Institutions, New Administrative Block, Peelamedu Post Coimbatore – 641 004 Ph.(0422) 4344201; Fax: (0422) 4344200 e-mail: baldev.dr@gmail.com
11.	Prof. Milan Kr. Sanyal, *FNA*	Condensed Matter Physics	Director, Saha Institute of Nuclear Physics, 1/AF, Bidhan Nagar, Kolkata – 700 064 Ph: (033) 3375346; Fax: (033) 3374637 e-mail: milank.sanyal@saha.ac.in

12.	Dr. Ashutosh Sharma, *FNA*	Chemical Engineering	Institute Chair Professor, Dept. of Chemical Engineering, Indian Institute of Technology, Kanpur – 208 016 Ph: (0512)2597026; Fax: (0512) 2590104 e-mail: ashutos@iitk.ac.in
13.	Prof. Ashok Misra	Chemical Engineering	Chairman – India Intellectual Ventures # 701, Raheja Paramount, 138 Residency Road, Bangalore – 560 025 Ph. (080) 6648 5501; Fax: (080) 6648 5500 e-mail: ashokmisra@intven.com
14	Prof. Amitabh Ghosh, *FNA*	Mechanical Engineering	Formerly professor IIT-Kanpur and Director, IIT, Kharagpur, Hony. Distinguished Professor, Bengal Engg. & Sc., Univ. of Sibpur, Botanic Gardens, Howrah -- 711 103 Ph.(033) 26680521; e-mail: amitabha@iitk.ac.in
15.	Prof. H.R. Tewari	Humanities & Social Sciences	Deptt. of Humanities & Social Sciences IIT-Khagarpur – 721 302 Ph.(03222) 283628 e-mail: hrt(hss.iitkgp.ernet.in
16.	Prof. A.K. Sharma	Humanities & Social Sciences	Professor of Sociology, Deptt. of Humanities & Social Sciences, IIT-Kanpur – 208 016 Ph. (0512) 2597946; Fax: (0512) 2597510 e-mail: arunk@iitk.ac.in
17.	Prof. M.P. Dube	Political Science & Public Administration	Director, Institute of Gandhian Thought & Peace Studies (Gandhian Studies Centre), University of Allahabad, Allahabad e-mail: mpdube@allduniv.ac.in dube.mp@gmail.com
18.	Prof. Anurag Sharma, *FNA*	Fibre & Integrated Optics	Professor, Department of Physics, Indian Institute of Technology – Delhi, New Delhi Ph. (011)26591350; Fax: 2658 1114 e-mail: asharma@physics.iitd.ac.in
19.	Prof. J. N. Goswami, *FNA*	Earth and Planetary Sciences	Director, Physical Research Laboratory Navrangapura, Ahmedabad – 380 009 Ph. (079) 26308550: Fax: (079) 26300374 e-mail: goswami@pri.res.in
20.	Prof. S.C. Lakhotia, *FNA*	Life Sciences	Professor Emeritus Deptt. of Zoology, Faculty of Science Banaras Hindu University Varanasi – 221 005 Ph. (O) 0542-2368145, 0542-6701827 (R) 0542-2312012, (M) 09453048657 Fax: 0542-2368457 e-mail: lakhotia@bhu.ac.in; sclakhotia@yahoo.co.in

Annexure – V(i)

Terms of Reference for Review of the IITs

Preamble

The review is envisaged as principally an academic review focusing on the core academic activities of teaching, research, as also interaction with the industry. Due importance, however, may be attached to a review of matters that influence academic performance, such as governance, management structure and support systems. All of these should be such as to enable the Institute being reviewed to realize the goals enunciated in its Vision and Mission statements.

The Review Committee may assess the performance and make recommendations at two levels: the general and the specific. Some aspects that could be covered under each are listed below.

I. General considerations

The Committee could opine on A) where the Institute has reached in relation to charters and projections spelt out in the past; B) its plans for the future; and C) the metrics that the Institute adopts in assessing itself.

A. Progress in relation to previous projections. The IITs were set up as outlined by the Sarkar Committee Report, which also spelt out their charter. This charter has undergone minor changes to keep pace with the times and as reflected in the IIT reviews of 1972, 1986 and 2004. Furthermore, each Institute may have enunciated its own Vision and Mission statements. Progress may be reviewed under two major heads:

- In relation to the IITs' charter
- In relation to the Intitute's existing Vision and Mission statements.

B. Plans for the future. Along with Vision and Mission statements, a strategy may have been articulated by the Institute as to how to reach its goals. The Committee could therefore remark on:

- Projections made
- Strategies formulated.

C. Measures adopted toward A and B above

The Institute may internally assess its own performance using a set of criteria and metrics. The Committee may opine on the suitability and robustness of these.

II. Specific pointers

The Review Committee should consider separately the Institute's performance in the arenas of its core academic activities: teaching and research. A selection of pointers is listed below.

A. Teaching

Present offerings: Range of degrees and disciplines. Consistency of curricula with academic vision. Quality of programmes. Relevance to recruiters.

Execution: Quality of teaching. Quality of engagement with students. Infrastructure for teaching. Learning environment and learning resources. Student feedback on courses and curricula. Feedback from employers.

Constraints, shortfalls: Student-teacher ratios. Academic infrastructure. Teaching support.

Outcome: Student placements. Student achievements. Collaborations with other Institutes – joint degrees.

Goals for the future: Vision for curricula and academic offerings 5-10 years in the future.

B. Research

Current scenario: Range of research activities: volume, breadth.

Execution: Infrastructure. Environment for research. Processes and procedures. Technical manpower. Collaborations: internal and external.

Outcomes: Major research contributions. Publications, Patents, Citations. Technology development, deployment. Nationally/Socially important R&D. Policy inputs. Consultancy. Ph.D. placements. Recognitions.

Constraints, shortfalls: What bottlenecks need to be removed? Adequacy of technical/ post-doctoral cadres? Is infrastructure adequate?

Vision for the future: Goals for the next decade: how well conceived? Do we need to identify priority areas, build critical strength in those?

C. Governance and support systems

Management : Is the administrative support adequate to enable the level of activities envisaged? Is the system responsive to faculty, student needs.

Transparency : What mechanism of transparency has been put in place by the Institute as also steps that have been taken for internal quality assurance.

Infrastructure: Is the support infrastructure (IT, Hostels, Faculty/Staff housing, sports facilities, ...) adequate? And how sensitive and eco-friendly it is to the immediate environment.

Diversity : Current status. Does the Institute have programmes to promote diversity among students, staff and faculty? Does the Institute have adequate mechanisms to deal with issues related with discrimination and harassment?

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Annexure – III

1st Report of the Empowered Group on Implementation of the Recommendations of the Kakodkar Committee: Strengthening the PhD Programmes in IITs

One of the recommendations of the Kakodkar Committee is to increase the number of Ph.D. students in the IIT system. It has proposed that steps be taken to increase the number of annual Ph.D. graduates from IITs from the present 1000 to 10,000 by 2025. Extracts from the Kakodkar Committee Report are enclosed in the Appendix. Such a scale up will require an infusion of resources and incentives. In order to implement these recommendations, the Task Force recommends the following immediate steps to be taken:

1) After the first year of a two year M.Tech programme, an option is to be given to students to switch to a dual degree programme of M.Tech and PhD. Students do not have to do a separate M.Tech project and they can immediately start working on their PhD. On completion, the student will be awarded both an M.Tech degree and a PhD degree. An option to leave the programme with an M.Tech degree after three years (from the time of admission) will be available.
   a) Remuneration as per normal Ph.D. assistantship / fellowship will be available for 4 years as soon as they switch to the dual degree programme.
   b) Some funds will be available for a special MHRD fellowship to be set up for a subset of Ph.D. candidates (see Item 3 below for details).
   c) The proposal is to be sent to Senates of IITs for their consideration. It is to be noted that this scheme has already been implemented by some IITs.

2) Students in the 4th year of their B.Tech programmes may be offered admission into PhD programmes by seeking applications in October-December and offering admissions by December for admission into the next July semester.
   a) Selection of students will be through the due processes approved by the Senates of IITs. If students give the GATE examination in their third year, the result can be used during the selection process. The National Co-ordination Board (NCB) of GATE is to be requested to allow third year B.Tech students to appear for GATE.
   b) Students selected for admission are to be eligible for Assistantship / fellowship for five years, as is the case now for those with B.Tech degrees.

c) To encourage students from CFTIs to enter the PhD programmes, the need for qualifying in GATE to get admission is to be waived for them provided they have a CPI of at least 7.00 at the end of their third year.
d) The need to qualify in GATE to avail assistantships / fellowships is also to be waived for such students.
e) The proposal is to be sent to Senates of IITs for their consideration.
f) The proposal also needs the approval of the IIT Council (or through SCIC) to exempt selected students from CFTIs with a CPI of 7.00 or more from GATE for payment of Assistantships.

3) It is proposed to also induct some of the best B. Tech. students from other Indian institutions, which agree to participate in the programme, at the end of their third year into a PhD programme at one of the IITs. The students should be amongst the top 10% of their Institution at the end of third year. To enable selections, students should have given the GATE examination in their third year. The National Co-ordination Board (NCB) of GATE is to be requested to allow third year B.Tech students to appear for GATE. Students selected for admission are to be eligible for Assistantship / fellowship for five years. They will get assistantships during their stay at IITs as is applicable to students with B.Tech degrees joining a PhD programme (currently Rs. 16000 per month). The selection process will then take place based on recommendations, which could include a written exam and interviews and due processes will be approved by individual Senates of IITs.

4) The selected students will move to the selected IIT in the fourth year. They would primarily do courses for a year. Each student's doctoral committee will assign them the courses. The credits earned during the first year of the PhD programme at IIT should have equivalence to the credit needed for the fourth year of the B.Tech programme. The respective senates will have to formulate policies for such credit transfer for easy and smooth functioning of the scheme. 4^{th} year credits for B. Tech comprising essentially of core courses would be helpful.

a) They will take their comprehensive / qualifying examination in their fifth year and will expect to get their PhD by the end of the seventh year or eighth year. The students would get their B.Tech. degree from their parent institution only at the end of the fifth year, at which point the IIT will transfer credits (this is to prevent student from dropping out after the fourth year and getting a degree). A PhD degree will be awarded by the IIT once the student completes his PhD programme.
b) If a student does not do well in the courses at the IIT, the student will be transferred back to the B. Tech. institution along with credits earned. The student will complete the B. Tech at the institution and get the degree.

c) If a student is not found fit to continue in the PhD programme, he will be allowed to drop out any time after the fifth year, at which point the B.Tech credits will be transferred to the parent institute.
d) Each IIT will enter into a Memorandum of Understanding (MoU) with other Institutions on a mutually acceptable basis to implement this scheme.
e) The proposal is to be sent to Senates of IITs for their consideration.

5) The proposal also needs the approval of the IIT Council (through SCIC) regarding payment of Assistantships (currently Rs 16000 per month) to students who join an IIT at the end of their third year.

6) It is suggested that MHRD set up a special fellowship for Ph.Ds, which will be over and above the normal Ph.D. scheme of Assistantships. About 10% of students at each IIT will be eligible for this fellowship. Each IIT will be awarded a fixed number of fellowships. Individual IIT Senates will decide the modalities of distribution of these fellowships among the disciplines in their Institute and will also decide the selection procedures. It will be open to all freshly admitted PhD students. Once given, it will be available for up to 4 / 5 years contingent on good performance. The fellowship may be awarded for two years in the first instance. The fellowship will be 1.50 times the regular PhD Assistantship and will include a yearly contingency grant of Rs. 25,000.00. It is proposed that the fellowship be called the MHRD Visveswaraiah Research Fellowship. Budgetary estimates based on the estimated PhD intakes as per the Kakodkar Committee are enclosed in Annexure 1. The estimated requirements are Rs. 12.6 crores in the first year (2013) to Rs. 100 crores in the fifth year of operation. The scheme needs the approval of the IIT Council and the Ministry of Finance.

7) It is recognized that in today's competitive and globally connected world it is imperative that candidates get a global experience. In this context it is recommended that MHRD set up a scheme for funding of travel, registration, and daily allowances to Ph.D students at CFTIs for presenting papers at international conferences. A PhD student will be eligible for support for at least one conference during his / her programme provided a paper in which he / she is a co-author is accepted at the conference. The budgetary requirements have been estimated based on the PhD student strengths as given in the Kakodkar Committee report and assuming a support of Rs. 1.35 lakhs each time. They are given in Annexure 2. The estimated requirements are Rs. 45 crores in the first year (2013) and Rs. 100 crores in the sixth year of operation. The scheme needs the approval of the IIT Council and the Ministry of Finance.

8) A PhD programme for persons working in industry is to be introduced in all IITs. A student will have the option to fulfill his/her course requirements through courses to be delivered remotely using the National Knowledge Network (NKN). Industry wishing to participate in such programmes may be allowed to access NKN for this purpose as per financial terms decided by NKN. The High Level Committee (HLC) of NKN is to be requested to allow this. Each IIT will introduce these programmes on their own and so each IIT will award separate degrees. The fees would be set so that the programmes are self-sustaining, they bring in some income to the Institute, and they also provide remuneration to faculty and staff taking part in the programmes. Sharing of courses among IITs will be done as is feasible. The proposal is to be sent to Senates of IITs for their consideration.

9) A similar programme will operate for teachers in Engineering Colleges. Private Colleges wishing to participate in such programmes may be allowed to access NKN for this purpose as per financial terms decided by NKN. The High Level Committee (HLC) of NKN is to be requested to allow this. The financial requirements for these programmes will be met by MHRD. The IITs are to send a joint proposal to MHRD giving details of the funds required.

APPENDIX: Extracts from the Kakodkar Committee Report on PhD Programmes

3.1.1 Research Scholars

A large number of highly talented research scholars working with eminent faculty in a very supportive environment is an important feature of a world-class research institute. The IITs graduate about 1000 PhD scholars per year now, though the numbers admitted have increased significantly in the last couple of years. Research scholars doing MS are also not significant. The number of M.Tech students has slowly increased over the years and to a limited extent they contribute to research. It is here that the IITs have to change. They have to significantly increase the number of its PhD scholars up to a scale that matters. The number of PhD students graduating in India in engineering and technology is around a factor of 10 less as compared to China and USA. Considering the population and likely scale of India's economy in the near future, the number of PhD scholars graduating should be comparable.

Till recently there were 7 IITs. Eight new IITs have been set up in the last few years. These are just beginning to recruit their faculty. At the same time, the established IITs still have significantly less number of faculty members than they require. Although adding a large number of IITs in a short time has been a major challenge and perhaps should have been a more gradual process, there is an urgent need to scale up the IIT system looking at their needs. It is likely that about 5 new IIT would be set up in the coming decade (making at least one IIT in each major state). These would all require faculty. PhD graduates of IITs would form a major feeder for IIT faculty. Other educational institutes would also require PhD graduates to strengthen their faculty. At the same time, as industry becomes stronger in India, they would need large numbers of PhDs for their R&D activities.

We recommend that the IITs should strive to increase the number of PhD

graduates from the currently less than 1000 PhD students graduating each year, to 10,000 research scholars graduating every year by 2024–25. As a PhD student would normally take 4 years to complete the programme, 10,000 PhD scholars need to be admitted to the PhD programme at IITs by 2020–21. This is the minimum number that would be required to meet the country's requirements. For 20 IITs, it would mean an average of 500 PhDs. The established IITs have to strive to reach a number of 800 to 900 PhDs graduating each year, so as to provide leeway and time to the newer IITs to gear up.

The first reaction of most would be that such a scale up is not possible. While it would not be an easy task, we would suggest the means to ensure that such numbers are indeed achieved. There is little doubt that such numbers are required by India. That it would be a big challenge for the IITs is also obvious. But this becomes an opportunity not only to contribute to the nation, but also to transform the IITs.

3.1.2 Faculty

Scaling of PhD scholars is not possible without scaling faculty numbers.[1] In fact, while significant faculty strength is required to produce a significant number of PhD scholars every year, the PhDs produced in the IITs would become a potential input and allow the number of faculty members to grow. Some top-level research institutes in the world produce about one PhD graduate for each faculty member (who is not on leave). This ratio for the IITs is much lower.

The Committee recommends that the IITs quickly get 0.6 PhD students to graduate for each faculty member every year and then strive to get to 1 PhD student to graduate per faculty each year in the years to come, with an assumption that the IITs would not let quality decline as they scale up. These ratios will establish IITs as premier research institutions. With an average of 0.6 PhD graduates for each faculty member and a target of 10,000 PhD students

graduating from the IIT system every year, faculty strength at the IITs needs to grow to 16,000
by 2020–25. This is indeed a tall task, given that the number is less than 4000 today. But if we are aggressive and continue to produce over 0.6 PhD graduates for each faculty, it is possible to reach these numbers, as shown in Table 3.1 (the numbers below are just an example of what can be done):

Table 3.1 : Aggressive Growth of Faculty at IITs

Faculty at IIT: Aggressive Growth by Rapidly Expanding PhD Programme						
Year	*No. of PhD students admitted*	*No. of PhD students graduating*	*No. of IIT PhDs joining as faculty*	*No. of faculty joining from outside*	*Retiring IIT faculty*	*Total IIT faculty*
2010						4,000
2011	2,600	1,200	420	280	240	4,460
2012	3,122	1,600	560	373	223	5,170
2013	3,619	2,000	700	377	207	6,040
2014	4,530	2,400	780	420	181	7,059
2015	5,294	2,470	803	344	176	8,030
2016	6,424	2,966	890	381	201	9,100
2017	7,280	3,438	1,031	344	182	10,293
2018	8,234	4,304	1,184	395	206	11,666
2019	9,333	5,029	1,257	419	233	13,109
2020	10,487	6,103	1,221	407	262	14,475
2021	11,580	6,916	1,037	346	362	15,496
2022	12,397	7,822	978	245	387	16,332
2023	13,066	8,866	887	222	408	17,033

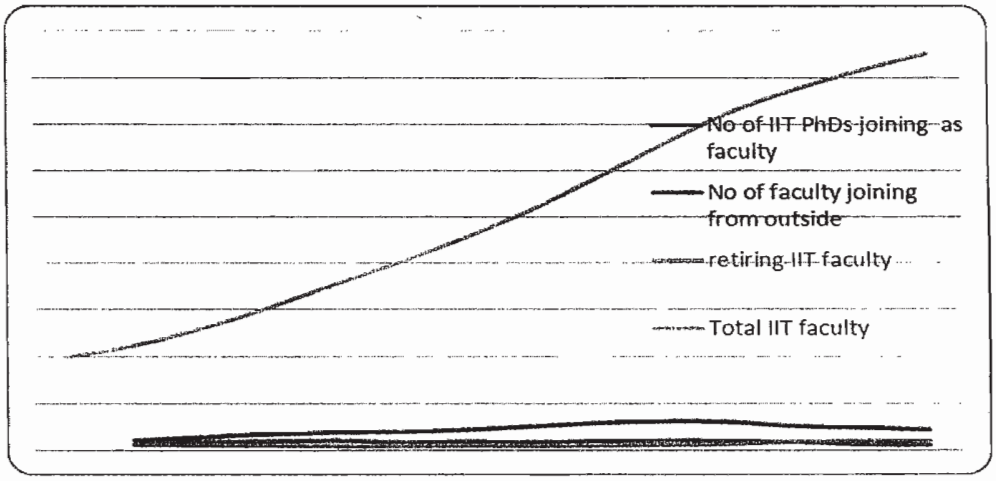


Figure 1.1 : Growth in PhD Programme

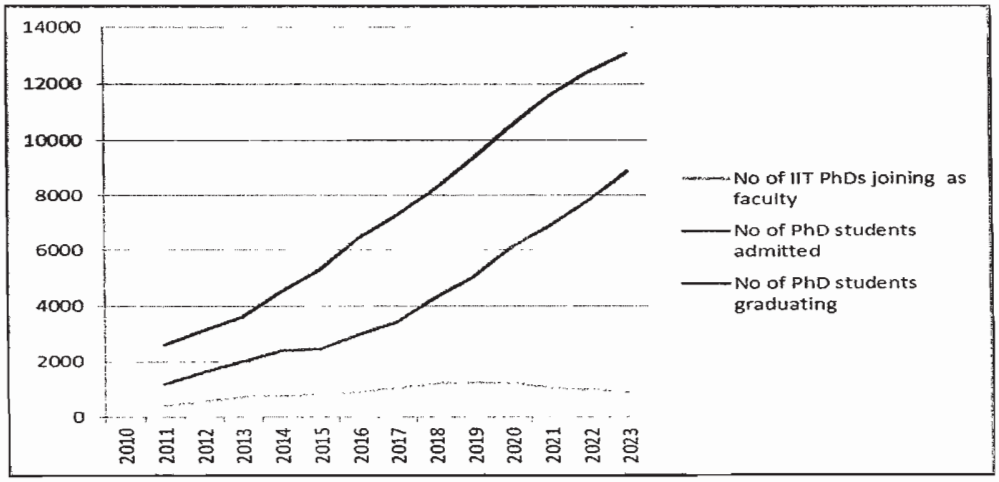


Figure 3.2 : Growth of Faculty at IITs

This assessment makes certain assumptions. These are

(i) The number of faculty today is about 4000.

(ii) On an average, a PhD student takes 4 years to complete his/her program. 95% of those admitted would get their degree (5% drop out).

(iii) PhD graduation in the next four years is assumed to be 1200, 1600, 2000 and 2400; after that, 95% of those admitted four years ago, will graduate.

(iv) The IITs today are aggressive in admitting PhD students. It has been assumed that IITs will admit 0.65 PhD students for each faculty member in 2012, which will grow to 0.8 PhD students per faculty by 2016. Individual IITs may admit more.

(v) It is expected that larger numbers would join industry as they will start paying higher salaries once they recognize the importance of in-house R&D. Thus, the percentage of graduating PhDs joining the IITs as faculty will initially be high (35%), as the newer IITs have to build their faculty strength. But it will drop to 25% in a few years (30% by 2016 and 25% by 2019); that is, by the time PhD students from industry and other institutes start graduating. The number will fall further to 20% and even 10% as the IITs reach closer to 16,000 faculty numbers.

(vi) The percentage of faculty who come from outside the IIT system is initially high (40% faculty intake will initially come from this category) as the number of IIT PhD graduates are now low. But it will go down to 20% in about ten years' time.

(vii) With these assumptions, one can reach close to 16,000 faculty by 2022 and 10,000 PhD students admitted by 2020. Even with marginal changes in these assumptions, it is indeed possible to come up with a plan to achieve the target numbers.

(viii) Retiring faculty is high in the beginning (as high as 6%); it will drop to 1.5% in about five years' time. This is because a number of senior faculties at the IITs are likely to retire in the coming years. But with young faculty joining thereby forming a large base, the number of those retiring is going to go down in some years. It will again rise to 2.5% by 2025.

3.2 Where will the PhD Students Come From

The next obvious question is, where would this large number of PhD intakes come from? Today IITs struggle to get quality intakes for their PhD programme and the number of joinees is rather inadequate. To enable a much larger number of PhD intakes (10,000 per year), the Committee suggests that the IITs consider three largely untapped streams for intake, besides the current one. These would include:

a) Admitting bright undergraduate (UG) students for PhD at the end of their third year undergraduate engineering programme from any institute in India. The IITs would have to take up a programme to identify such students purely on the basis of their academic performance of the past three years, recommendations from their teachers and evaluation of their research potential as identified through an interview (conducted by the IITs). Once identified, these students would be admitted immediately at IIT and would complete their B.Tech programme as well as their PhD in about five years' time at IIT. The UG degree could be awarded by the institute they came from and the PhD in due course by IIT. The IITs should aim to take 2500 such youngsters for PhD programmes from this stream every year.

b) Teachers from other institutes in India joining an IIT for PhD. The programme is to be somewhat similar to the Quality Improvement Programme (QIP) of yesteryears. Appropriately rechristened, the programme should be supported by MHRD by partially paying their salary in addition to tuition fee for the three years that they would spend at IIT. With over 3000 engineering institutions in the country, it should be possible for the IITs to admit 2500 such teachers every year for PhD.

c) Attracting youngsters working in industry to join part-time PhD programmes. While provision for such admissions exists, it has to be further liberalized; for example, these youngsters could take up their course-work on video, even while they are at the industry. Their one-semester mandatory stay at IIT could follow while they take up the research work. The IITs have to

strive to get 2500 youngsters from industry every year for their PhD programme.

Each of these three streams would require some action by the IITs; they would not get the numbers by simply waiting for students to come. The IITs have to take upon themselves to attract students. If each of these three streams ensures 2500 intakes each year and another 2500 come through the existing channels, it should be possible for the IITs to attract 10,000 PhD students every year. Incentives to attract students to do PhD and later join the IIT system as faculty, as discussed later, should help the process.

Visveswaraiah MHRD Research Fellowships

All values in Indian Rupees

Item	Years 1 and 2	Years 3, 4, 5
Monthly Fellowship	27000	30000
Yearly Fellowship	324000	360000
Annual Contingeny	25000	25000
Annual Value per student	349000	385000

Year	PhD Admissions	10% Fellowships	Budget
2013	3619	362	126338000
2014	4530	453	284435000
2015	5294	529	482088000
2016	6424	642	722454000
2017	7280	728	995570000
2018	8234	823	1166539000

PhD Admission Figures are from the Kakodkar Committee Report

International Conference Travel Support Scheme for PhD Students in IITs

All Values in Indian Rupees

Item	Amount
Travel Cost	75000
Registration Fees	18720
DA for four days @ $150 per diem	31200
Visa Fees etc	10080
Total	135000

Year	PhD Admissions	Graduating	Total	25% of Total	Budget
2012			12000		
2013	3619	2000	13619	3405	459675000
2014	4530	2400	15749	3937	531495000
2015	5294	2470	18573	4643	626805000
2016	6424	2966	22031	5508	743580000
2017	7280	3438	25873	6468	873180000
2018	8234	4304	29803	7451	1005885000

PhD Admission and Graduating Figures are from the Kakodkar Committee Report

92—99

2018	8234	4304	29803	7451	1005885000

PhD Admission and Graduating Figures are from the Kakodkar Committee Report

CONCEPT NOTE

'Green Technologies and Sustainability Agenda'

1. Why Green Agenda?

The population of the world has crossed 7 billion and could touch 9billion earlier than 2050. Population of India is close to 1.2 billion and could cross 1.4 billion by 2025.The Indian economy has been growing at a rate of over 6% and is projected to grow at still higher rates. Increasing population and economic growth leads to increased demand for natural resources (land, water, timber, and minerals), energy, food (grains, fish, milk, and meat), fiber, industrial products, etc. India is already facing a shortage of food (edible oil seeds, pulses and even cereals during lean years), water, land, and timber (which is mostly imported), etc. Further, pollution of air, water and soil is already widespread. Finally, India is also exposed to global environmental challenges such as climate change, loss of biodiversity, sea level rise, ocean acidification, desertification, loss of wetlands and coastal zone erosion.

Implications of observed and projected trends in demand for land, food, water, minerals, forest products, and energy coupled with environmental degradation will threaten sustainable food production, water supply, energy supply and health. Thus, there is a need for transformational shift to sustainable energy supply, land and water management, building construction, crop production, fish extraction, etc. Urgent action is required at all levels; global, national, state, city, towns, villages and even individual households. This requires technological development, rational policies, regulations, trained man power, awareness at all levels, financing, etc. Thus a 'Green/Sustainability Agenda' is necessary, encompassing all these components.

Most of the education and research institutions in Europe and America have adopted Sustainability Agenda and are implementing programmes to reduce their Caron footprint, recycle the resources, adopt energy efficiency measures and include sustainability issues in the teaching programmes. In U.K universities are ranked for the greenness as a green league index. (*http://peopleandplanet.org/green-league-2012/tables* and *http://www.guardian.co.uk/news/datablog/2012/may/28/university-green-league-greenwich-environment#data*).

2. Why Green/Sustainability Agenda for Higher Educational and Research institutions

Educational institutions at all levels and research institutions have a critical role to play. Here the focus, to begin with is on ***"Centrally funded technical institutions*** . The rationale for these to take a proactive role in promotion of 'Green/Sustainability Agenda'areas follows:

- Demand for increased RD&D on green technologies and practices and creating a structured academic ambience for environmental sensitivity to nurture creativity and innovation in research.
- Become a model on sustainable or green energy, low carbon transport and energy systems, water conservation, green buildings, recycling and resource management and biodiversity conservation.
- Adopt and inculcate green practices on the campus:Promote energy efficiency, renewable energy technologies, water conservation, rainwater harvesting, waste management, recycling, energy efficient building construction, transport management, etc.
- Conservation of biodiversity and wildlife on the campus and carbon stock enhancement on campus land.
- Develop, demonstrate and disseminate green technological practices and management systems to municipal corporations, industries, corporates, establishments, transport agencies, farms and individuals in the city or region they are located in.
- Mainstream green or sustainability agenda in education and teaching programs of the institute.
- Create awareness among faculty, students, staff, and workers on green sustainable practices.

3. The SCIC in its meeting on .... Approved the agenda of greening technologies as follows:

4. Approach

Beginning with IITs and IISC, in a phased manner all centrally funded institutions of technical education should strengthen he greening program in their curriculum and their own institutional management processes.
The approach would involve; making institutional arrangements, developing 'Green/Sustainability Agenda and policies', preparing technologies, management practices, implementation, monitoring, reporting and dissemination. Initial steps at the institution level would involve the following:

I. Setting up a green office in each institute
II. Networking among the green offices
III. Anchoring a Resource Group on green agenda in IISC

to lead and coordinate the greening programme (among IISc – IITs - IISERs)

The Operational steps would imply the following at the institute's level:

Step I	Identify the centre for sustainable technologies IISC for resource support to the MHRD and other institutes to 1. Develop the concept, technology packages/ modules for consideration by " Inter IISc- IIT – IISER Coordination Committee/ Working Group" 2. Organize periodic meetings of "Inter IISc- IIT – IISER Coordination Committee/ Working Group" 3. Develop protocols or guidelines for monitoring, auditing, evaluation, reporting and publication 4. Develop methodology for preparing a baseline status and annual reports 5. Identify and involve external experts and agencies for designing, implementation and monitoring of Green technology package.	By MHRD - Month - 1
Step II	1. Decision making body on - Technology processes/modules/ models/ packages - Monitoring/ Auditing/ verification, reporting and publication arrangements - Institutional arrangements 2. Dissemination/ marketing of green technology package 3. Mainstreaming green agenda in education 4. Identifying institutions, agencies and consultants for implementation, monitoring, evaluation.	IISC (Centre for sustainable technologies) Month 2 (Jan)
Step III	1. Establishment of Green Office by the institutes 2. Develop a baseline/ status report as a reference for future impact assessments 3. Develop a phased implementation arrangement for	By institutes, Months - 2 - 3

	the 'Green Agenda' 4. Organize an annual monitoring of the environment/ sustainability status 5. Disseminate/ market; green concept, technology package to corporations, municipalities, establishments, industries, corporate and families.	
Step IV	Formulate a greening policy, vision statement, objective and framework for the institute Develop a web based assessment system with green indicators	By institutes, Months - 1-2
Step V	Organize consultation and strategy formulation workshops and to develop green policies	By institutes, Months - 3 - 4
Step VI	Prepare baseline scenario/ status reports Energy use, water use, recycling, CO2 emissions, biodiversity, etc	By institutes, Months - 3 - 6
Step VII	Develop green technology packages / interventions Develop monitoring and reporting mechanisms	By institutes, Months - 4 - 5
	-	
Step VIII	Prepare institute level phased implementation plans	By institutes, Months - 4 - 6
StepIX	Implement the green plan in a phased manner	By institutes, Month - 6 onwards
Step X	Periodic monitoring, verification and reporting of the process and outcomes Publication of progress reports from the institutes on the internet periodically Ranking of institutes/ universities according to a Green index/ Green league	By institutes, Month - 6 onwards

5. Interventions in a phased manner

Phase I: Develop a baseline scenario for the institute: *Timeline: 3 months*

The baseline scenario could include data and information on Green auditing, energy balance, CO2 emissions, water use, waste generation, biodiversity of the campus, transportation arrangements, carbon footprint, paper use, building construction technologies, carbon stock of the institute land, Biodiversity conservation plan, etc.

Phase II:Development of green technology packages: *Timeline: 3 months*
Potential or illustrative list of green technologies or environmental concerns are as follows:

- Energy conservation: lighting/ air conditioning/ refrigeration…
- Renewable energy utilization: installation of SPV, wind mills, waste conversion to energy, bioenergy and Concentrated Solar Power
- New buildings: Energy efficient design and construction practices, building integrated PV, , etc
- Hazardous waste management, paper recycling and water recycling
- Rain Water Harvest from land / buildings and it's utilization
- Water conservation, surface water storage and ground water recharge
- Forestry or gardening for carbon and biodiversity enhancement

Technology package should also include the following:

- Investment and annual operation/ maintenance cost
- Returns/ saving from energy, water, paper conservation and reuse
- Estimates or projections of energy conservation, CO2 emission reduction, carbon stock enhancement, biodiversity conservation
- Implementation plan – prioritized and phased intervention
- Monitoring plan
- Institutional arrangement for implementation monitoring

Involvement of external professional agencies: IISc or IITs may not have expertise in green technologies, biodiversity conservation, hazardous waste management, etc. Thus whenever expertise is unavailable, external agencies could be drafted for preparing the plan. However these plans have to be approved by the ' Green Inter IISc – IIT – IISER coordination committee'.

Phase III:Implementation of green action plan in a phased manner:*Timeline: 6 months to 2 years*

- Prepare phased implementation plan with prioritized interventions

- Examples of prioritized interventions could include:Forestry/ tree plantation/ border tree plantation, efficient lighting/ air conditioning/ refrigeration, Paper recycling, Hostel/ food waste – biomethanation, Solar PV lights for street lighting, etc.
- Implementation could be by the Green Office of the institute, external professional agencies, consultancy firms, government agencies and NGOs.

Phase IV:Monitoring, Reporting, Verification, and Evaluation:*Timeline: 12 months after implementation and annually*

- Periodic auditing/ accounting/ monitoring of;
    - Energy consumption/ conservation (in kWh/GJ/ Tones of oil)
    - Renewable energy use (source and MWh/GJ)
    - CO2 emissions, carbon footprint
    - Water consumption/ conservation
    - Paper consumption/ conservation
    - Waste treatment, including hazardous waste
    - Extent of use of different efficient buildingtechnologies
    - Biodiversity (Flora and fauna)
    - Carbon stock changes in gardens and forests
    - Energy self – reliance
- Transparent reporting: website presenting all data and information
- Verification/ evaluation: External agency

Phase V:Mainstreaming Green Agenda in education and teaching: *Timeline: Second year onwards*

The institutes could assess the existing teaching and research curriculum and develop options for incorporating Green Agenda into the teaching and research programmes.

6. Financing of Green/Sustainability Agenda

Green/Sustainability Agenda can't be a choice and educational institutions should be duty bound to adopt and promote sustainability. There are different types of interventions with differing financial implications.

1) ***Cost effective technologies***: Manygreen technologies are cost effective with net financial benefit, even immediately. E.g. energy efficient lighting, air conditioning and refrigeration, rainwater harvesting, recycling of paper, bioenergy from organic waste, biomass power, solar water heater.
2) ***Cost effective on a life cycle basis***: Technologies that may not be cost – effective immediately, but will be if life cycle cost analysis is carried out. E.g., energy efficient building technologies, solar PV for some applications, wind power etc.

3) ***Emerging technologies***: Technologies which are still evolving and require large investment, and may not be cost – effective. E.g., concentrated solar power, SPV for large scale application.
4) ***Other interventions:*** Interventions such as gardening and tree planting are part of any institutes maintenance programmes and will be part of the institute's budget.

Which technologiesfor implementation? The institutes should go firstly forthe cost – effective technologies which may not require any additional funding, though it may involve some investment for replacing inefficient devices or systems. Institutes depending upon the financial resources consider adoption of technologies which require significant investment, but are cost – effective in the long run. These two categoriesof technologies need to be mainstreamed for meeting the energy, water, paper, etc needs of the institutes even in the short term. The last category of technologies which are still in development stage could be considered for demonstration or testing.

Incentives and disincentives: Incentiveto promote implementation of Green Agenda could be evolved through mutual consultation .

Annexure – XI
p.118-124

SCHEME FOR TRAINEE TEACHER AWARD NIT / IIT JOINT SCHEME

Submitted to
Ministry of Human Resource Department
Government of India
New Delhi

October 2012

Submitted on behalf of the Committee
by

Dr. Anil Kakodkar
Chairman
NIT Review Committee

I Introduction

A scheme is proposed to fill gap between demand and availability of good dedicated teachers in NITs taking raw B Tech graduates, nurturing them for teaching along with their M Tech cum PhD research at IIT. This not only will catch top 15% of the engineering graduates but will also help these trainees' to have their degree from prestigious Institutes. The present need for teaching can be solved to some extent immediately by this trainee teacher's scheme.

II Objectives

To enhance teaching quality and to address the faculty shortage issue, some of the best engineering graduates (i.e. top 15% ranking from the University / deemed to be University) could be attracted and trained. They could be engaged as trainee teachers at NITs. While they assist in teaching, they would simultaneously go through part time Master-cum-PhD programmes of IITs.

III Deliberations of the Committee

The methodology could be as below:

i. NITs will advertise and select appropriate numbers of fresh bright B Tech students (B Tech degree not before 2 years from the selection date) in appropriate branches after a proper screening procedure. These students must satisfy the criteria of being within top 15% ranks from the University / deemed to be University and CGPA 7.5 and above. The probable number of trainee and their branch can be decided by individual NITs based on prospective recruitment programme with trainee teachers holding supernumerary positions.

ii. These selected students will be asked for preference of minimum two IITs. These students will be evaluated and screened by corresponding IITs considering their eligibility criteria, for their potential for teaching and performing research for Masters-cum-PhD program in the NKN enabled distance learning mode. If the candidate is not selected by IIT for Masters-cum-PhD program by IITs, he/she will not qualify to be a trainee teacher.

iii. The trainee teachers will mainly help the Institute for Laboratory and Tutorial classes and progressively play bigger role in academics and research in the Institute.

iv. The status of trainee teachers will be like a contract employee with pay scale (remuneration higher than a regular PhD fellow but lower than an Assistant Professor) with regular leave, medical facilities, accommodation / HRA as applicable, transport allowance etc. Also all the fees and expenses towards the Master-cum-PhD programme will be reimbursed. Part of the pay will be

retained by the Institute, placed in recurring deposit and this would be returnable to the trainee only after successful completion of PhD.

v. It is necessary for the trainee teachers to complete Masters-cum-PhD within 5-8 years. If candidate fails to complete his PhD within eight years, he will have to be terminated. The trainee teacher also can opt out of the scheme by giving sufficient notice to the administration and it should be at the end of semester.

vi. After successfully completion of the PhD, the trainee teacher will be absorbed as Assistant professor at appropriate pay scale.

vii. The IITs and NITS will have to generate broad counter on e-courses to help the trainee to complete most of the credits while serving in the NITs. The trainee teacher will spend one semester in corresponding IIT for their PhD work. Course work would include adequate coverage on teaching pedagogy in addition to covering courses relevant to PhD programme.

viii. The scheme will be reviewed every year by MHRD and after 3 years by an external committee.

IV Financial Outlay

A. Basis for financial outlay:

Proposed Pay to Trainee Teachers: 14 increments less than what an Assistant Professor will get, though on same scale) and what will he / she gets just at the time of finishing PhD (if PhD is completed in 7 years).

Assistant professor: minimum qualification: PhD

Rs 15600 Pay + 6000 AGP (Basic Pay = Rs 21600)
7 advance Inc on basic : (each increment of 3%) -- Rs 4550
DA (65% on Basic): Rs 16998
HRA (20% on Basic): Rs 5230
Transport Allowance: Rs 3200
DA on transport (65% of TA): Rs 2080
Total: Rs 53658

Teacher trainee: minimum qualification B.Tech.

Basic: Rs 21600 - 21% of Basic = Rs 17060
DA (65% of Basic): Rs 11090
HRA (20% of Basic): Rs 3410
Transport Allowance: Rs 3200 (fixed)
DA on TA (65%): Rs 2080
Total: Rs36840/- pm — SAY 37,000/-
12 month cost — 4,44,000/-
20% towards RD* — 90,000/-
Additional 10% towards contin. / prof. expnd. — 45,000/-
Yearly increment = 3% of basic

On completion of PhD: 6% of basic as special increment

*(20% of total funds to be deducted initially and put in recurring deposit. End of 7 years, the deposit should be around Rs 10 lakhs). This amount would be released on successful completion of the programme.

End of 7 years PhD over: When the trainee teacher finishes the course work and get admitted to PhD at IITs, he / she gets two increments instead of one regular.

Basic: Rs 21600 + 6% =21600+1300=22900
DA (65% of Basic): Rs 14885
HRA (20% of Basic): Rs 4580
Transport Allowance: Rs 3200 (fixed)
DA on TA (65%): Rs 2080
Total = Rs47645

After absorption of the teacher trainee as regular faculty, he/ she will start getting the regular salary as per Assistant Professor's scale.

B. FinancialRequirements

Table I give below indicates the details of possible number of candidates who can be considered for "Trainee Teachers" programme. It is assumed that the requirements of New NITs will be half that of old NITs.

Finan. Year	**2013-14**	**2014-15**	**2015-16**	**2016-17**	**2017-18**	**2018-19**	**2019-20**
Cum. No. of "TT" per NIT	5	10	15	20	25	30	35
Reuirement of 20 Old NITs	100	200	300	400	500	600	700
Reuirement of 10 new NITs (x.25)	25	50	75	100	125	150	175
Total	**125**	**250**	**375**	**500**	**625**	**750**	**875**

Table – I :No. of "Trainee Teachers"

Comment: Number of Trainee Teachers at any time to be within projected vacancy position at the end of training period. In equilibrium number of trainee teachers could be typically around 3% of the sanctioned faculty strength.

Table II provides the committed expenditure (in Rs. Lac) based on the eligible students admitted up to academic year 2011-12. Here it is presumed that tuition fee will be waived.

Comment [A1]: Tution fee should be charged and paid to concerned IIT. To be added.

Finan. Year	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20
Estimated Cost basis	**Rs4.89Lacs per year per TT with an average annual increase of 15% (3% + 12%) (3.99 Lac provided to the Trainee Teacher as salary and 0.90 Lac in RD)**						
Increased Annual cost	4.89	5.62	6.47	7.44	8.55	9.84	11.31
Total TTs	125	250	375	500	625	750	875
Requirement of funds	611.25	1405.00	2426.25	3720.00	5343.75	7380	9896.25
Gen Coord. / Admin. expenses	20.00	22.00	24.20	26.62	29.28	32.21	35.43
Total	**631.25**	**1427.00**	**2450.45**	**3746.62**	**5373.03**	**7412.21**	**9931.68**

Table II :Financial Commitment/Outlayduring first seven years of operation (Rs. lac.)

The amount shown above in Table II is maximum committed amount calculated on the basis of an average cost and average no. of beneficiariesunder the scheme.

/* Gen. Coordination and Administrative expenses are increased yearly by 10% only where as the nos of trainee teachers will be almost double. Can it be doubled or in proportion with nosof trainee teachers as it has to cover the tuition fees etc. */

Likely onetime bonus to be paid at the end of first 7 years is shown in the Table III below

Year of Operation	No. of TTs	Average amount per TT	Total Bonus amount
2019-20	125	Accumulated amount in RD (as per actuals) plus completing bonus (2.00 Lac per candidate)	2.50Crore

Table III :Likely Bonus at the end of 7year term

Comment [A2]: Should be primarily for better performers

The trainee teacher should get some funds for professional expenditure like attending conference, which they have to apply for, if they have paper accepted.

V Operationalization of the Scheme

The scheme once approved should be implemented jointly by the IITs and NITs. Following are the proposed roles of IITs and NITs.

1) Role of IITs :

(1) To enrol students for M. Tech cum Ph. D programmes from top 15% of the qualified students from a given academic year

(2) To deliver the programme in Virtual/Distance mode such that the "trainee Teachers" are available to the host NIT for a maximum period to facilitate teaching-learning activities

(3) To select students jointly with NITs for "teachers Trainee" programme

(4) To deliver contents related to pedagogy which are in addition to the conventional course/programme requirements

(5) To possibly engage NIT faculty (may be as co-guide) in guiding the doctoral work

(5) Coordinate all activities in regard to its implementation of the scheme with NITs or a centralized body created for its implementation

(6) To nominate one contact person from each IIT side for its effective implementation.

2) Role of NITs :

(1) To plan and implement the scheme keeping in view the overall requirements of faculty in given time frames

(2) To enrol "Trainee Teachers" as potential faculty and facilitate their interaction with IITs for M.Tech cum Ph D programmes and also engage them suitably in teaching learning activities of their own institute

(3) To disburse salary/scholarshipand other perks and benefits to "trainee teachers"in their respective institutions.

(4) To select students jointly with IITs for "teachers Trainee" programme

(5) To possibly join IIT faculty in guiding the doctoral work

(6) To absorb them in regular faculty positions upon successful completion of the Ph D programmes.

VI Conclusion

The scheme should be launched from the current academic year itself after obtaining necessary approval form the MHRD and other concerned bodies.

Necessary budgetary provisions should also be made for financing the scheme on long term basis.

The concerned BoGs of every NIT should make effective plans to make use of the scheme to mitigate the shortage of faculty on a long term basis. While doing so, they should adequately balance the recruitments from various channels including the "Trainee Teacher Scheme".

Annexure – XII
p.125-133

Prevention of Suicide and Promotion of Wellness in the Central Government Funded Technical Institutions (CFTIs)

Report of the Task Force

constituted by

MINISTRY OF HUMAN RESOURCE DEVELOPMENT (MHRD)

September 2012

8 Recommendations

8.1 Creation of systems and structure in Institutions

8.1.1 Systems:

- Every institution should have a dedicated system to cater to the mental health and counselling needs of its students.
- The leadership should ensure a visible entity for the service with parity in the organizational structure of the institution.
- Multiple stakeholders should be involved, including faculty, students, staff, parents and mental health professionals.
- Institutions should create a proactive and enabling environment for students with psychological needs.
- Institutions should ensure heightened awareness and sensitivity towards issues of social justice including gender, class and caste.

8.1.2 Structure:

- Every institution should have a Counselling Centre/Service which will serve as a mainstay to cater to the psychological needs of students.
- It should be headed by a senior Professor of the institution.
- It should be staffed by
    - adequate number of fulltime professional counsellors supported by part-time counsellors; the number of full-time counsellors should be at least one for every thousand students. The counsellors should hold a master's degree in Psychology (clinical or counselling) or Social Work (medical and psychiatric) with practical experience,
    - psychiatrist (part-time, full-time, or on referral), and
    - trained student and faculty volunteers.
- Services should be available at student friendly locations and timings
- Information on accessing services should be displayed at prominent locations frequented by students including dining halls, canteens, hostels, recreation rooms, computer centres, and libraries as well as on the institute website. Names and contact information for those in charge as well as for counselors must be displayed.
- Confidentiality should be ensured at every stage of the counselling process.
- Close cooperation and collaboration between counselling services and the health services should be established for early detection and prompt intervention.
- Orientation programmes should be conducted for both students and parents, at the time of admissions. Complete information about available counselling services should be provided.
- Preventive and promotional mental wellness activities such as publishing leaflets, CDs, training materials as well as organizing workshops, lectures by experts and bonding exercises, etc. should be integral to the centre's responsibilities. Counselling centres are expected to assist students who have social, academic, linguistic, financial, physical or other difficulties.

8.2 Institutional preparedness

The institution should:

- Establish a mechanism to handle suicidal behaviour and crisis management.
- Use methods to prevent "copycat" suicides, by providing emotional support to immediate friends and families, encouraging help-seeking behavior for emotional distress, providing a forum for emotional expression, etc.
- Establish a protocol for communication with the media, identify and train a specified spokesperson to respond to media queries and provide factual and accurate information. Awareness about the WHO guidelines on reporting of suicides will be a valuable tool.
  (Link: http://www.who.int/mental_health/prevention/suicide/resource_media.pdf)

8.3 Responsibilities of the Institution

To create an enabling environment, the institution should:

- Organize sensitization and awareness programmes for the faculty, to highlight the impact of their words and deeds on the stress level of the students;
- Ensure increasing compassionate interaction between the faculty and students beyond the class room;
- Provide avenues, such as grievance cell, ombudsmen, etc., for addressing student grievances;
- Hold special orientation programmes for administrative personnel, laboratory staff, hostel wardens, hostel support staff, security personnel and other gatekeepers;
- Ensure regular communication and interaction with parents;
- Help faculty, staff and students understand the grief process and cope with any suicides that may occur.

8.4 Follow-up measures

In order to ensure that the above recommendations are implemented in all the Centrally Funded Technical Institutions, the task force suggests the following measures:

- Establishment of an Empowered Committee by MHRD to ensure that all CFTIs follow the recommendations mentioned above;
- The Committee should also establish a database relating to the incidents of suicides in CFTIs;
- The Committee should monitor and ensure continuous data collection and analysis;
- The Committee should promote training programmes for counsellors, volunteers and faculty;
- The Committee should establish links with institutions/centres engaged in suicide research and prevention;
- The Committee should recommend appropriate pay scales and benefits, on par with similar professionals within the higher education system;
- The Committee should identify institutes such as NIMAHANS, AIIMS, IBHAS and other institutions of excellence, and request them to provide regular training courses for the counsellors

- The Committee should find ways of reducing the financial burden and time loss of terminated students:
    - Making arrangements with other universities for sympathetic consideration of the earned credits of the terminated students. This would enable the crucial years spent in pursuit of study to be accounted for and would also not allow consequences of failure to be magnified.
    - Some consideration may also be given to the fees the students have paid so far, as many come from an economically weak background and may have taken educational loans for the same.

8.5 Financial Support

In order to provide high-quality counselling service to students as per the recommendations contained in this report, it is essential that adequate financial support is made available in a predictable manner in the budgetary provisions of the institution and the Government. At present, some of the CFTIs make ad-hoc financial allocations for the counselling services. Part of these allocations is also obtained through one-time fees charged to the students.

Based on the current levels of expenditure for the counselling services and the projected set of activities, it is estimated that the minimum financial requirement will be Rs 50 lakhs a year. The actual support may be worked out by the Empowered Committee based on the needs of an institution on a graded basis. The Government of India should provide this support to the CFTIs.

9 Limitations of the data

This is a preliminary survey/report. The Task Force is of the view that a detailed survey covering all CFTIs is necessary.

An in-depth analysis of various factors (psychological autopsies) that might have contributed to the suicides was not possible and needs to be carried out.

The number and depth of discussions with students and parents were not adequate.

The Empowered Committee will endeavour to address some of these concerns.

10 Suggested Action Plan

In the light of the data, deliberations and recommendations, the following action plan is suggested.

10.1 In case of an attempted suicide:

This calls for crisis management skills, and immediate actions to be undertaken. They may or may not follow in the following sequence. However, all the steps may be required at different points in time and must be adhered to.

1. Maintain the dignity and privacy of the student involved and ensure complete confidentiality of the incident;
2. Immediate medical help, hospitalization (always accompanied by warden or hostel superintendent), if necessary, and share information with the parents;
3. Shifting of hostel room or making the student stay under the supervision of a parent or guardian, if necessary;
4. Daily counselling, at least for seven days, including visits of the counsellor to the hostel room, if necessary;
5. Student must be seen by the psychiatrist who can make any necessary referrals.
6. Enlisting help of volunteers and peers to keep an eye on the student. This should be with the consent of the student who can identify his/her own resources.
7. Trauma may also be experienced by close friends and peers. Group or individual counselling may be required for them too.
8. Close coordination between Dean, students, doctor, counsellor and warden for the well-being of the student.

10.2 For new students:

Students entering CFTIs are from diverse socio-economic and cultural backgrounds and need to handle a variety of challenges in a new academic and social environment. This challenge is heightened in cases where the students may be away from home for the first time.

To enable them to handle these challenges in an appropriate and effective manner, the following steps are recommended:

1. Conduct sessions on:

- Social skills and inter-personal skills, including developing healthy relationships, effective communication, assertive communication and negotiation skills, and maintaining self esteem;

- Skills for managing emotions (such as, anger, failure, disappointment), handling peer pressure and competition, cultivating activities for relaxation;
- Substance use, recognizing signs of distress, and improving help-seeking behavior;
- Problem-solving, time management, goal setting and decision making, communication in English, email communication, and importance of staying up-to-date with academics, etc;
- Inclusion as an instrument for social justice, with reference to class, caste and gender, and ethics and values in academic system.

2. These sessions may be conducted in the first fifteen days prior to registration, as a part of the orientation programme given to first-year students, or

Classes can begin 15 days later to make space for these sessions, or

The sessions may continue concurrently with the studies in the form of a compulsory session for one and half hours per week, during the first semester.

4. Trained professionals need to conduct these sessions.

10.3 For other students

Similar exercises should be conducted regularly in every semester for the rest of the student community Students must be taught the value of a healthy life style, study-life balance, the impact of substance (alcohol and drugs) use and the value of exercise and relaxation.

Special awareness-building films can be screened at the beginning of other important events.

10.4 For faculty and staff

The student strength and classroom sizes are increasing in the CFTIs. In addition, rapid changes in the lifestyle of young people and their increased expectations necessitate that the faculty and staff are also enabled to address these issues in an appropriate and sensitive manner.

Interactive sessions with trained professionals should be conducted to address the following issues:

1. Enhancing sensitivity to the needs and concerns of students;
2. Developing an empathetic mode of communication with students;
3. Understanding the effect of illness/problems on academic performance, behavioural issues like class attendance, assignment submission etc;
4. Being aware of the symptoms of stress and other emotional problems/disorders;

5. To be aware of the impact of their words and actions on the self esteem and emotions of the students;
6. Availability of confidential counselling and therapeutic facilities for staff, faculty, and their dependents for their personal and professional problems and conflicts.

The above programmes can be conducted for various groups of faculty and staff, like seniors and juniors or new faculty, or in terms of their job responsibilities like wardens, heads, academic administrators (such as provost, dean, conveners of committees, etc.).

10.5 For the CFTI

At the institutional level the following actions should be undertaken:

1. Prescribing clear and unambiguous rules and policies concerning failure, termination, appeal/re-appeal and reinstatement of students. This will ensure uniform interpretation and implementation of rules. These should be made available to students, faculty and parents.
2. Institute policies and processes should be framed in such a way so as to harmonize academic progress of a student with his/her academic potential.
3. Institutes usually have a grading policy; however in some institutions there may be variations from one faculty to another. In the absence of an institute policy, if any, every faculty member needs to specify the policies for attendance and cut-offs for grades at the beginning of the course. This will reduce potential areas of stress and conflicts.
4. Institutes ought to lay down clear laboratory policies to avoid students spending unusually long hours in the laboratories.
5. Institutes should facilitate counselling and mental health support and follow-up for students diagnosed with problems/difficulties. Formal methods of referral and involvement of the family, in a confidential way, should be put in place.
6. Institutes should provide educational and emotional support to those who are lagging behind in academic performance. They must also be advised to take mandatory regular counselling and parents must be kept informed when necessary.
7. Institutes should provide a platform to facilitate regular interaction between parents, faculty, and students. The institution should recognize that the parents of children from disadvantaged section of the society would need special support such as help with logistics and language, to enable their participation in the interactions, and these should be provided.

A review of the existing rules may be carried out to examine their compliance with the above.

11 Conclusion

The issue of suicides in general is a growing phenomena, and more so in technical institutions, in view of very specific pressures and expectations. The rate of suicides among young adults is increasing. Fortunately the seriousness with which the CFTIs wish to address this phenomenon is also increasing. The data available, though limited, points to this trend. In view of the fact that a large number of technology institutions are in the nascent stage, they are also likely to face similar situations in the future.

The Task Force believes that the present initiative of the MHRD to reduce the incidences of suicide in the CFTIs should be enlarged and concretized through the standing mechanism of an Empowered Committee with the powers and functions suggested in this report. The investment made in creating a supportive system will promote mental wellness and save many valuable young lives.

Annexure - V

Secretariat of the Council of IITs

Deptt. of Higher Education, MHRD

Minutes of the I[st] Meeting of the second Re-constituted
Standing Committee of the Council (SCIC)

Venue	:	Conference Room IIT Bombay
Date	:	5[th] November, 2012
In the Chair	:	Prof. M.M. Sharma
Participants	:	As per Annexure-I

Before taking up the Agenda, Prof. M. M. Sharma, the Chairman, SCIC welcomed all the participants.

Item No. 1 : To confirm the minutes of the third meeting of the first Re-constituted Standing Committee of the Council (SCIC) held on 4.7.2008

The minutes of the third meeting of the I[st] Re-constituted Standing Committee of the IIT Council (SCIC) held on 4.7.2008, were confirmed, as circulated.

Item No. 2 : To report action taken on the decisions of the last meeting (third meeting of the first re-constituted SCIC) held on 4.7.2008

The committee took note of report of the action on the decision of the last meeting of the SCIC held on 4.7.2008.

Item No. 3 : To consider a proposal for Peer Review of IIT on a periodic basis

The SCIC considered the proposal for Peer Review of IITs, based on the 'Terms of Reference for review of the IITs' earlier discussed in the Empowered Task Force headed by Dr. Anil Kakodkar and finalized subsequently by Prof. Devang Khakhar, Director, IIT Bombay and a member of the SCIC. After detailed deliberations the Standing Committee approved the draft with following recommendations :

(a) The Peer Review of each Institute would be carried out on a periodic basis, once in every five years. For the new IITs, similar exercise be carried out on completion of five years.

(b) The Review Committee will consist of five eminent persons from Industry and Academia, to be selected by the Chairman of the Council of IITs, from a panel of 10 names proposed by the Board of Governors of respective Institutes. The report of the Review Committee will be placed before the IIT Council for its consideration.

(c) Besides periodic review of the institution, each IIT will similarly undertake, an in-house, department-wise review before any external Peer Review is carried out. The report will be considered by the concerned BOG of IIT and the recommendations made therein would be pursued at appropriate level i.e. at the Institute level, Board level and the IIT Council, if necessary.

It was further decided that the Review Committee(s) may be notified by the end of April, 2013 and the Report of the Review Committee(s) be made available to the IIT Council by the end of October, 2013.

A copy of the 'Terms of Reference for review of the IITs', as finalized by the Standing Committee is at **Annexure – II.**

Item No. 4 : To consider a proposal for opening an Account in the name of council of IITs

The SCIC approved the proposal for opening an account in the name of **'Council of IITs'** in principle. The Committee, however, desired that adequate safeguards be put in place in operation on the account and for the purpose every Cheque be issued under dual signatures.

Item No. 5 : To consider a proposal for revision of fee for UG Students in the IITs

The SCIC approved the recommendation of the Group of Directors of IITs and Empowered Task Force for revision of fee for UG students from the existing Rs. 50,000/- to Rs. 90,000/- per annum from the year, 2013 for consideration by the IIT Council. The revised rates will, however, be applicable for the new entrants to the UG programmes and the revised fee are liable to change from year to year.

Item No. 6 : To consider the 1st Report of the Empowered Group constituted by the MHRD/IIT Council on implementation of the recommendations of the Kakodkar Committee – Strengthening the Ph.D. Programme in IITs

The SCIC approved the recommendation of the Empowered Task Force as contained in its 1st Report, for "strengthening the Ph.D. Programme in the IITs", as at **Annexure – III,** for consideration of the Council of the IITs before the same is forwarded to the respective Senates of the IITs. The Committee felt that it should be possible, with sustained efforts, to reach the target of admitting 10,000 Ph.Ds. per annum by the year 2020 which currently is close to 3,000. It was agreed that the National Coordination Board (NCB) of GATE be requested to allow 3rd year B.Tech. students of any approved institution to appear for GATE.

The Standing Committee took note of the fact that suggestion of the Empowered Task Force, that the requirement of qualifying in the GATE for admission be waived, provided the student has a CPI of at least 7.00 at the end of 3rd year from any approved institution, was not part of the recommendations of the Kakodkar Committee. There was unanimity that the admission could be given without GATE but for scholarship the GATE score card would be the enabler.

Item No. 7 : To consider improving the quality of Technical education through greening technology and technology-societal interface

The SCIC appreciated and welcomed the concept of improving the quality of technical education through greening technology and technology relevant to the needs of society. A reference was also made to the recent amendment to The Institutes of Technology ACT, 1961 which enjoins upon every Institute to strive to meet the technological needs of the immediate neighborhood. This will offer opportunity to each IIT to showcase the good work that is already being done by them in this regard.

In the above context, the Committee agreed that technology for sustainable development and societal interface ought to be a central part of the vision and functioning of technical institute. For facilitating the institutes to move towards this end in a planned and transparent manner, the following decisions were taken.

(a) Environment concerns:

The aim should be to minimize the Institute's impact on the environment and its carbon footprint. To this end, each Institute will constitute a dedicated and independent Green Office consisting of members demonstrably knowledgeable in environmental issues and green

technologies and practices, besides student representative. The Green Office would track, monitor and steer the Institute towards green practices through the following activities.

- carry-out regular transparent green audit of the Institute's infrastructure construction and usage, waste disposal policy, energy and water usages and encourage positive action towards renewable resource management like solar energy and water recycling.
- Help evaluate the curriculum to include 'green', technologies for sustainable development as intrinsic to the technical education imparted.
- organize regular participatory seminar/workshops to sensitize the campus community about green practices, and its biodiversity by preserving and expanding its green cover and protecting local fauna.

Green office's reports and follow up action would be shared on regular basis with the IIT Council and will be placed on the institute's web site

(b) Society interface:

Institutes will take up projects that respond to local neighborhood problems. This should encompass the following:

- Exemplary labor practices at construction sites which include minimum wages, proper working hours, safety protocols, adequate civic and medical amenities and a framework for engagement of labour in the informal sector.

- Emphasis on gender equality and redressal of related issues.

- An academic policy enjoining every student to complete at least one project of technology application relevant to local neighborhood development ance in his/her area of expertise/concern.

For improving the institute's communication in public domain transparency in processes would be ensured, inclusive of procurement, construction, and similar projects beyond a certain value being placed on the institute's web site.

Action taken on these issues will be regularly shared with the Council both through its meetings as well as through the Institute's web site.

Item No. 8 : To consider implementation of the Scheme for Group A Registry Staff to all Group A staff other than Doctors

Prof. Gautam Barua, Director, IIT Guwahati briefed the Committee about the genesis of the proposal and made a forceful plea for extension of uniform career progression scheme to all group 'A' officers at par with the Assistant Registrars and Deputy Registrars, as applicable in the UGC system. However, in view of the fact that the Ministry of Finance had desired that the Ministry should follow scrupulously the Modified Assured Career Progression (MACP) scheme prescribed by the DOPT and circulated by the Ministry vide its order dated 7th April, 2010, it was decided that the Director, IIT Guwahati would prepare a comprehensive note on the subject, bringing out clearly as to how the case(s) of Group 'A' officers in IIT system is on a separate footing than that obtaining for the equivalent category of officials in the UGC system so that a plausible case could be submitted by the MHRD to the Ministry of Finance.

Item No. 9 : To consider revision of pay in respect of Design & Scientific Staff of IIT Kanpur

It was felt that the subject matter a essentially concerned to a particular Institute was not under the domain of the SCIC and may be suitably dealt with by the Ministry. Accordingly, the item was withdrawn.

Item No. 10 : To consider revision of the Professional Development Allowance

The SCIC agreed in principle with the suggestions made in the Agenda Note for revision of admissibility of Professional Development Allowance to the faculty. Since this proposal involved higher financial implications, it may be examined by MHRD in consultation with IFD and thereafter be placed before the IIT Council for its consideration/decision.

Item No. 11 : To consider IIT, NIT Joint Scheme for Trainee Teacher Award

It was decided that the proposal be recommended to the IIT Council for its consideration in its next meeting.

The meeting ended with a vote of thanks to the Chair.

* * * * *

Annexure - I

First meeting of the second Re-constituted Standing Committee of the IIT Council (SCIC) held on 5th November, 2012 at IIT Bombay.

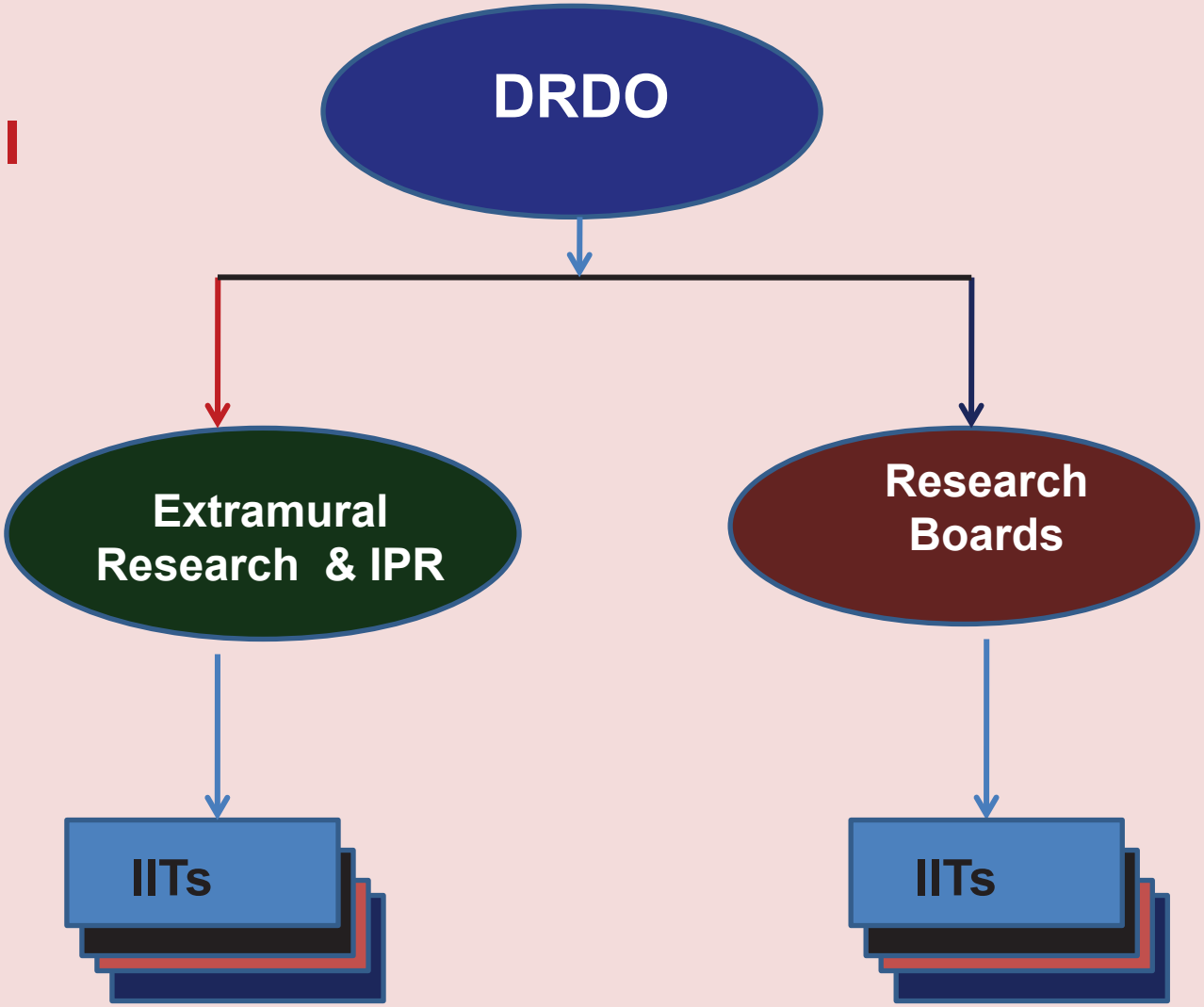
List of participants

Sl. No.	Name & Address	Designation
1.	Prof. M.M. Sharma Chairman, BOG, IIT Madras	Chairman
2.	Prof. Gautam Barua Director, IIT Guwahati	Member
3.	Prof. D.V. Khakhar Director, IIT Bombay	Member
4.	Prof. R.K. Shevgaonkar Director, IIT Delhi	Member
5.	Prof. S.K. Som Director (Actg.), IIT Kharagpur	Member
6.	Prof. A.K. Chaturvedi Dean (R&D), IIT Kanpur (On behalf of Director, IIT Kanpur)	Member
7.	Prof. Timothy Gonsalves Director, IIT Mandi	Member
8.	Smt. Amita Sharma, IAS Additional Secretary (TE), MHRD	Member
9.	Sh. R.D. Sahay Joint Secretary, MHRD	Member

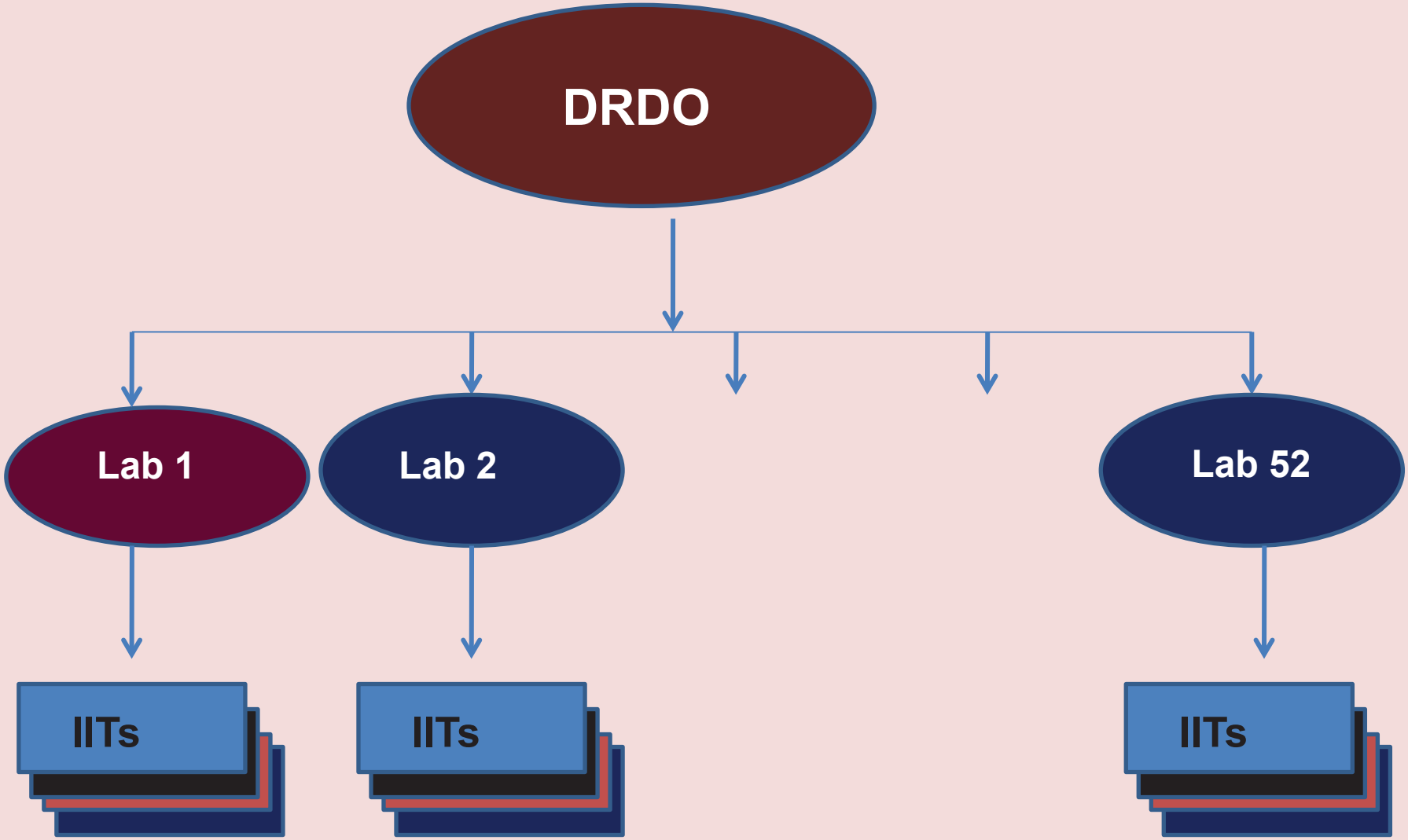
* * * * *

DRDO - IITs Interactive Models

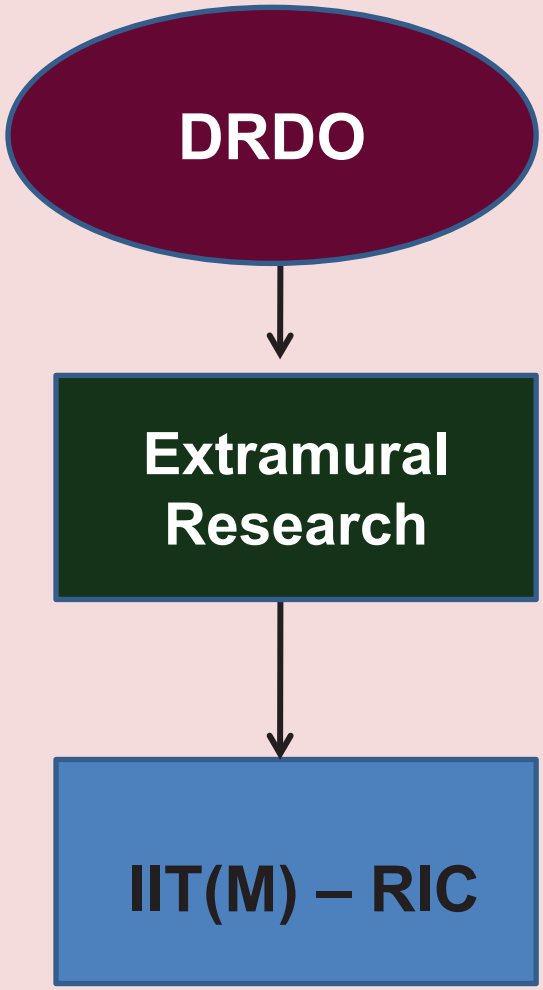
Model I



Model II



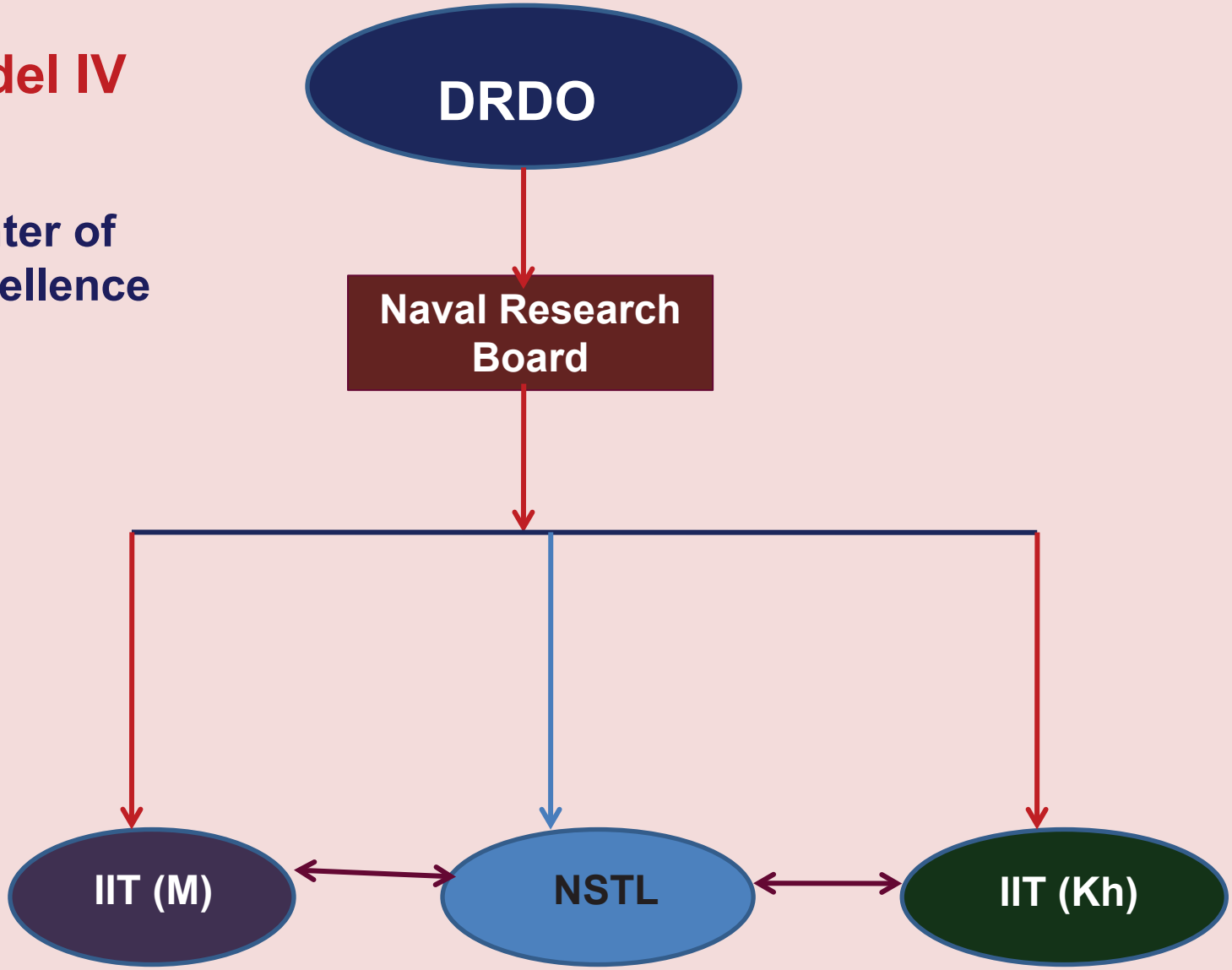
Model III



- Co-Located
- Joint Research
- Close INTERACTION

Model IV

Center of Excellence



- DRDO deputes nearly 100 scientists every year to IITs for M-Tech Programme
- DRDO Recruited about 80 scientists Through Campus in 2012
- DRDO Engages IITs for conducting Scientists Entrance Test
- DRDO Invites IITs Faculties for Project reviews/ Interviews

Shortcomings in the Present System

- Absence of Long Term Strategic Relationship
- Absence of Joint Research Programmes
- Interaction is at Professional Level Only
- Absence of Time Bound Completion of Sponsored Projects
- Projects are Taken, Depending on the Availability of Ph-D Students
- No Standard MOUs/IPR Harmonization
- Absence of Desired Level of Mobility from IITs

Suggestions for Improvements

- Each IIT to Have a JRC (Joint Research Centre) and Identification of Islands of excellence Where Both DRDO Scientists & IIT Faculty Can Work Together (IIT (M) – RIC Model)
- DRDO to Extend Its Facilities to IIT Researchers and/ Create a Research Center for Academician in Each Lab.
- IITs to Recognize DRDO Labs as Research Centres for Ph-D Programs and DRDO Scientists as External Research Supervisors.
- IITs to Offer Adjunct Professorship to Serving/Retired Scientists of DRDO
- DRDO to Sponsor Research Scholarship to Ph-D Students Working on Defence Related Projects

Suggestions for Improvements (..contd)

- A Joint Working Group May be Established to Arrive at a Good Working Model With Liberalized Admin Procedures for Joint Fast-track Research.
- A Steering Committee at Secretary Level to Review the Progress.
- A High Level Council of Ministerial Level to Bring all the Entities on Common Platform with Common Goal of Research for Meeting National Defence/Security/Civil Society & Industry Needs.

Joint Research Work Specific to Defence R&D

- Nano Science & Technologies for Defence Projeources
- Synthetic Biology
- Laser Plasma Science
- Cyber Security/Cryptology
- Aeronautics & Space

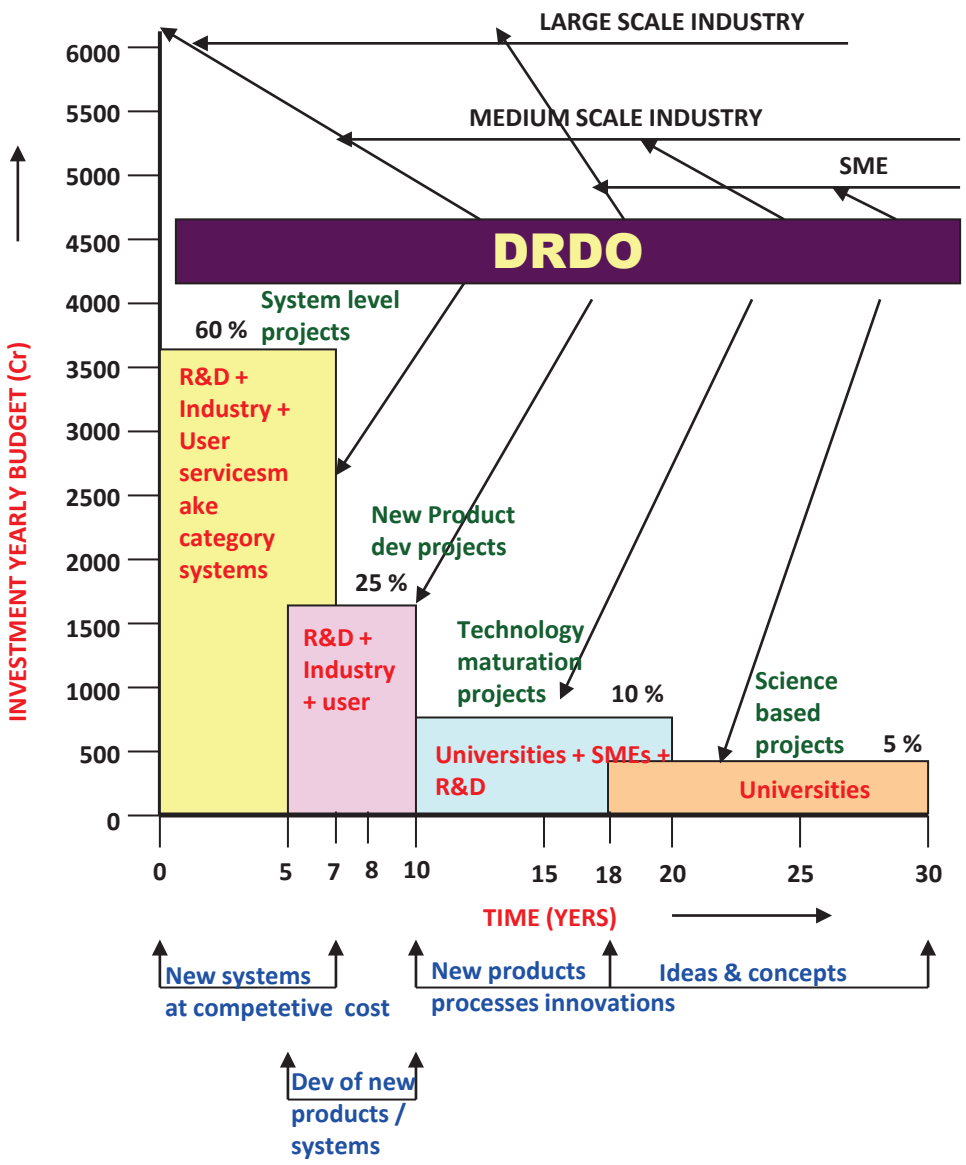
- Robotics
- Stealth Technology
- Directed Energy Weapons
- TERA Hz Imaging
- Indigenous OS
- High Energy Propulsion
- Photonics
- High Altitude Research

OVERVIEW OF SYSTEMS & TECHNOLOGIES

OUR MISSION

- Design, develop and lead to production state-of-art defence systems and technologies
- Provide technological solutions to the Services to optimise combat effectiveness
- Develop infrastructure and committed quality manpower and build strong indigenous technology base

TECHNOLOGY DEVELOPMENT STRATEGY



- TECHNOLOGY STRATEGY – TO COVER A PERIOD OF 30 YEARS
- IDENTIFY TECHNOLOGIES TO COVER NATIONAL SECURITY NEEDS OF PRESENT & FUTURE (DYNAMICALLY UPDATED)
- CREATE CENTERS OF EXCELLENCE – IN ABOUT 50 IDENTIFIED TECHNOLOGY AREAS

CRITERIA - TECHNOLOGY STRATEGY

- ACADEMIA, INDUSTRY & DRDO TO FORM STRONG CONSORTIA
- DEVELOPMENT OF TECHNOLOGY UNDER MISSION MODE
- LONG TERM PLANNING FOR HIGH END TECHNOLOGY BASE LEADING TO PRODUCTS MATCHING WITH USER PERSPECTIVE PLAN
- CREATE PRODUCTION INFRASTRUCTURE IN TECHNOLOGY DENIAL AREAS

WEAPON SYSTEM DEVELOPMENT – NEXT 30 YEARS

Missiles

- Hypersonic and sub-sonic cruise missiles
- Long range ballistic missiles with MIRV (multi-platform – land, air, under-water)
- Ballistic & cruise missile defence systems with space segment
- Multi-platform tactical missiles & missile based PGM's

Naval Systems

- Torpedoes with thermal engines

Aeronautics

- UAV, UCAU, aerostats, airships with multiuse payloads
- Multi role stealth combat aircraft

EW Systems

- Multi-platform EW systems
- Cyber warfare systems

Armaments & Combat Systems

- Next generation MBT, APC
- Remotely piloted reconnaissance ground vehicles
- Low cost guided multi-barrel rockets with PGM's
- Self propelled guns with PGM's.

New Concept Weapons

- Directed Energy
  - Lasers, micro-wave, particle beams
- Kinetic Energy
  - EM cannons, kinetic kill vehicle
- Non-Anti Personnel
  - Chemical energy-losing agents, Low energy-laser blinding weapons, Omni directional irradiation weapons

PROPOSED INFRASTRUCTURE FOR ACCELERATED TECHNOLOGY DEVELOPMENT

- Hypersonic Wind Tunnel
- Scramjet Test Facilities
- Arc Tunnel / Shock Tunnels and High Enthalpy Test Facility
- FPA Foundry
- MEMS Foundry
- Floating Test Range for BMD
- Long Range RTRS
- Aircraft Test Range
- ESW/EW Test Range
- Torpedo Test Range
- Airborne Telemetry, Radar, Transponder System

TECHNOLOGY DEVELOPMENT – NEXT 30 YEARS

TECHNOLOGIES

MISSILES

- MEMS based actuators, sensors
- RF seekers – Electronically steered arrays, Power source, klystrons, MPM, signal processing, ATR
- Gel propulsion systems
- Navigation sensors
  - RLG, FOG, DTG, HPM, Navigation on chip

ELECTRONICS

- IIR Seekers – focal plane arrays, bolometers, CCD's, adaptive optics, IR domes
- Laser seekers
- Network centric warfare technologies
- Active phased array radars
- Space based IR sensors, SAR
- Secured multi-layer high speed communication network
- Mini & micro Satellites
- VLF, ELF, blue-green laser
- SDR

MATERIALS

- Ceramic radomes
- High temperature materials
- Stealth materials

AERONAUTICS

- Airborne (AEWS, ESM, ECCM Systems)
- Gas turbine engines
- Stealth technologies
- Robotics & unmanned vehicles

ARMAMENT & COMBAT TECHNOLOGIES

- High energy solid propellants (ADN)
- Pulse detonation engines
- Thermobaric warheads
- Automated, composite, bridging systems
- Soldier as a system
- Low intensity conflict technologies

LIFE SCIENCES

- NBC defence Technologies

NANO TECHNOLOGIES

- NANO materials, nano sensors,
- NANO structures, nano electronics

WARGAMING

- Wargaming, modelling & simulation of defence systems