



Government of India

Indian Council of Medical Research,  
Department of Health Research, Ministry of  
Health & Family Welfare

And

Ministry of Human Resource Development

# **Medical Diagnostics and Devices Innovation Partnership Workshop**

**19th and 20th September 2014**

# **Medical Devices and Diagnostics Innovation Partnership Workshop**

**19<sup>th</sup> and 20<sup>th</sup> September 2014**

**Report Prepared by  
Dr Meenakshi Sharma, ICMR**

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## **Brief Report of the DHR/ICMR – MHRD Medical Diagnostics and Devices Innovation Partnership Workshop**

### **1. Overview:**

The Department of Health Research (DHR)/ Indian Council of Medical Research (ICMR) and Ministry of Human Resource Development (MHRD) agreed to collaborate on the development of affordable medical devices and diagnostics in areas of unmet medical needs.

The workshop brought together a panel of secretaries from various interested Government of India (GOI) departments, viz. Department of Health Research (DHR)/Indian Council of Medical Research (ICMR), Ministry of Human Resource Development (MHRD), Department of Pharmacology, Chairman, ASSOCHAM and nominees to secretaries of Department of Biotechnology (DBT), Department of Electronics and Information Technology (DeitY), Defense Research & Development Organization (DRDO), Ministry of Textile, Atomic Energy Commission (AEC) and PHD Chamber of Commerce and Industry.

The clinicians, engineers from IITs under MHRD, scientists from ICMR institutes and Headquarters, representatives from above mentioned GOI departments, ASSOCHAM, PHD Chamber of Commerce and Industry and young entrepreneurs from startup companies deliberated on joint opportunities for innovations and networking during working groups of this workshop.

### **Objectives of Workshop**

- to identify the challenges and opportunities for medical technology innovations as perceived by different stakeholders
- to prioritize the nature of innovations in medical devices carried out by IITs, examine the medical, social, economic and market opportunities for these innovations and identify stakeholders at various levels.
- to suggest enabling mechanisms for achieving the unmet clinical needs, with a futuristic view of technologies that are likely to meet those needs.
- to identify human resource gap areas for medical devices/technology development and the role of scientific agencies.

- to interact and network for partnering with IITs and industry for the translation and commercialization process required for medical technologies developed by ICMR and non ICMR institutes.

### Sessions of Workshop

The workshop participants participated in invited talks and 3 working groups during the following sessions:

- A. Perspective of Various Government Agencies in Providing a Forum for Discussion: Panel of Secretaries and Nominees to Secretaries
- B. Medical Device Innovation: Challenges and Opportunities
- C. Innovations In Medical Device: Nature and Priority
- D. Mentoring Medical Device Development
- E. Working Groups

As the areas of medical devices is extremely vast and it is difficult to cover all areas in a 2 day meeting, therefore this workshop was restricted to discussions on issues across a spectrum of devices in only 4 areas and included technologies at various stages of development. Efforts were made to identify the unmet clinical needs and the technologies to address these issues. The targeted technologies were in following areas:

**Group A:** Electronic Technologies Programs

**Group B:** Invasiveness Reducing Technologies Programs

**Group C:** Decentralized Care Technologies Programs

**Group D:** Synthetic organs/tissues Programs

Three working groups addressed the issues as per objectives of the workshop: These were as follows:

- 1) **Working Group I:** Enabling Mechanism (covered all 4 technology areas mentioned above)
- 2) **Working Group II:** Human Resource Development
- 3) **Working Group III:** Interaction & Networking

This workshop served as a forum to discuss actionable strategies for enabling various stakeholders (government, researchers, industry groups, care givers) establish databases, create networks and conducive environment to promote innovation and entrepreneurship. The workshop also addressed the need for incentives for creating innovations to cater to the unmet needs of public health.

## **2. Recommendations of Sessions/ Working Groups of the Workshop**

## **A. Perspective of Various Government Agencies in Providing a Forum for Discussion: Panel**

**Panel Moderator:** **W Selvamurthy**, *President, Amity Science, Technology & Innovation Foundation, Amity University, NOIDA; Former Chief Controller R & D for Life Sciences, DRDO.*

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### **Panelist:**

- **VM Katoch**, Secretary Department of Health Research & Director General, Indian Council of Medical Research, Ministry of Health & Family Welfare
- **Ashok Thakur**, Secretary , Department of Higher Education, Ministry of Human Resource Development
- **Aradhana Johri**, Secretary, Department of Pharmaceuticals, Ministry of Chemicals & Fertilizers
- **BK Rao**, Chairman, ASOCHAM
- **TS Rao/ Alka Sharma**, Nominee, Secretary, DBT
- **Rajesh Harsh**, Nominee, Secretary, Deity
- **RS Sharma**, Nominee, Secretary, DRDO
- **Sakthivel Perumalsamy** , Nominee, Secretary, Ministry of Textiles
- **Ashwariya Kumar Doyal**, Nominee, PHD Chamber of Commerce and Industry

The panel of secretaries and nominees from various interested Government of India (GOI) departments and industry discussed and appreciated ICMR's initiative for development of diagnostic kits by its institutes and devices like glucometer, glucose strips through extramural mode. Other major success in medical technologies in the country includes heart valve, blood bags, stent, ventilator FROs and diagnostics kits.

The panel of secretaries further discussed the need for developing Medical devices/ diagnostics. It was suggested that affordable & accessible health care for all cross section of our society is required. The importance of workshop's theme in view of more than 80% of biomedical devices being imported was emphasized. It was opined that a considerable self-reliance is required in this domain. Further, besides focusing on Indian requirements, a need to compete for a share in global market was emphasized. The



panel recommended mechanisms for promoting developments in area of medical devices and diagnostics.

**Recommendation of the Panel of Secretaries, Government of India:**

1. Integrated and concerted efforts through synergy among various stake holders and ministries involved in biomedical technology development and its commercialization needed.
2. Regulatory Authority for biomedical devices needs to be established like Indian Medical Device Regulatory Authority (IMA).
3. A separate Department of Biomedical Technologies to be considered.
4. Hand holding with industries through fiscal protection and government patronage for indigenous technology necessary.
5. Public Private Partnership to be given a focus.
6. International collaboration to be considered in specific domains.
7. Mission Mode Projects/ National Task Force to be established to realize specific action plan including time lines, role of stake holders defined with champions for specific missions.
8. Rigorous Review process to be placed.
9. Establishment of Special Economic Zones to house R&D Centres, Incubators and Research & Innovation Park considered important.
10. Human Resource – Biomedical Engineers, Skills Technicians and other Allied Health Specialists in Biomedical field need to be developed.

## B. Innovations in Medical Device: Challenges and Opportunities

**Session Moderators:** **Alok Ray**, *Director, Stanford-India Biodesign (India); Formerly at IIT, Delhi;*  
**KK Deepak**, *Prof Physiology, New Delhi*

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### Speakers:

- Translation Research– An Experience: **Balram Bhargava**, *Prof Cardiology, AIIMS and Executive Director, Stanford-India Biodesign (India)*
- Challenges and opportunities in collaborative medical technology innovation and translation: **Mohanasankar S**, *IIT, Chennai*

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**Aim:** To identify the challenges and opportunities for medical technology innovations as perceived by different stakeholders.

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### General Recommendations

1. Database of medtech innovations to be vertically segregated into:
  - Diagnostic: Low value/ high value
  - Medtech Devices: Low tech and high tech
  - Fundamental research: to create a strong applied research culture based on a vibrant and dynamic base of fundamental/ basic research.
2. Outdated work in an apparent quest at cost reduction should be reviewed with a 'clinical lack of compassion': If the product is targeted at PHC, then there must be a PHC end user in the review body. Similarly if a product is aimed at a secondary or tertiary care-centre such clinicians must be included in the review process.
3. 'Frugal' technology to be deliverable and clinically available within a defined period for public funding: Suggested timeline is of 3 years or less.
4. Medtech innovations commencement after a strong clinical/ healthcare review (relevant review depending on target group) and survey of need and market potential.
5. To speed up medtech delivery, permit outsourcing of research (packets) between labs so that hardware procurement and setup time can be reduced. Working together between departments and institutions should be facilitated by incentivizing people directly.

6. Need to take clinician's perspective on medtech innovations: When a doctor, nurse or paramedic uses a device, he would want it to work appropriately. It must be ergonomic, good to look at and trouble-free in operating. However **quality can't be compromised**. Something that comes at a tenth of the cost will have an initial market even if it doesn't meet all the listed criteria. However, one critical failure and it won't be used again.

### Recommendations for Policies for Making for Medical Device Innovation

1. Setting up of regional facilities for prototype making.
2. Facility for validation and certification.
3. Promotion and replication of successful model of DBT-Stanford-AIIMS Model and DBT IHMIT-IIT Madras as model with specific targets.
4. Policy for promoting fundamental/ basic research in medical devices/diagnostics for long term benefits.
5. Policy for developing animal research facility owned by Government. The same should be encouraged in private sector.
6. Policy for permitting PhD courses across medicine and engineering disciplines.
7. Policy for knowledge dissemination on the issues of taking idea from laboratory to the field through regular workshops. Entrepreneurship development programs should be carried out .
8. Setting up the task force for convergence meeting for clinicians (different levels), patients, device manufacturers, and other stake holders for analysis for success and failure regarding given technology.
9. Policy for encouraging researcher for development of novel devices.
10. Policy for infrastructure to support translational science, pre-clinical and clinical support.
11. Provision of facility for safety studies in mission mode.
12. Identification of plans for dormant institutions (Medical and Engineering) and proactively supporting them.

## C. Innovations in Medical Device: Nature and Priority

**Session Moderators:** **Partha Roy**, *Prof Biotechnology, IIT Roorkee*; **Taslimarif Saiyed**, *Director and COO, CCMP, NCBS-TIFR, Bangalore*, **Chandershekhar**, *ICMR, New Delhi*; **Sujay Shad**, *Cardiac Surgeon, Sir Ganga Ram Hospital, New Delhi*.

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### Speakers:

- Experience of ICMR in Medical Technologies: **Sushma Gupta**, *ICMR, New Delhi*
  - Medical Technology Innovations: DBT's Initiative : **Alka Sharma**, *DBT, New Delhi*
  - Healthcare Innovations in IITs: **Rohit Srivastava**, *Biosciences & Bioengineering, IIT, Mumbai* and **Sirshendu De**, *Chemical Engineering , IIT Kharagpur*
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**Aim:** To prioritize the nature of innovations in medical devices carried out by IITs and other departments of GOI and to assess current social, economic, and market requirements for such medical diagnostics and devices so as to converge research and development efforts in the various govt. funded research laboratories with industries.

### Recommendations

1. Identifying community needs/market needs to build specifically focused innovation programmes for talented scientists: This can be achieved by using earlier databases like SIB and other organizations, and through priority areas based call for proposals e.g. grand challenge programmes
2. To have clinicians/ other stakeholders as well as industry as a part of project to be funded: these are the delivery modes and market sensors for these technologies
3. To build dedicated arms that can help take early ideas/challenges further towards market/solutions in large clinical research set ups.
4. To build CSR group interested in funding medical diagnostics and devices for corporate funding
5. To undertake an exercise to find out gap areas in the field : plan a larger survey
6. To develop joint ventures of funding agencies and research institutes like IITs/NITs and others

7. A larger group of representatives from IITs to map synergistic research areas across IITs as all IITs are doing many projects but are not visible to each other. This exercise can be then done for other institutes/agencies.

## **D. Working Group I: Enabling Mechanisms**

### **(i) Working Group on Electronic Devices**

**Moderators:** **Vinod Kumar**, Prof Electrical Engineering, IIT, Roorkee; **S Dandapat**, Prof, Electronics & Electrical Engineering, IIT, Guwahati ; **N Khandelwal**, Prof Radio diagnosis & Imaging, PGIMER, Chandigarh; **Mukesh Sharma**, Villgro Innovations Foundation, Bangalore; **Kanav Kahol**, Affordable Health Technologies, PHFI, N Delhi; **Shri RS Verma**, DeitY, New Delhi; **Shri R Balamurugan**, Assoc. VP, HCL, Chennai, **Chandershekhar**, ICMR, New Delhi

**All Workshop participants participated in the deliberations.**

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### **Recommendations**

ICMR-DHR should take a lead to implement the following with the help of IITs/ Medical Institutes/Industries.

### **Inventory and Creation of National portals: Identifying needs of various stakeholders**

- 1 An electronic portal for stakeholders: clinicians, patient groups, health system and public health personnel and community, industry
- 2 Working Group meetings for identifying the needs of various stakeholders

### **Area wise and sub area wise List in Electronic Devices**

- 1 Identifying leading groups/ individuals from IITs, NIITs and other engineering colleges, SCTIMST, institutes under Deity, AEC, ISRO, universities, etc.
- 2 Working Group meetings for identifying the needs of various stakeholders

### Immediate Goals

- 1 E system in Tertiary care government hospitals and medical colleges in Phase I; Secondary care hospitals in phase II and primary centres in phase III.
- 2 National Database (annotated) with interpretation for all physiological signals (ECG/EEG/EMG/Respiratory etc) and also medical image database with interpretation (US/I/PET/SPET etc)
- 3 A repository of software /algorithms developed indigenously in India by IITs & NITs etc for the use of research scholars and industries.
- 4 Telemedicine facilities at the ground level patients i.e. for the sparsely populated and remotely located villages, hill areas, melas & yatras and also army personnel who are posted on boarder areas etc.

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### (ii) Working Group on Minimally Invasive Devices

**Moderators:** **George Joseph**, Prof Cardiology, CMC Vellore; **Dinesh Kumar**, MD, DesignInnova; **Soura Bhattacharyya**, CEO, Lattice Innovations, **Rajesh Harsh**, SAMEER, Mumbai, **Bhavuk Garg**, Orthopedics, AIIMS, New Delhi; **. Maheshkumar H.Kolekar**, IIT, Patna, **Sadhna Srivastava**, ICMR, New Delhi

### General Recommendations

- **Limitations/ Weakness:**

- (i) Standards, regulatory mechanism/authorities for medical equipment: Different regulatory body specific for Medical Devices instead of having one authority i.e. Drug Controller General of India (DCGI)
- (ii) Create infrastructure for testing and approving such equipment to meet the set standards

- **Incentive mechanism:**

- (i) Incentives to industry such as soft loans, tax holidays and initial procurement of such systems for Government hospitals to attract them for participation in commercializing public funded indigenously developed technologies.

- (ii) Special incentive scheme to be worked out for clinicians/researchers who are part of such R&D team.
- (iii) Requirements of additional skilled manpower in institutions/organizations involved in these developmental programmes

### Specific Recommendations

1. **Imaging Systems:** consortium has been formed with SAMEER as nodal agency and proposal on a National Mission project on 1.5 Tesla development has been worked out involving research organizations, academia, doctors and industry. Proposed project should be carried forward and efforts need to be put for developing low cost I machine to cater to the need of country's requirements.
2. **Ultrasound Imaging Systems:** In view of the Pre-Natal Diagnostic Technique (PNDT) act 1994, portable Ultrasound may be developed primarily for future research purpose or for widespread use with appropriate safeguards.
3. **Optical Imaging Systems:** Needs to be identified for specific requirement of our country. A focused groups consisting of professors from IITs, scientists from various organizations and doctors to identify user requirements for optical imaging systems including laser based technologies.
4. **Minimally invasive implants:** ICMR, IIT Delhi and IIT Mumbai, clinicians, industry to collaborate
5. **Minimally invasive radiotherapy systems:** SAMEER to continue its efforts in the development of advanced versions of LINACs including image guided radio-therapy and related field.

### (iii) Working Group on Decentralized Care Technologies

**Moderators:** **Rohit Srivastava** , IIT Mumbai; **Kanav Kahol**, Head, Division of Affordable Health Technologies, PHFI, New Delhi; **JS Thakur**, Addl Prof, PGIMER, School of Public Health, Chandigarh; . **Dhananjaya Dendukuri** , CEO & Co-Founder, Achira Labs Pvt. Ltd, Bangalore; **Dinesh Kumar**, Managing Director, DesignInnova, N. Delhi. **Meenakshi Sharma**, ICMR, N Delhi

**All Workshop participants participated in the deliberations.**

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**Why needed?** : Universal Health Care Coverage: (ii) Gap - Database on top 10 diseases, mortality missing and human resources (ii) Needs: Technologies at primary and secondary level needs to be considered; Looking at the training requirement for various National program

#### **Recommendations:**

1. Work Group for sensors for needs of public health: Home sensors not only for home but also for front line workers
  2. Enabling mechanisms for industry: low risk products only, manufacturing issues to be discussed, cost of building a plant even for low cost devices/ technologies
  3. A National Task Force : A simple user interface for sensors. Cost of ownership should be defined, Data transfer to cloud to be part of sensor
  4. Need to foster research on big data analytics and include data collection in national surveys (non communicable diseases also to be included)
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### (iv) Working Group on Synthetic Organs

**Moderators:** **Jayesh Bellare and Prof Rinti Banerjee**, Prof, IIT, Mumbai;; **M Balakrishnan**, Prof, Department of Computer Science & Engineering, I.I.T. Delhi ; . **Santanu Dhara**, Associate Professor, School of Medical Science and Technology, IIT Kharagpur; . **Sanjeev Kumar Mahto**, Assistant Professor, IIT (BHU); **Ashish Suri**, Professor, Department of Neurosurgery, AIIMS, N Delhi ; **Bhavuk**



**Garg**, *Department of Orthopedics, AIIMS, New Delhi*; **Shri R Balamurugan**, *Assoc VP, HCL, Chennai*,  
**Rajni Kant**, *ICMR, New Delhi*

**All Workshop participants participated in the deliberations.**

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### **Recommendations**

1. To tackle gaps, availability of materials, GPL ( so that we do not regulatory problems), large animal facility and Implants meeting high standard are required
  2. Regulatory formulation needed
  3. Interdisciplinary approach re-emphasized
  4. Assistive devices to be included
  5. A Government funded PSU which can undertake all facilities : Allowing facilities for testing , etc created by Big industries
  6. Creating In vitro platforms
  7. Insulin Delivery system : Non invasive systems
  8. Bonding grants to be encouraged with international partners
  9. SCTIMST To be part of any group to be constituted in future
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## **E. Working Group II: Mentoring and Human Resource Development (Joint recommendations)**

**Working Group:** **Prof Anil Gupta**, IIM, Ahmadabad and Executive Vice Chairman, NIF; **Krishan Kumar**, Prof Paediatric Cardiology, AIMS, Kochi; **Rajesh Harsh**, SAMEER, Mumbai; **Sneha Anand**, Prof CBME, IIT, N Delhi; **KK Singh**, ICMR, N Delhi; **S Mukherjee**, Wellcome Trust., **Anil Wali**, MD, FIIT, IIT, Delhi; **Goutam Saha**, Prof Electronics and ECE, IIT, Kharagpur; **Alka Sharma**, DBT, New Delhi; **Meenakshi Sharma**, ICMR, N Delhi, **Girish Sahni**, Director, IMTECH, Chandigarh; **Rajni Kant**, ICMR, N Delhi; **JS Sahambi**, Electrical Engineering, IIT Ropar; **Anil Prabhakar**, Prof Electrical Engineering, IIT Maas; **M Balakrishnan**, Prof Computer Science & Engineering, I.I.T. Delhi **Purnima Sharma**, MD, BCIL; **S Mukherjee**, Wellcome Trust; **GD Puri**, PGIMER, Chandigarh. **All Workshop participants participated in the deliberations.**

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### **Mentoring**

The mentoring process should help the mentee in identification of critical health needs of the country that can be addressed through Innovation. It should help the mentee to carry out research necessary to develop, validate, and test their concepts. To increase the translation of research findings, mentor while mentoring a project design should consider the implementation issues. Further, the mentoring approach should emphasize on problem-solving and collaborative approaches allowing people from medical, engineering and industry to be trained together.

**Aim:** The aim is to develop broad interdisciplinary mentoring directed towards encouraging innovation in products, processes, and policies.

Discussion in this session was focused on attributes of the mentoring and a framework for mentoring process.

### **Human Resource Development**

**Aim:** To identify human resource gap areas for translating medical devices/technology development and the role of scientific agencies.

Discussions in this session were focused on (but not restricted to) how to ensure availability of skills for supporting medical device innovation and industry.

**Focused discussions were held on following:**

- A. Organizations Capitalizing Training opportunities for interdisciplinary scientists, bioengineers and healthcare providers at different levels of career
- B. Building Capacity to Train the Next Generation of Interdisciplinary Scientists, Bioengineers and Healthcare Providers
- C. Strengthening Ecosystems for Medical Device / Technology Development

### **General recommendations**

1. Setting up pre commercialization centers on CSIR model
2. DCGI to be involved at early stages
3. Medical Device Bill to be passed at the earliest
4. Need to develop a community of interdisciplinary experts
5. Track the patents in India to look at which can receive further funding: ICMR may acquire rights from inventors and then give to entrepreneurs
6. Virtual incubators for interdisciplinary – Accessible to all
7. ICMR DRDO Engineering collaboration
8. BIRAC kind of models to be replicated for public health
9. Creating Hungry System ( Once in a month Skype call to discuss the innovative methods)

### **Specific Recommendations:**

1. Interdisciplinary graduate model
2. Barriers to interdisciplinary should be studied and mapped.
3. Long term, top down initiative for interdisciplinary initiative.
4. Modifications – Regarding Medical Device Bill needs to be passed.

### **Recommendations for Bridging Human Resource Gap**

1. Regulatory structure changes for engineering students to pursue PhD in medical domains & medical colleges as well as nursing schools, basic sciences, health systems, veterinary sciences.
2. Increased compensation for interdisciplinary scholars and the students with innovative projects after graduation and post graduations
3. Mid carrier professionals to be encouraged for inter-disciplinary research.
4. Demand side of interdisciplinary research
5. Workshops for FAB Lab in Medical college to be approved by MCI

6. Tracking the innovator after the workshop
7. Attaching hospital or field area with IITs . Incorporate social service into curriculum

## **F. Working Group III: Interaction & Networking**

**Moderators:** **OP Kharbanda**, Prof & Head, Centre for Dental Education and Research, AIIMS, New Delhi; **Anil Wali**, Managing Director, FITT, IIT, Delhi; **Sadhana Srivastava**, ICMR; **Sakthivel Perumalsamy**, Head, Centre of Excellence for Medical Textile, Coimbatore; **Purnima Sharma**, MD, BCIL; **RK Sharma**, Addl Director, DRDO, New Delhi. Alok Mishra, HRD, **Renu Swarup**, MD, BIRAC and Advisor, DBT; **Ashish Suri**, Prof Neurosurgery, AIIMS, New Delhi ; **Debashish Dutta**; Deity, New Delhi, **Chandershekhar**, ICMR, New Delhi, **Mahesh Kappanayil**, Prof, AIMS, Kochi; **SK Mahapatra**, Mechanical Sciences, Prof, IIT, Bhuvaneshwar. . **KK Deepak**, Prof Physiology, AIIMS, New Delhi; **Jaspal Singh**, CDAC , Mohali; **Jayesh Bellare**, Prof Chemical Engineering, IIT, Mumbai; **Sushma Gupta**, ICMR, New Delhi; **Dinesh Kumar**, MD, Designinnova, New Delhi

### **All Workshop participants participated in deliberations**

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#### **Discussions were held in following areas:**

- A:** Programs in Medical Colleges, IITs and various GOI Departments targeting innovation, design, technology transfer
- B:** Challenges and Opportunities in development of inter agency collaborative programs. and entrepreneurship in biomedical engineering
- C:** Sharing resources and creating community wide tools (e.g. web portals, etc).

#### **Recommendations**

1. MCI, UGC approvals for integrated programs for all sciences.
2. National Portal for Aggregation of Technologies supported by different funding agencies
3. Knowledge base of existing technology innovations
4. Interactions for Design
5. Risk fund

### **3. Priority Recommendations of Workshop**

### 3. Priority Recommendations of Workshop

**Moderators:** **Prof Anil Gupta**, Executive Vice Chairman, NIF and Prof IIM, Ahmadabad; **Anil Wali**, Managing Director, FIIT, IIT, Delhi; **OP Agarwal**, ICMR; **Alok Ray**, Director, Stanford-India Biodesign (India), IIT, Delhi; Former Head, Centre for Biomedical Engineering, IIT, Delhi

An interactive session was held with all the participants on 'Next Possible Steps'. The recommendations of each session of the workshop were presented by **Meenakshi Sharma**, ICMR.

**Discussions were held on recommendations of each of the sessions and working groups.**

S.No.	Recommendation	Details	To be supported by
1.	<b>Establishment of National Portal for Innovation in Medical Devices &amp; Diagnostics</b> <b>1st step: Constitution of area specific sub-committees</b>	<p>The portal will serve as a resource for disseminating:</p> <ol style="list-style-type: none"> <li><u>1. Available facilities within each organization/ institution</u>, which are sharable, the terms of usage.</li> <li><u>2. Documentation of Unmet clinical Needs</u></li> </ol> <p><b>Usage of portal:</b>  <b>Who will use it:</b> clinicians, para-medical personnel, front line health care workers, patient groups, community, engineers, industry  <b>How to use it:</b> The user will need to register with the portal and can posts request for usage of facility/express intent to collaborate on a relevant project.  <b>Administration of portal:</b> Portal</p>	ICMR, MHRD, DBT and DeitY [pooling of technical and financial resources advocated]

		will be monitored for maintaining quality, reviewing its functioning and usability, making changes as per requirement. This will be done by champions in medicine and related areas, academia like IITs ( Vinod Kumar), IIMs, industry and healthcare professional.	
3.	<b>Project on Electronic Medical Record Keeping</b>	A Mission Mode project/ task force project	ICMR, DeitY and MHRD
4.	<b>Public Repository of Patient and Healthy Population Data ( Including Scans) and Biological Samples (including unused serum samples).</b>	Constitution of Task Force for sorting technical, ethical and logistic issues related to repository and placing 'Call for data sharing'	ICMR, DeitY, MHRD
5.	<b>Capacity Building in Area " Technologies needed for Public Health"</b>	Inventory of region specific public health needs to be generated. Capacity building in this area through Grand Challenge type programs.	ICMR and MHRD (e.g. IITs), Can seek need based collaboration with other departments
6.	<b>ICMR-HRD platform for 'Creating Hungry System'</b>	Platform to allow cross pollination in innovations for health e.g. Once in a month Skype call to discuss the innovative methods	Identified Prof Anil K Gupta, IIM, Hyderabad and Meenakshi Sharma, ICMR
7.	<b>Enabling regulatory framework for Medical Devices</b>	A separate body with a distributed testing facility without compromising the safety was recommended.	To be communicated to MOH&FW and

			followed up by ICMR
8.	<b>Partnership between ICMR and ICAR</b>	To upgrade animal laboratories (if need be) and make these available for biomedical engineering researchers	ICMR & ICAR
9.	<b>Resource for Medical Devices and Diagnostics including Infrastructure and Human Resource</b>	<p>i. <b>IMMEDIATE GOAL: A joint call</b> for proposals for <b>‘Biomedical Award Innovation’</b> for young researchers (<math>\leq 40</math> years) by ICMR, DBT, Deity, MHRD. Number of awards: 25; Amount of Award: Rs 20-25 Lakh per nominee for developing the innovative product in 3 years period. Award to be given strictly merit basis to engineering, medical, basic science, nursing students/ young researchers and healthcare workers. Terms and conditions to be formulated by a Committee.</p> <p>ii. <b>Distributed Physical/ Virtual Incubators</b> : associated with leading institutes in the country,</p> <p>iii. Creating a trained workforce of technology transfer and research translation professionals</p> <p>iv. Creation of facilities for bio medical engineering in colleges and IITs</p> <p>v. ICMR Summer Internship program for biomedical engineering</p>	<p>i. ICMR, DBT, Deity, MHRD, Department of Pharmacology, DRDO, Ministry of Textiles</p> <p>ii. to iv: ICMR, DBT, MHRD (e.g. IITs, IIMs) and industry</p> <p>v. ICMR, medical</p>



		students in medical colleges	colleges, engineering colleges
10.	<b>Incentives for startup companies and industries for manufacturing indigenous innovative products and products of public health importance)</b>	e.g. relevant tax holiday, duty on imported components	To be taken up with Ministry of Commerce for 'Made in India' policy' by ICMR and MHRD

**DHR/ICMR – MHRD MEDICAL DIAGNOSTICS AND DEVICES INNOVATION PARTNERSHIP  
WORKSHOP**

**Venue: Annexe Lecture Hall 1, India International Center Max Mueller Road, New Delhi**

**Programme**

**Friday, September 19, 2014**

9:00-9:30

**Registration**

9:30-9:45

**Welcome**

DK Shukla, Head, Division of NCD, ICMR

**Introductory Remarks**

Meenakshi Sharma, ICMR

**Inaugural Remarks**

*Secretary, Higher Education, MHRD*

*Secretary, DHR & DG, ICMR*

9:45-11:00

**Perspective of Various Government Agencies in Providing a  
Forum for Discussion: Panel**

**Panel Moderator:** **W Selvamurthy**, *President, Amity Science,  
Technology & Innovation Foundation, Amity University, NOIDA;  
Former Chief Controller R & D for Life Sciences, DRDO.*

**Panelist:**

Secretary DHR & DG, ICMR

Secretary, Higher Education, MHRD

Secretary, Department of Pharmaceuticals, Ministry of  
Chemicals & Fertilizers

President, PHD Chamber of Commerce and Industry

Chairman, ASOCHAM

Nominee, Secretary, DBT

Nominee, Secretary, Deity

Nominee, Secretary, DRDO

Nominee, Secretary, Ministry of Textiles

	Nominee, President, FICCI.
11:00-11:30	<b>High Tea</b>
11:30-12:30	<p><b>Medical Device Innovation: Challenges and Opportunities</b></p> <p><b>Session Moderators:</b>    <b>Alok Ray</b>, <i>Director, Stanford-India Biodesign (India); Formerly at IIT, Delhi;</i> . <b>KK Deepak</b>, <i>Prof Physiology, New Delhi</i></p> <hr/> <p>Translation Research– An Experience: <b>Balram Bhargava</b>, <i>Prof Cardiology, AIIMS and Executive Director, Stanford-India Biodesign (India)</i></p> <p>Challenges and Opportunities in Collaborative Medical Technology Innovation and Translation: <b>Mohanasankar S.</b>, <i>IIT, Chennai</i></p> <p>Socio Technical Approach to Prototype Development In India For Medical Devices- Barriers And Enablers: <b>Kanav Kahol</b>, <i>Affordable Health Technologies, PHFI, N Delhi</i></p>
12:30-1:30	<p><b>Innovations In Medical Device: Nature and Priority</b></p> <p><b>Session Moderators:</b>    <b>Partha Roy</b>, <i>Prof Biotechnology, IIT Roorkee;</i> . <b>Taslimarif Saiyed</b>, <i>Director and COO, CCMP, NCBS-TIFR, Bangalore;</i>    <b>Chandershekhar</b>, <i>ICMR, New Delhi;</i>    <b>Sujay Shad</b>, <i>Cardiac Surgeon, Sir Ganga Ram Hospital, New Delhi.</i></p> <hr/> <p>Experience of ICMR in Medical Technologies: <b>Sushma Gupta</b>, <i>ICMR, New Delhi</i></p>

	<p>Medical Technology Innovations: DBT's Initiative : <b>Alka Sharma</b>, <i>DBT, New Delhi</i></p> <p>Healthcare Innovations in IITs: <b>Rohit Srivastava</b>, <i>Biosciences &amp; Bioengineering, IIT, Mumbai</i> and <b>Sirshendu De</b>, <i>Chemical Engineering, IIT Kharagpur</i></p>
13:30-14:30	<b>Lunch</b>
14:30-15:30	<p><b>Working Group I: Enabling Mechanism</b></p> <p><b>Group A:</b> Electronic Technologies Programs in Department of Electronics, ISRO, IITs and Scientific Organization</p> <p><b><u>Working Group A Moderators:</u></b> <b>Vinod Kumar</b>, <i>Prof Electrical Engineering, IIT, Roorkee</i>; <b>S Dandapat</b>, <i>Prof, Electronics &amp; Electrical Engineering, IIT, Guwahati</i> ; <b>N Khandelwal</b>, <i>Prof Radio diagnosis &amp; Imaging, PGIMER, Chandigarh</i>; <b>Mukesh Sharma</b>, <i>Villgro Innovations Foundation, Bangalore</i>; <b>Kanav Kahol</b>, <i>Affordable Health Technologies, PHFI, N Delhi</i>; <b>Shri RS Verma</b>, <i>DeitY, New Delhi</i>; <b>Shri R Balamurugan</b>, <i>Assoc. VP, HCL, Chennai</i>, <b>Chandershekhar</b>, <i>ICMR, New Delhi</i></p> <p><b>Group B:</b> Invasiveness Reducing Technologies Programs in DeitY, IITs, Scientific Organization, Medical Colleges and Industry</p> <p><b><u>Working Group B Moderators:</u></b> <b>George Joseph</b>, <i>Prof Cardiology, CMC Vellore</i>; <b>Dinesh Kumar</b>, <i>MD, DesignInnova</i>; <b>Soura Bhattacharyya</b>, <i>CEO, Lattice Innovations</i>, <b>Rajesh Harsh</b>, <i>SAMEER, Mumbai</i>, <b>Bhavuk Garg</b>, <i>Orthopedics, AIIMS, New Delhi</i>; . <b>Maheshkumar H.Kolekar</b>, <i>IIT, Patna</i>, <b>Sadhna Srivastava</b>, <i>ICMR, New Delhi</i></p>

15:30-16:00

Tea

### Mentoring Medical Device Development

**Session Moderator: Balram Bhargava**, *Prof Cardiology, AIIMS and Executive Director, Stanford India Biodesign Centre (India)*, **Anil Prabhakar**, *Prof Electrical Engineering, IIT Maas*; **M Balakrishnan**, *Prof Computer Science & Engineering, I.I.T. Delhi* **Purnima Sharma**, *MD, BCIL*; **S Mukherjee**, *Wellcome Trust*; **GD Puri**, *PGIMER, Chandigarh*.

Interface of Biology and Engineering: . **Taslimarif Saiyed**, *Director and COO, CCMP, NCBS-TIFR, Bangalore*

Neuro Technology Challenges in Mentoring Medical Devices: **Ashish Suri**, *Prof Neurosurgery, AIIMS, N Delhi*

Conceptualization to Prototyping and Beyond: Framework for Measuring Mentoring : **Goutam Saha**, *Prof Electronics & ECE, IIT, Kharagpur*

Saturday, September 20, 2014

9:00 – 10:00

### Invited Talks on the Theme of Working Groups

Strengthening Ecosystems for Medical Technology Development. **Girish Sahni**, *Director, IMTECH, Chandigarh*

Industry Perspective on Funding Startups and Training People: **Mukesh Sharma**, *Villgro Innovations Foundation, IIT Maas Research Park, Chennai*

Sharing Resources and Creating Community Wide Tools. **Anil Gupta**, *Prof IIM, Ahmadabad and Executive Vice Chairman, NIF*

10:00-11:00

## **Working Group II: Human Resource Development**

**Working Group:** **Prof Anil Gupta**, *IIM, Ahmadabad and Executive Vice Chairman, NIF*; **Krishan Kumar**, *Prof Paediatric Cardiology, AIMS, Kochi*; **Rajesh Harsh**, *SAMEER, Mumbai*; **Sneha Anand**, *Prof CBME, IIT, N Delhi*; **KK Singh**, *ICMR, N Delhi*; **S Mukherjee**, *Wellcome Trust*, **Anil Wali**, *MD, FIIT, IIT, Delhi*; **Goutam Saha**, *Prof Electronics and ECE, IIT, Kharagpur*; **Alka Sharma**, *DBT, New Delhi*; **Meenakshi Sharma**, *ICMR, N Delhi*, **Girish Sahni**, *Director, IMTECH, Chandigarh*; **Rajni Kant**, *ICMR, N Delhi*; **JS Sahambi**, *Electrical Engineering, IIT Ropar*

**All Workshop participants participated in the deliberations.**

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### **Mentoring**

**Aim:** The aim is to develop broad interdisciplinary mentoring directed towards encouraging innovation in products, processes, and policies.

### **Human Resource Development**

**Aim:** To Identify Human Resource Gap Areas for Translating Medical Devices/Technology Development and the Role of Scientific Agencies.

Discussions in this working group to be focused on (but not restricted to) how to ensure availability of skills for supporting

	medical device innovation and industry.
11:00 – 11:30	<b>Tea</b>
11:30-12:30	<p><b>Working Group I (Contd) : Enabling Mechanism</b></p> <p><b>Group C:</b> Decentralized Care Technologies Programs In IITs, Medical Colleges, other Departments and Industry</p> <p>Moderators: <b>Rohit Srivastava</b> , <i>IIT Mumbai</i>; <b>Kanav Kahol</b>, <i>Head, Division of Affordable Health Technologies, PHFI, New Delhi</i>; <b>JS Thakur</b>, <i>Addl Prof, PGIMER, School of Public Health, Chandigarh</i>; . <b>Dhananjaya Dendukuri</b> , <i>CEO &amp; Co-Founder, Achira Labs Pvt. Ltd, Bangalore</i>; <b>Dinesh Kumar</b>, <i>Managing Director, DesignInnova, N. Delhi</i>. <b>Meenakshi Sharma</b>, <i>ICMR, N Delhi</i></p> <p><b>Group D: Synthetic organs/tissues</b> Programs in IITs, Scientific Organization, Research Institutions, Universities, Industries and Medical Colleges</p> <p><b>Moderators:</b> <b>Prof Jayesh Bellare</b> and <b>Prof Rinti Banerjee</b>, <i>IIT, Mumbai</i>; <b>Prof M Balakrishnan</b>, <i>Department of Computer Science &amp; Engineering, I.I.T. Delhi</i> ; . <b>Santanu Dhara</b>, <i>Associate Professor, School of Medical Science and Technology, IIT Kharagpur</i>; . <b>Sanjeev Kumar Mahto</b>, <i>Assistant Professor, IIT (BHU)</i>; <b>Ashish Suri</b>, <i>Professor, Department of Neurosurgery, AIIMS, N Delhi</i> ; <b>Bhavuk Garg</b>, <i>Department of Orthopedics, AIIMS, New Delhi</i>; <b>Shri R Balamurugan</b>, <i>Assoc VP, HCL, Chennai</i>, <b>Rajni Kant</b>, <i>ICMR, New Delhi</i></p>
12:30-13:30	<p><b>Working Group III: Interaction &amp; Networking</b></p> <p><b>Moderators:</b> <b>OP Kharbanda</b>, <i>Prof &amp; Head, Centre for Dental</i></p>

*Education and Research, AIIMS, New Delhi; **Anil Wali**, Managing Director, FITT, IIT, Delhi; **Sadhana Srivastava**, ICMR; **Sakthivel Perumalsamy**, Head, Centre of Excellence for Medical Textile, Coimbatore; **Purnima Sharma**, MD, BCIL; **RK Sharma**, Addl Director, DRDO, New Delhi; Alok Mishra, HRD, **Renu Swarup**, MD, BIRAC and Advisor, DBT; **Ashish Suri**, Prof Neurosurgery, AIIMS, New Delhi ; **Debashish Dutta**; Deity, New Delhi, **Chandershekhar**, ICMR, New Delhi, Mahesh Kappanayil, Prof, AIMS, Kochi; **SK Mahapatra**, Mechanical Sciences, Prof, IIT, Bhuvaneshwar. . **KK Deepak**, Prof Physiology, AIIMS, New Delhi; **Jaspal Singh**, CDAC , Mohali, **Jayesh Bellare**, Prof Chemical Engineering, IIT, Mumbai; **Sushma Gupta**, ICMR, New Delhi; **Dinesh Kumar**, MD, Designinnova, New Delhi*

#### **All Workshop participants participated in deliberations**

#### **Discussions were held in following areas:**

**A:** Programs in Medical Colleges, IITs and various GOI Departments targeting innovation, design, technology transfer

**B:** Challenges and Opportunities in development of inter agency collaborative programs.

and entrepreneurship in biomedical engineering

**C:** Sharing resources and creating community wide tools (e.g. web portals, etc).

13:30-14:30

**Lunch**

14:30-15:00

**Next Possible Steps? Interactive session with participants**

**Moderators:** **W Selvamurthy**, President, Amity Science, Technology & Innovation Foundation, Amity University, NOIDA; Former Chief Controller R & D for Life Sciences, DRDO; **Girish**



<p><b>Sahni</b>, Director, IMTECH, Chandigarh; <b>Anil Wali</b>, Managing Director, FIIT , IIT, Delhi; <b>OP Agarwal</b>, ICMR; <b>Alok Ray</b>, Director, Stanford-India Biodesign (India), IIT, Delhi; Former Head, Centre for Biomedical Engineering , IIT, Delhi</p>	
<p>Recommendations of the Sessions and Working Group I to III : <b>Meenakshi Sharma and Chandershekhar</b>, ICMR, New Delhi</p>	
15:00-15:30	<p><b>Discussions on Recommendations and its Finalization</b></p> <p><b>Prof Anil Gupta</b>, Executive Vice Chairman, NIF and Prof IIM, Ahmadabad; <b>Girish Sahni</b>, Director, IMTECH, Chandigarh; <b>OP Agarwal</b>, ICMR; <b>Alok Ray</b>, Director, Stanford-India Biodesign (India), IIT, Delhi; Former Head, Centre for Biomedical Engineering , IIT, Delhi, <b>Chandershekhar</b>, ICMR, New Delhi, <b>Meenakshi Sharma</b>, ICMR, New Delhi; <b>Krishan Kumar</b>, Prof Pediatric Cardiology , AIMS, Kochi</p>
15:30-15:35	Vote of Thanks - <b>Meenakshi Sharma</b> , ICMR, New Delhi;
15:35 -16:00	Tea

### **Details of Focus Areas**

The session aims to identify a broad set of technical issues in medical devices and technologies which have the potential of significant innovation/development over next 5 years. The list will forego costs so that a wider range of medical device/technologies can be considered.

It is planned to undertake discussions among participants of Workshop in 3-4 working groups. The participants will include physician, engineers and manufacturers and scientific officers from ICMR, DST, DRDO, DBT, etc.

### **Working Group I : Enabling Mechanisms**

#### **The areas identified below are only indicative and not exhaustive**

Group A: Electronic Technologies Programs in Department of Electronics, ISRO, IITs and Scientific Organization

#### **Computerized systems & IT systems**

- Integrated electronic patient medical record systems
- Computer assisted diagnostic systems
- Virtual reality medical training systems

#### **Robotic systems**

- Robotic surgery
- Robotic prosthetics

#### **Wireless products**

- RFID technology

**Any other felt important by the Group**

- Limitations/ Weakness
- Strengths of various sectors
- Goals for next 5 years (Short, medium and long term)

Group B: Invasiveness Reducing Technologies Programs in DeitY, IITs, Scientific Organization and Medical Colleges

**Imaging devices and systems** (Advanced versus Already Available)

- imaging systems
- ultrasound imaging systems
- optical Imaging systems
- Image guided therapy systems

**Minimally invasive therapeutic products**

- Minimally invasive implants
- Minimally invasive radiotherapy systems

**Photonics**

- Optical diagnostic devices
- Optical therapeutic devices

**Any other felt important by the Group**

- Limitations/ Weakness
- Strengths of various sectors
- Goals for next 5 years (Short, medium and long term)

Group C: Decentralized care technologies Programs in IITs, Medical Colleges, DRDO, DAE, Department of Pharmacology

### **Home and self care products**

- Home sensors
- Smart homes

### **Any other felt important by the Group**

- Limitations/ Weakness
- Strengths of various sectors
- Goals for next 5 years (Short, medium and long term)

### **Synthetic organs/tissues :**

- **The areas identified below are only indicative and not exhaustive**

#### **Artificial organ and organ assistive device**

- Tissue Engineered products
- Prosthetic limbs with advanced bio-integration properties
- New types of stents
- Joint replacements
- Insulin pumps and delivery systems
- Glucose monitoring products

#### **Combination product area**

- Drug delivery system

### **Any other felt important by the Group**

- Limitations/ Weakness
- Strengths of various sectors
- Goals for next 5 years (Short, medium and long term)

<b>DHR/ICMR – MHRD MEDICAL DIAGNOSTICS AND DEVICES INNOVATION PARTNERSHIP WORKSHOP</b>	
Venue: Annexe Lecture Hall I, India International Center Max Mueller Road, New Delhi	
<b>List of Participants</b>	
<b>Secretaries , GOI</b>	
<b>1.</b>	VM Katoch, Secretary DHR & DG, ICMR
<b>2.</b>	Shri Ashok Thakur, Secretary , Higher Education, MHRD;
<b>3.</b>	Ms Aradhana Johri Department of Pharmaceuticals, Ministry of Chemicals & Fertilizers
<b>4.</b>	B K Rao, Chairman, ASSOCHAM National Council on Healthcare and Hospitals
<b>5.</b>	W Selvamurthy, President, Amity Science, Technology & Innovation Foundation, Amity University, NOIDA; Former Chief Controller R & D for Life Sciences, DRDO. Email: <a href="mailto:syp@sitra.org.in">syp@sitra.org.in</a> ,
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