



Role of Collaboration in 4IR Technology Development and Commercialization for Sustainable Development

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4th Industrial Revolution

- Emerging Cyber-Physical Systems (CPS)
 - AI, Robotics, Machine Learning, Data Analytics
 - Blockchain
 - IoT
- Biotechnological Advancements
- Advanced Materials
- Key Aspect - Extensive Embedding of Technology within
 - Society, Communities, even in the human body
 - All Pervasive Connectivity and Networks
 - 5G, 6G, Social Media
 - Ubiquity of Devices

4IR - Role of Collaboration

- Potential to Transform the Human Society
- But Might worsen Problems for People/Planet too
 - Problems pertaining to Sustainability
 - Climate Change, Reduced Biodiversity, Rising Inequality etc.
 - Extensive Embedding of Technologies
 - Technologies More and More Invasive
 - Resistance/Distrust to adopt new Technologies/Ways of Business
 - Extensive embedding increases Distrust/Resistance
 - Increased Conflicts
- Collaboration between Stakeholders
 - Help address the Challenges
 - Global Pandemic Response could have been better
 - Mitigate Adverse Consequences of Changes
 - Trust based Adoption, Reduced Conflicts
 - Enhances Social/Environmental Benefits

4IR - Collaboration Modalities

- Technology Transfer
 - From Government Research Institutions/Academia to Industry
 - Bodies in Organizations which enable Technology Transfer
 - Antrix of ISRO
 - C-Tech of DRDO
 - Startup Incubation and Innovation Centre of IIT Kanpur
- Govt Funded Incubation/Innovation
- Partnerships and Linkages
 - Linkages between Government, Academia, Industry, Social Institutions
 - Global Linkages
 - Collaborative footprint in Global fora
 - 5G/6G/IoT/... Technology Standards

Ecosystem for Collaboration - Examples

- Connect Innovators to the Market
 - Accelerating the Growth of New India's Innovations (AGNIi)
 - Supported 450+ innovations so far – Healthcare & Pharma, Energy, Agriculture
 - Examples - IoT Sewage Treatment
- Support Exciting/New Ideas from Academia/Start-ups/Incubators
 - Biotechnology Industry Research Assistance Council (BIRAC)
- Promote R&D and Technology Entrepreneurship
 - MeitY supports ICT start-ups
 - Covid vaccine development by Bharat Biotech supported by Govt of India
- Ecosystem Creation for Innovation & Entrepreneurship at Academic Institutions
 - IIT Madras Research Park
 - IIT Kanpur SIIC
 - Currently 100+ startups in its portfolio
 - The Society for Innovation and Entrepreneurship (SINE) at IIT Bombay
 - Foundation for Innovation and Technology Transfer (FITT) at IIT Delhi
 - Society for Innovation & Development (SID) at IISc

Covid19 Vaccine- COVAXIN Example

- Co-developed by Bharat Biotech with Indian Council of Medical Research-National Institute of Virology
- Scaling Up Manufacturing for COVAXIN
 - Acquired Ankleshwar plant from GSK Asia to manufacture COVAXIN®
 - Linked agreement with Indian Immunologicals Limited, Hyderabad to manufacture and supply the COVAXIN® drug substance.
- Govt Support for Scaling up
 - CSIR-Indian Institute of Chemical Technology developed a new process for scaling up the adjuvant production
 - Under Mission 'COVID Suraksha' announced US\$ 8.75 M support to repurpose its Bangalore facility
 - 3 Public Sector Enterprises, IIL, (US\$ 8.08 M approx.), Haffkine Biopharmaceuticals, (US\$ 8.75 M approx.) and Bharat Immunologicals and Biologicals Corporation Limited-Bulandshahr, (US\$ 4.04 M) received funds to increase vaccine manufacturing capacity
- Technology Transfer and Commercialisation
 - DBT assisting in technology transfer of COVAXIN® production to 3 institutes namely OmniBRx Biotechnologies Pvt. Ltd., Hester Biosciences, and Gujarat Biotechnology Research Centre,
 - Ocugen Inc, US entered into an agreement to co-develop and commercialize the COVAXIN® in US
 - Ocugen got exclusive rights for Canada
- Granted Emergency Use Authorization by the WHO testifies to the increasing innovation capabilities of Indian Firms.
- Received the Good Manufacturing Process (GMP) certificate from Hungary for COVAXIN