



# **Foresight Practices in India – An Overview**

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**Session - Foresight: Best National Practices**



**Technology Information, Forecasting and Assessment Council  
(TIFAC)**

*(An Autonomous Body under Department of Science & Technology, Govt)*

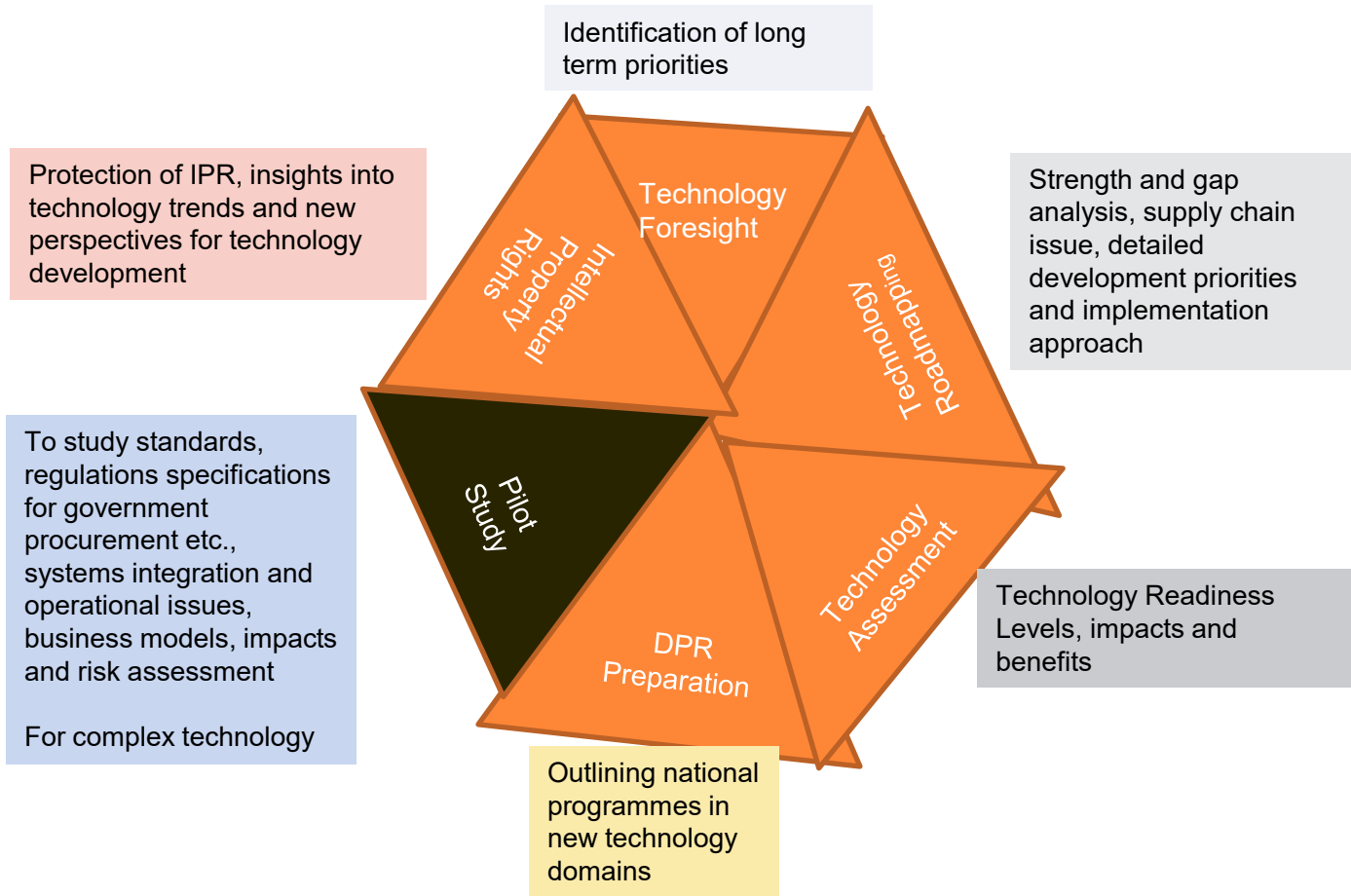
# Genesis

- **The Technology Policy Statement 1983**, GoI highlighted the need for undertaking technology forecasting and assessment studies on a systematic and continuing basis.
- **Cabinet SAC PM Recommendations** : TIFAC was instituted as an autonomous registered society under DST in February, 1988.

**Vision:** Technology Foresight Leadership

**Mission:** Assess and develop roadmaps for future technological options in crucial sectors of socio-economic importance - formulation of strategy and nucleation of technology programs

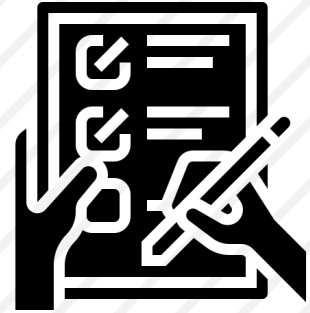
# Technology Evolution from Foresight: A 360° View



# TIFAC ACTIVITIES at glance



- Foresight and Vision exercise, demand driven customised report preparation
- Preparation of Annual Technology Report for PMO
- Preparation of Policy Papers
- Technology Evaluation, Assessment
- Technology Demonstration and Piloting
- Strengthening technology capability of SMEs
- IP Management
- Technology Marketing and Transfer
- Skilling and Capacity Building
- International Collaboration



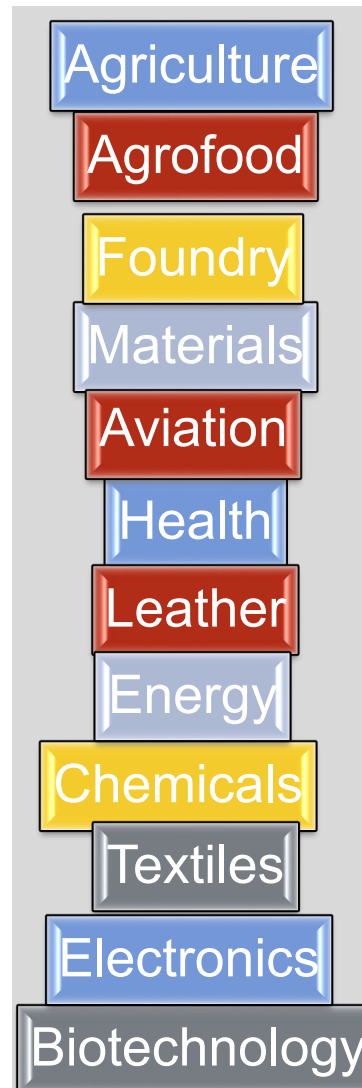
# Initial Phase (1988 - 2002)

## Techno Market Survey Reports

Provided market linked business opportunities to new technologies

More than 300 reports published

The reports served to be a valuable resource during the times when information on technologies, market, economy, were not accessible and easily available in open domain, unlike on a click of a mouse nowadays.



- Revenue generation
- Development of Technology Missions
  - ✓ Fly Ash Mission
  - ✓ Advanced Composite Mission
  - ✓ Sugar Technology Mission
  - ✓ Leather Vision

## Second Phase

# Technology Vision 2020 - *Dreamt for Developed Nation by 2020*

### First ever Long Term Vision Document for India

**- Released in 1996 by the then PM**

- Delineated technology trajectory for 17 sectors in 25 volumes
- Govt approved - Rs.360 Crores towards Technology Assessment of forecasted Technology at ground level

**IMPACT - Assessment of model - multi stakeholders for large scale adoption**

# Third Phase

## Technology Vision 2035 Document

### Vision:

“Technology in the service of India: Ensuring the **security** enhancing the **prosperity** and strengthening the **identity** of every Indian”

### Broad Coverage

- Retrospection of TV 2020
- Indians and their aspirations
- 12 Prerogatives : SDGs
- 10 Grand Challenges
- Technologies and their readiness levels
- Transversal Technologies

### Spin off:

PMO directed to all ministries for consulting TV 2035 documents  
Swachch Bharat, Swasth Bharat, Make in India, Promotion of Start ups, Skill Development, Digital India Initiative



# TECHNOLOGY ROADMAPS – *Post release TV 2035*

## Released Technology Roadmap of key sectors

### Impact :

- o **Education Roadmap**- reflected in New Education Policy - 2020
- o **Manufacturing Roadmap**- Smart Advanced Manufacturing and Rapid Transformation Hub (SAMARTH) Industry 4.0 initiative of DHI
- o **Transport Roadmap**- ITS demonstrated in Bangalore, Pune, Indore
- o **Healthcare Roadmap** - Automated alerting system for medical emergencies, ICT driven rural healthcare delivery etc. under implementation.
- o **ICT Roadmap** - National Policy on Electronic 2019, Mission on Cyber Physical System and Quantum Computing
- o **Water Roadmap** - BARC project on thin film composite polyamide (TFCP) membranes.





1. Future prospect of controlled release fertilizer in India (Macro & Micronutrient)
2. Study on Climate Smart Agriculture (CSA)
3. White paper on Self-Healing Roads (SHR)
4. Evolving a National Strategy for Promotion of Millets towards Achieving Nutritional Security
6. Vertical farming vs Horizontal farming - a comparative analysis
7. Technology Foresight Study on Micro Nano Manufacturing
8. Preparation of an action plan document on use of advanced technologies in agriculture (IoT and Sensor based)

# Technology Foresight for Automotive R&D (TFAR)

1. Development of an Agent Based, Bottom Up Model for Forecasting of Penetration of Electric Two Wheelers in India till 2030
2. Emerging Energy Storage Technologies
3. Impacts of Electric Mobility: Materials
4. Wireless Opportunity Charging of Electric Buses using Solar Energy
5. Techno economic feasibility of Hyperloop technology

# Climate Change Initiatives

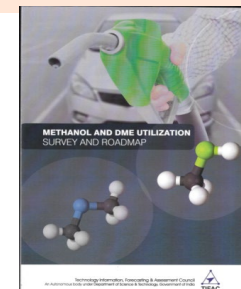
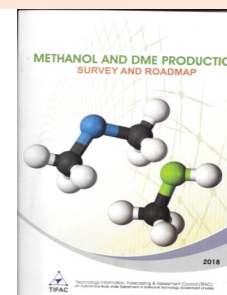
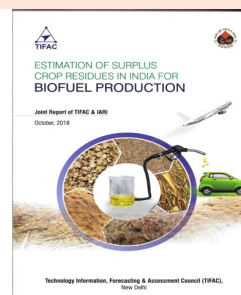
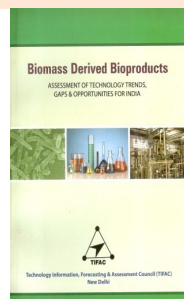
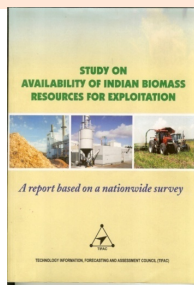


- Prepared the requirement of technologies for India's INDC report in 2015
- Identified Technology Needs for GOI for Climate Change Mitigation and Adaptation purposes
- Prepared Global Technology Watch Group Report and its prioritization

# Foresight Reports - Bio-Process sector

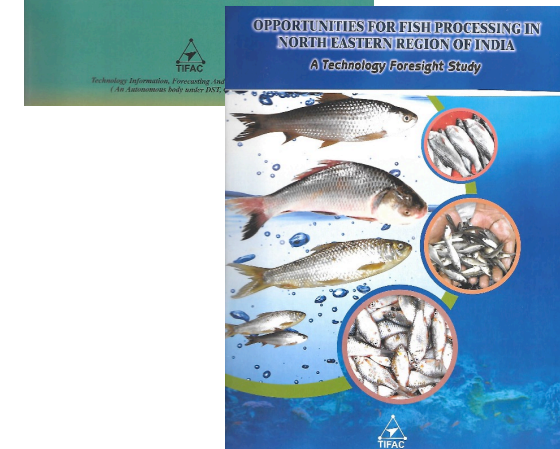
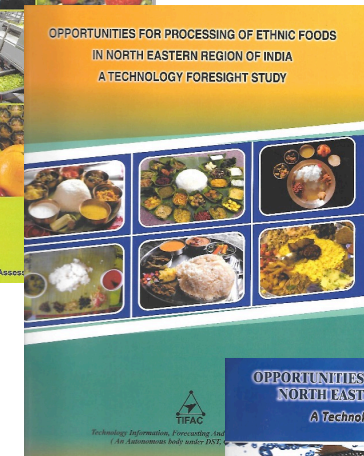
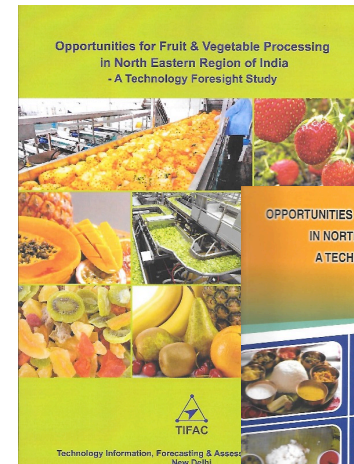


1. **Bioprocess & Bioproducts – Emerging Trends** : Encompassing bio-ethanol, bio-oil, bio-hydrogen, bio-chemicals and industrial enzymes
2. **Bioprocesses & Bioproducts - Technology Trends & Opportunities**
3. **Availability of Indian Biomass Resources for Exploitation** :State-wise survey on generation & surplus of biomass resources
4. **Biomass Derived Bioproducts – Assessment of Technology Trends, Gaps & Opportunities for India**: Identification of potential bio-products & technological routes for projects in R & D, pilot, semi-commercial scales
5. **Production & Utilization related aspects in Methanol and Di-Methyl-Ether (DME) & Road Map**
6. **Estimating generation and surplus amounts of crop residues in India**
7. **Seaweeds Cultivation and Utilization- Prospects in India'**
8. **Characterization of major agro-residues biomass in India**



## Technology Foresight Studies

- i. Fruits & Vegetable Processing
- ii. Traditional Ethnic Foods
- iii. Fisheries
- iv. Spice Processing
- v. Regional Cereal Processing
- vi. Meat & Poultry Processing

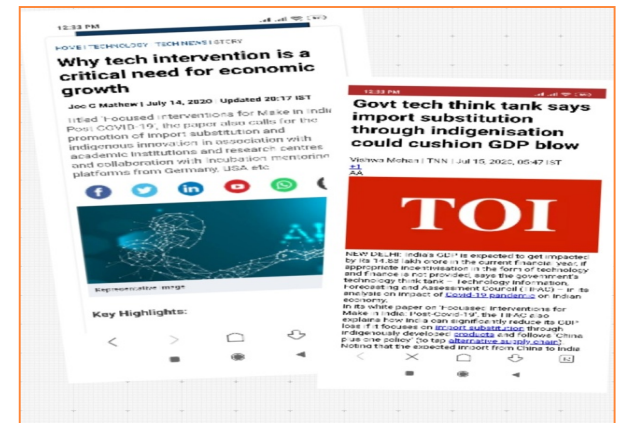


# Recent Initiatives in 2021 (Post COVID 19)

# White Paper on Focused Interventions for Make in India post COVID 19

Analyzed Impact of COVID 19 on Industries across the following sectors

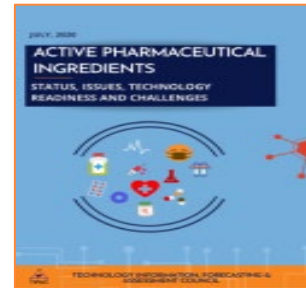
- Medical and Health
- Machinery & Manufacturing
- Information and Communication Technology (ICT)
- Electronics
- Agriculture & Food Processing



# Report on 'Active Pharmaceutical Ingredients (APIs): Status, Issues, Technology Readiness and Challenges

## Focused Program to Support API R&D

- **Early stage R&D Support** for pilot development of APIs
- **Pilot Scale Facility – Kilo lab** in select Academia and Incubators for techno economic up scaling
- Creation of new **Centers of Excellence in collaboration with lead pharma companies across India in PPP model.**
- **Integrated Cluster Development Programs** for effluent treatment plants (ETP), technological up gradation, Quality Monitoring System (QMS) and **Common facilities** to be established- **Bulk Drug Parks**
- **Revive & revitalize Public Sector Enterprises** (HAL, IDPL, etc.) in PPP mode for low value APIs
- Review of **regulatory norms** for Clinical trials keeping in view Indian population





# Action Agenda for AtmaNirbhar Bharat (AAAN)

## *Roadmap for Local to Global*

### Policy recommendations across sectors categorized:

- Innovation and Technology development
- Technology adoption/ diffusion
- Manufacturing and Productivity
- Trade and globalization
- Education and Training & Internet Policy
- AI & Data management



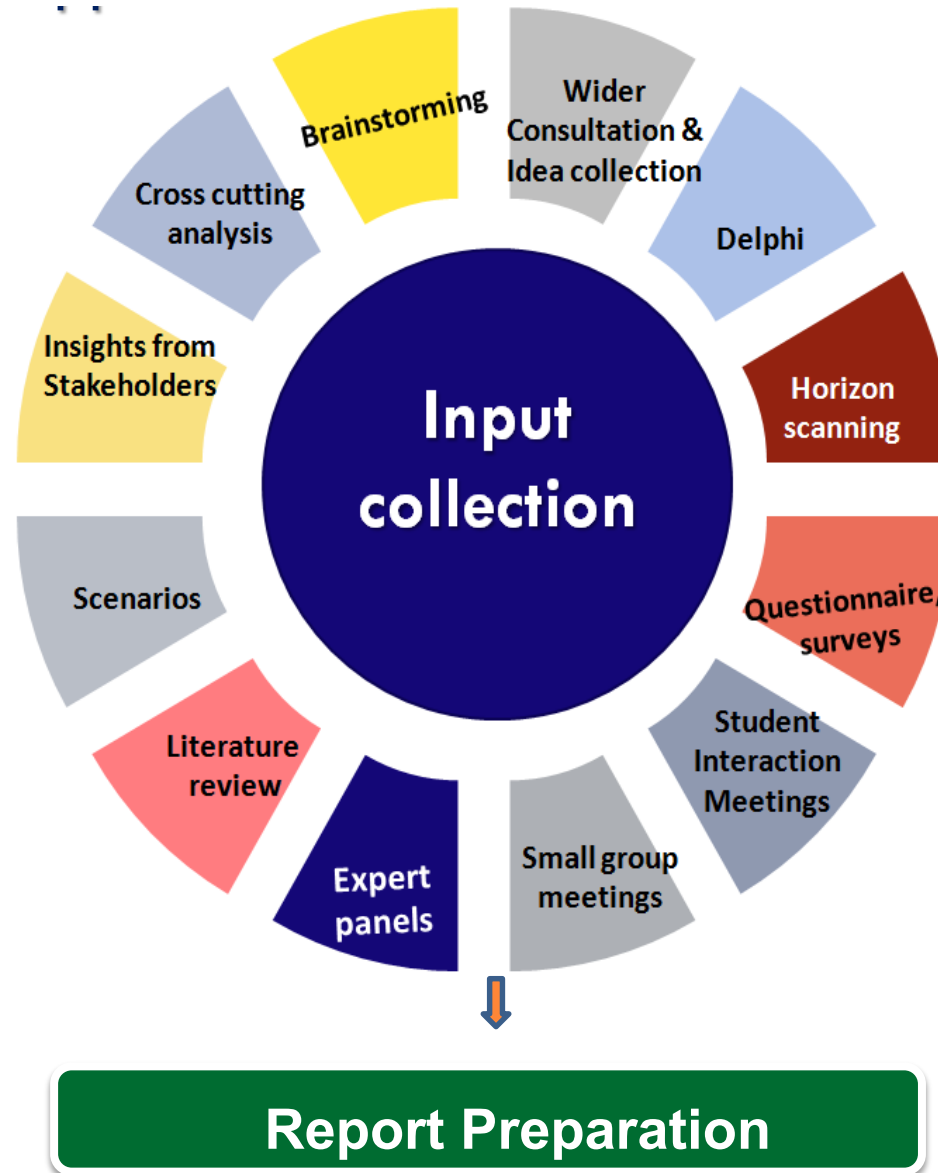
# S&T Approach Addressing Resurgence of COVID-19 (STAARC)



- Identified measures to control and arrest the pandemic proliferation with S&T perspective
- Addresses the pandemic from the perspectives of:
  - Clinical overview
  - Pharma, drugs and vaccine, their efficacy and availability
  - Medical Equipment and infrastructure.
  - Skill development
- Policy recommendations



# Foresight Techniques Used





# Technology prioritization process: MCDA technique

TECHNOLOGY SCORING SHEET					SUB THEME			
NAME:		ORGANIZATION:		DESIGNATION:		DATE:		
TECHNOLOGIES/APPROACHES ↓	Weightage (%) →		TECHNOLOGICAL FEASIBILITY	ECONOMIC FEASIBILITY	ENVIRONMENTAL FEASIBILITY	MANAGERIAL FEASIBILITY	SOCIAL ACCEPTABILITY	TOTAL
	Technology Score → (1 to 3 = Low; 4 to 6 = Moderate; 7 & 8 = High & 9 & 10 = Very High)		20	20	20	20	20	100
1	Mixed land use for ensuring efficient use of resources							
2	LIDAR & RADAR satellite: 3D/4-D Modeling for Urban flooding							
3	Thermal satellite technology: Land Surface Temp. (LST) & Urban Heat Island (UHI) for micro-climate							
4	GPS and DGPS technology for updating and precise location of land surface features, utility and service							
5	Total Station: Land management, surveying and updating of existing maps at various scales							

# Lessons learnt from past activities

## Lessons learnt:

- Foresight exercise should be linked with assessment of their efficacy on ground through demonstration for wide scale acceptability by the policy makers.
- Focus should be on short term foresight exercise than longer term.
- Involvement of related stakeholders since beginning of foresight exercise.

Thanks

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