



MAY 2025 EDITION

# INDUSTRY 4.0

4<sup>th</sup> INDUSTRIAL REVOLUTION

SECTOR SPECIFIC REPORT



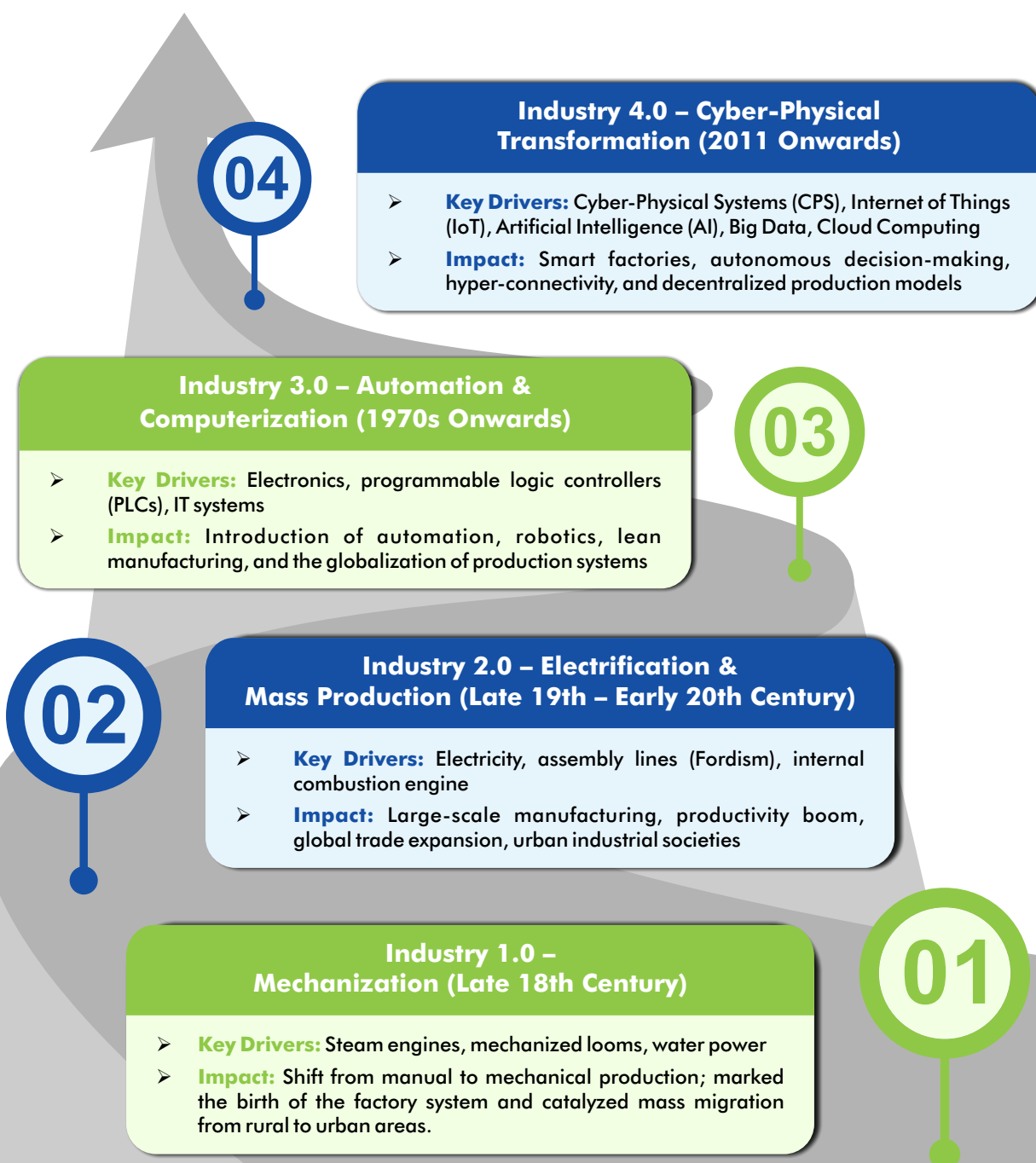


# Industrial Revolution

## **INDUSTRY 4.0: A PARADIGM SHIFT IN INDUSTRIAL EVOLUTION**

# BACKGROUND: EVOLUTION OF INDUSTRIAL REVOLUTIONS

The journey of industrial transformation has unfolded over four distinct phases, each redefining the relationship between technology, production, labor, and economic growth:



## GENESIS OF INDUSTRY 4.0

The term **“Industry 4.0”** was coined in 2011 at the **Hannover Messe (Germany)** as part of the country's high-tech strategy to future-proof its manufacturing sector. This initiative was led by a strategic think tank comprising:

- Henning Kagermann (former CEO of SAP)
- Wolfgang Wahlster (AI pioneer)
- Wolf-Dieter Lukas (science policy expert)

It was institutionalized by Germany's Federal Ministries for Education & Research (BMBF) and Economic Affairs & Energy (BMWi) under the banner of **“Plattform Industrie 4.0”**. The initiative aimed to position Germany as a leader in smart manufacturing and digital integration.

Since then, Industry 4.0 has grown into a global movement, with countries developing localized strategies to align their manufacturing and industrial sectors with future digital demands.

## WHAT IS INDUSTRY 4.0?

**Industry 4.0 refers to the integration of intelligent digital technologies into industrial systems to enable smart, automated, and connected production environments.** At its core, Industry 4.0 leverages cyber-physical integration, real-time data analytics, and AI-driven automation to optimize the entire value chain—from design and production to logistics and customer experience.

### STRATEGIC SIGNIFICANCE

#### RESILIENCE

Decentralized systems are more adaptable during disruptions.

#### EFFICIENCY

Real-time data improves productivity, energy use, and cost-effectiveness.

#### CUSTOMIZATION

Enables mass personalization at scale.

#### SUSTAINABILITY

Encourages resource efficiency and circular economy practices.

#### GLOBAL COMPETITIVENESS

Facilitates entry into international value chains.



# INDIA'S STRATEGIC RESPONSE: BUILDING A DIGITAL-INDUSTRIAL FUTURE

India has embraced the Industry 4.0 paradigm as a national imperative, linking it with flagship missions like Make in India, Digital India, and Atmanirbhar Bharat. Recognizing its potential to boost manufacturing competitiveness, skill development, and digital infrastructure, India has launched multiple targeted programs:

## 1. SAMARTH UDYOG BHARAT 4.0

- Implemented by the Ministry of Heavy Industries
- Focuses on:
  - i. Promoting adoption of smart manufacturing technologies (IoT, AI, CPS)
  - ii. Skilling the workforce through specialized centers
  - iii. Supporting MSMEs in accessing advanced technologies
- Centers of Excellence include:
  - i. C4i4 Lab Pune
  - ii. IIT Delhi – AIA Foundation
  - iii. Smart Manufacturing Cell at CMTI, Bengaluru
  - iv. IISc Bengaluru R&D Factory Platform
  - v. DHI CoE at IIT Kharagpur



## 2. DIGITAL INDIA (2015)

- Lays the foundation for digital infrastructure, governance, and citizen services
- Provides high-speed internet, mobile access, digital ID, and cloud-based platforms

## 3. MSME DIGITALIZATION DRIVE

- Supported through the SIRI and AIRI indices in collaboration with CII and INCIT
- Aims to evaluate and scale digital maturity among small and medium industries



## 4. BHARAT 6G MISSION

- Envisions next-gen telecom infrastructure to power hyper-connected Industry 4.0 applications
- Launch of the Bharat 6G Alliance (B6GA) to coordinate research and global collaboration



# STRATEGIC INITIATIVES & INNOVATION LANDSCAPE

Future of Innovation:  
Aligning Technologies with  
Tomorrow's Economy

Industry 4.0 Transforming  
Indian MSME Growth  
Landscape

India Showcased Its  
Digital Expression at  
WAVES 2025

YUGM Innovation Conclave  
Empowering Indian Youth  
for a Self-reliant India

6G Spectrum Technology  
Revolutionizing Industry  
4.0 Growth

Expert Insight:  
Mr Chandrakant Nayak





India is strategically aligning its technological advancements with the evolving demands of tomorrow's economy, emphasizing innovation to drive sustainable growth and global competitiveness. A cornerstone of this vision is the substantial investment in emerging technologies. **The Union Budget 2025 earmarked Rs 2,000 crore for the IndiaAI Mission**, a significant increase from the previous year's allocation.

This initiative aims to bolster AI research, develop sector-specific applications in healthcare, agriculture, and education, and establish AI Centres of Excellence in premier institutions. Complementing this, **the establishment of the IndiaAI Safety Institute underscores the government's commitment to ethical AI deployment**, ensuring technologies are developed with safety and inclusivity.



Source: <https://indiaai.gov.in/>

The infographic for the National Quantum Mission (NQM) features a blue and orange color scheme. At the top, it includes the Department of Science &amp; Technology logo, the 75th Azadi Ka Amrit Mahotsav logo, and the G20 India 2023 logo. The main title is 'National Quantum Mission (NQM) to scale up R&amp;D &amp; leverage India into a leading nation in the area'. Below the title, there are three orange boxes with icons of a computer monitor and keyboard. The first box states: 'NQM to seed, nurture and scale up scientific and industrial R&amp;D and create a vibrant &amp; innovative ecosystem in Quantum Technology (QT)'. The second box states: 'It targets developing intermediate-scale quantum computers with 50-1000 qubits in 8 years, quantum communication with complete quantum key distribution'. The third box states: 'Mission can provide a great fillip to invention of new products and services as well as create world class Start-ups, HRD and International Collaborations'. To the right of these boxes is a graphic of a laptop with various icons (laptop, camera, people, @ symbol, speech bubble, etc.) connected to it by lines, symbolizing a networked or digital ecosystem.

Source: <https://pib.gov.in/PressReleasePage.aspx?PRID=2111953>



Further, the **National Quantum Mission, backed by an allocation of Rs 6,003.65 crore, is strategically advancing India's position in quantum research.** With a deep focus on developing cutting-edge capabilities in quantum computing, communication, and sensing, India is establishing global technological leadership in the field. To nurture a robust innovation ecosystem, the government has introduced several initiatives.

The Anusandhan National Research Foundation Act 2023 seeks to streamline research across disciplines, promoting collaboration between academia, industry, and government agencies. Additionally, the Atal Innovation Mission continues to inspire young minds, with plans to establish 50,000 Atal Tinkering Labs in schools nationwide, fostering a culture of creativity and problem-solving from an early age. The government has strengthened its support frameworks, acknowledging the critical role of startups in fostering innovation.

**UNION BUDGET 2025-26**

**Investing in Public Education and Health**

- ▶ **50,000 Atal Tinkering Labs** to be set up in Government schools in next 5 years to cultivate spirit of curiosity and innovation, and foster scientific temper among young minds.
- ▶ **Broadband connectivity** to be provided to all Government secondary schools and primary health centres in rural areas, under Bharatnet project
- ▶ **Bharatiya Bhasha Pustak Scheme** to be implemented to provide digital-form Indian language books for school and higher education.
- ▶ **Day Care Cancer Centres** to be set up in all district hospitals in next 3 years, 200 Centres in FY 2025-26

Source: <https://pib.gov.in/PressReleasePage.aspx?PRID=2098380>

## SHAPING INDIA THROUGH TECHNOLOGY-DRIVEN INNOVATION



The Fund of Funds for Startups has been bolstered with an additional Rs 10,000 crore, focussing on deep-tech ventures. Moreover, tax incentives have been extended to startups incorporated before April 1, 2030, offering a three-year tax holiday and exemptions on capital gains, thereby encouraging entrepreneurship and investment in cutting-edge technologies. Through these efforts, India is fostering technological innovation and ensuring that such advancements are inclusive, ethical, and aligned with the broader socio-economic objectives.



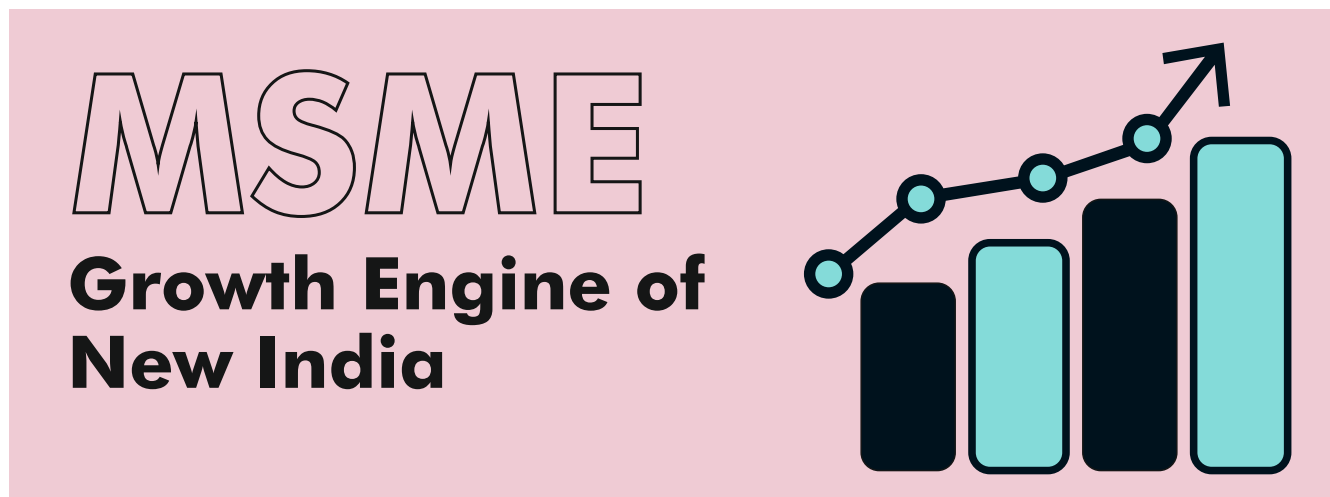
# INDUSTRY



**02**

## **INDUSTRY 4.0 TRANSFORMING INDIAN MSME GROWTH LANDSCAPE**

India's Micro, Small, and Medium Enterprises (MSMEs) are undergoing a transformative shift, propelled by Industry 4.0 technologies, automation, and supportive government policies. This evolution is enhancing their competitiveness and integrating them into global value chains.



Source: [https://financesaathi.com/news\\_details/dot-launches-industry-40-baseline-survey-to-propel-msmes-into-the-digital-age](https://financesaathi.com/news_details/dot-launches-industry-40-baseline-survey-to-propel-msmes-into-the-digital-age)

An important milestone is the strategic alliance formed between the International Centre for Industrial Transformation (INCIT) and the Confederation of Indian Industry (CII). This partnership aims to accelerate Industry 4.0 adoption among MSMEs by utilizing globally recognized tools like the Smart Industry Readiness Index (SIRI) and the Industrial AI Readiness Index (AIRI). The initiative focuses on digital transformation, cyber-physical systems, and capacity building, aligning with India's 'Make in India' and 'Atmanirbhar Bharat' missions.



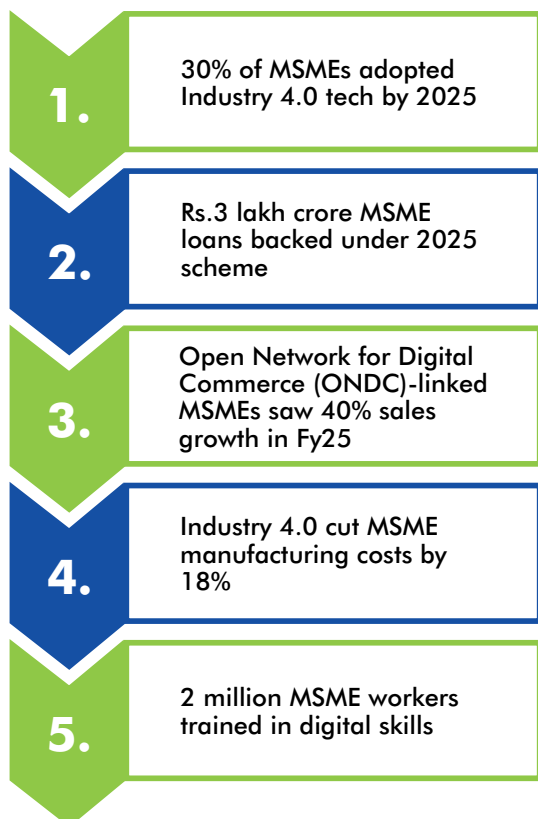
Source: <https://incit.org/en/newsroom/confederation-of-indian-industry-cii-and-incit-signed-strategic-cooperation-agreement-to-accelerate-industrial-transformation-in-india/>

**credit demand by FY21.** The report recommends revamping the Credit Guarantee Fund Trust for Micro and Small Enterprises (CGTMSE) scheme and stresses the need for better awareness and implementation of supportive policies at the state level.

Besides supporting these initiatives, **NITI Aayog's report, "Enhancing Competitiveness of MSMEs in India"**, outlines key reforms in financing, skilling, innovation, regulatory easing, and market access. The efforts highlighted **an increase in formal credit access for micro and small enterprises from 14% to 20% between FY 2020-FY 2024.** Despite such great progress, **formal financial institutions were meeting merely 19% of MSMEs' total**

The Union Budget 2025 strengthens support for MSMEs by updating the classification criteria, which increases investment and turnover limits. This reclassification enables a larger number of businesses to qualify for MSME benefits, promoting sustainable growth while ensuring continued access to government incentives. Additionally, the budget increases credit guarantee coverage, enhancing financial support for MSMEs.

### KEY STATISTICS



Digital integration remains pivotal. **The government's emphasis on Digital Public Infrastructure (DPI) aims to empower MSMEs through platforms like the Open Network for Digital Commerce (ONDC), enhancing data-driven market access, innovation, and operational efficiency.** Collectively, these initiatives signify a robust, future-ready framework for MSMEs to embrace Industry 4.0, fostering innovation, sustainability, and inclusive economic growth.



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# waves

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## **03 | INDIA SHOWCASED ITS DIGITAL EXPRESSION AT WAVES 2025**

**India took centre stage at WAVES 2025, hosted at Mumbai's Jio World Centre, by powerfully showcasing its digital capabilities in alignment with Industry 4.0.** The event focussed on the transformative impact of digitization in the creative economy, underscoring how technology and culture can converge to redefine global narratives. **This event emphasized the role of artificial intelligence, virtual production, and digital tools in content creation.**

India demonstrated how it is leveraging AI to support real-time storytelling, content localization, and immersive viewer experiences. Generative AI models and creative technologies were central themes, positioning India as a digital-first creative powerhouse. The summit saw **participation from over 500 global technology and media companies and drew more than 30,000 attendees across sectors. It also featured over 150 technology showcases,** demonstrating the breadth of digital transformation in India's creative industries.



Source: <https://ddnews.gov.in/en/waves-2025-govt-launches-indian-institute-of-creative-technology-to-boost-animation-gaming-and-digital-arts/>

**MEDIABRIEF**

**₹850 crore YouTube push; WPP reveals AI-driven content platform; UK-India cultural pact announced**

**WAVES**  
World Audio Visual & Entertainment Summit  
Connecting Creators, Connecting Countries

Source: <https://mediabrief.com/waves-2025-%E2%82%B9850-crore-youtube-push/>

A major highlight was the **announcement of Rs 850 crore in investment to boost India's digital creator economy**. This initiative aims to empower emerging digital talent, enhance digital infrastructure, and **support a growing ecosystem of over 80 million creators across India**. This move aligns with Industry 4.0 goals by promoting innovation, digital literacy, and data-driven content strategies.



Source: <https://mediabrief.com/adobe-backs-indias-creator-economy-at-waves-summit/>

The economic significance of WAVES 2025 was further underlined by the **success of the WAVES Bazaar, which facilitated business deals exceeding Rs 1,328 crores**. Additionally, the **signing of Memorandum of Understanding (MoUs) worth Rs 8,000 crores marked a strong step toward attracting investment in India's media and entertainment sectors**, reinforcing the nation's potential in the global creative economy.

#### KEY FACTS

AI-IoT integration for Industry 4.0 leadership showcased at WAVES 2025

Smart manufacturing with robotics and real-time analytics on display

Digital twin and blockchain driving autonomous industrial systems

Moreover, the **launch of the Indian Institute of Creative Technology (IICT)** reflected a commitment to skill development, for training over 100,000 students annually in digital arts, virtual design, and AI-based production techniques. WAVES 2025, thus, established India's vision for a tech-empowered future by integrating digitization and creativity to lead the fourth industrial revolution.





## 04 | YUGM INNOVATION CONCLAVE EMPOWERING INDIAN YOUTH FOR A SELF-RELIANT INDIA



The **YUGM Innovation Conclave**, held at **Bharat Mandapam in New Delhi**, marked a significant step towards realizing the vision of a self-reliant and innovation-driven India. The term '**YUGM**,' meaning '**confluence**' in **Sanskrit**, describes this meeting of government officials, academia, industry leaders, and research professionals, united in advancing future technologies for a developed nation.



Source: <https://www.newindianexpress.com/nation/2025/Apr/29/pm-modi-outlined-significance-of-new-education-policy-at-conclave-in-delhi>

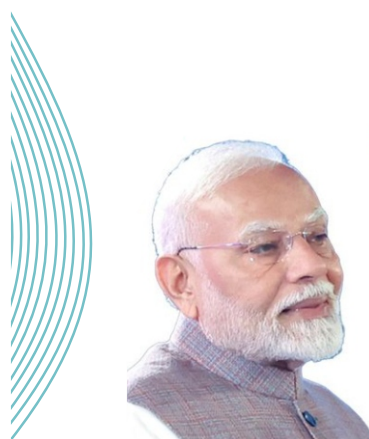
The conclave emphasized the importance of empowering youth with skills to position India as a global innovation hub. It has highlighted the **modernization of the country's education system**, citing the **national-level implementation of the New National Education Policy (NEP) 2020**. It has been further empowered by the **National Curriculum Framework**, and **AI-based digital education platforms** like '**One Nation, One Digital Education Infrastructure**' under **PM e-Vidya** and **DIKSHA**.



Source: <https://english.metrovaartha.com/news/national/govt-working-on-modernising-education-system-pm-modi>

The **launch of Superhubs at IIT Kanpur and IIT Bombay**, dedicated to **AI & Intelligent Systems** and **Biosciences, Biotechnology, Health & Medicine**, was also launched during the conclave. Additionally, the **Wadhvani Innovation Network (WIN) Centres** were introduced to drive research commercialization, and a partnership with the **Anusandhan National Research Foundation (ANRF)** was formed to jointly fund late-stage translation projects, thereby promoting research and innovation.

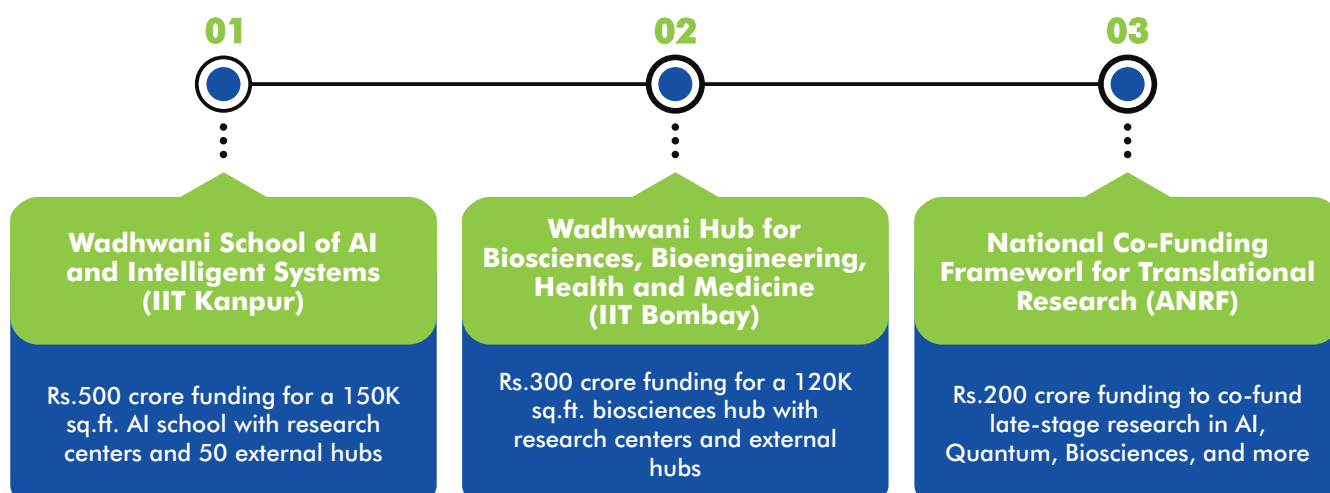
The conclave also featured a **Deep Tech Startup Showcase**, highlighting innovations from across India, and facilitated roundtables and panel discussions aimed at fast-tracking the translation of research into impactful solutions. These efforts align with the national initiative of 'Viksit Bharat @2047,' aiming to democratize innovation access across institutions and foster a national innovation alignment.



“  
Talent,  
Temperament और  
Technology की  
Trinity ही  
भारत के भविष्य को  
Transform  
करेगी।

Source: <https://ddnews.gov.in/en/indias-future-lies-in-the-trinity-of-talent-temperament-and-technology-pm-modi/>

## DETAILS OF MOUS



This conclave underlined the 'Troika' of Talent, Temperament, and Technology as a vital foundation for shaping India's future transformation. The importance of completing the journey from idea to prototype to product in the shortest time possible was underscored, aligning with India's goal of accelerating technological development. It stands as a testament to India's commitment to nurturing the country's youth and fostering an environment conducive to innovation that can pave the way to a self-reliant and technologically advanced nation.



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# 05 | 6G SPECTRUM TECHNOLOGY REVOLUTIONIZING INDUSTRY 4.0 GROWTH



India is poised to revolutionize Industry 4.0 through the deployment of 6G spectrum technology, to become a global leader in next-generation telecommunications by 2030. The Department of Telecommunications (DoT) has launched the Bharat 6G Mission, structured in two phases: Phase 1 (2023–2025) focuses on research and development, while Phase 2 (2025–2030) targets deployment and commercialization.



Source: <https://government.economictimes.indiatimes.com/news/technology/prime-minister-modi-unveils-bharat-6g-vision-document-launches-6g-research-and-development-testbed/98912537>

The Bharat 6G Vision emphasizes affordability, sustainability, and ubiquity of communication technologies, aligning with the national goal of Atmanirbhar Bharat. It aims to create, implement, and expand 6G network technologies that ensure widespread, smart, and secure connectivity to enhance the overall quality of life.



Source: <https://government.economictimes.indiatimes.com/news/technology/bharat-6g-alliance-launched-to-drive-innovation-collaboration-in-next-gen-wireless-technology/101470772>

To facilitate this vision, the **Bharat 6G Alliance (B6GA)** has been established, bringing together industry leaders, academia, and research institutions. The alliance aims to foster innovation, develop indigenous technologies, and contribute to global standardization efforts. B6GA has also **signed Memorandum of Understanding (MoUs) with international organizations to enhance global collaboration in 6G technology development.** The **Telecom Technology Development Fund (TTDF)** scheme, launched by DoT in 2022, allocates 5% of annual collections from the **Universal Service Obligation Fund** to support research and development in telecom technologies.





Source: <https://www.india.gov.in/spotlight/universal-service-obligation-fund-usof>

This initiative aims to bridge India's digital divide with the help of developing and manufacturing state-of-the-art technologies by fostering synergies among academia, start-ups, research institutes, and the industry. Within the framework of Industry 4.0, 6G technology is anticipated to transform multiple sectors. In healthcare, it holds the potential to facilitate remote surgeries and enable continuous, real-time patient monitoring. In agriculture, smart farming practices could be enhanced through precise data analytics. Defence and internal security could benefit from improved surveillance and communication systems.

### KEY FACTS & STATISTICS

<b>India's 6G Vision Timeline</b>	<ul style="list-style-type: none"> <li>▶ Bharat 6G Mission launched in 2023</li> <li>▶ Targeting commercial deployment by 2030</li> </ul>
<b>R&amp;D Investment via TTDF</b>	<ul style="list-style-type: none"> <li>▶ 5% of Universal Service Obligation Fund allocated for 6G R&amp;D</li> <li>▶ Focus on indigenous innovation and manufacturing</li> </ul>
<b>Ultra-Low Latency &amp; Speed</b>	<ul style="list-style-type: none"> <li>▶ 6G to offer latency &lt; 1 millisecond</li> <li>▶ Projected speeds up to 1 Tbps (Terabit per second)</li> </ul>
<b>Expected Economic Impact</b>	<ul style="list-style-type: none"> <li>▶ 6G-enabled Industry 4.0 could add \$1.5 trillion to India's GDP by 2035</li> </ul>
<b>Smart Manufacturing Integration</b>	<ul style="list-style-type: none"> <li>▶ 80% of Indian manufacturing units to adopt IoT and 6G connectivity by 2030</li> </ul>
<b>Bharat 6G Alliance Participation</b>	<ul style="list-style-type: none"> <li>▶ 100+ institutions and 200+ startups on boarded under B6GA as of 2024</li> </ul>
<b>Global Collaboration</b>	<ul style="list-style-type: none"> <li>▶ India signed MoUs with Korea, Japan, and the EU for 6G standardization</li> </ul>

As India progresses towards its 6G goals, collaborative efforts between the government, industry, and academia will be essential. By investing in research, infrastructure, and skill development, India aims to not only meet domestic needs but also contribute significantly to the global 6G landscape.



## 06 | EXPERT INSIGHT



"Industry 4.0 offers significant outcomes for the chemical industry. However, after all these years – we have understood that technology is not 'one-size-fits-all.' India must develop its own smart manufacturing plants that can particularly address the economic challenges. It provides an opportunity to create a level playing field for large, medium, and small companies through regulation, innovation in a responsible manner, and creating value that makes India a competitive market for the world".

**Mr Chandrakant Nayak**  
**CEO & Country President**  
**Dow India**

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