



# Madhya Pradesh Science, Technology & Innovation Policy 2022 (MPSTIP 2022)

Department of Science & Technology  
Government of Madhya Pradesh



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# Table of Contents

1. Introduction	5
1.1. Vision	5
1.2. Objectives	5
2. Policy Focus Areas	7
2.1. Building a Science, Technology, and Innovation Ecosystem	7
2.1.1. Creating an ecosystem	7
2.1.2. Strategic actions for the STI ecosystem	7
2.1.3. Making science engaging and fun	8
2.1.4. Follow-up policies for building the STI ecosystem	10
2.1.5. Leverage learnings from technology initiatives and success stories:	11
2.2. Research and Development	11
2.2.1. R&D focus sectors	11
2.2.2. R&D Expenditure	11
2.2.3. R&D Incentives	12
2.2.4. R&D for traditional knowledge, heritage, and grassroots innovation	12
2.2.5. R&D for climate change and clean energy	12
2.2.6. Goals and policy targets for R&D	13
2.3. Capacity Building and Skill Development	13
2.3.1. Strategic actions for capacity building	13
2.3.2. Centre of Excellence (CoE) for STI	14
2.3.3. Goal and policy targets for capacity building	14
2.4. Leveraging STI for Good Governance	14
2.4.1. Artificial Intelligence and Data Analytics	15
2.4.2. 5G	15
2.4.3. Internet of Things (IoT)	15
2.4.4. Blockchain	15
2.4.5. Drones	15
2.4.6. Augmented Reality/Virtual Reality	16
2.4.7. Quantum Computing	16
2.4.8. Robotics	16



2.5. Data for STI ecosystem	16
2.5.1. Data for Innovation	16
2.5.2. Data for Policy Making	17
2.5.3. Data for Better Governance	17
2.5.4. Data for Inclusion	17
2.5.5. Unlocking the value of data	17
2.5.6. Data Protection	17
2.6. Collaboration with Institute of Excellence	17
<b>3. Policy Implementation Framework</b>	<b>18</b>
3.1. Financing framework	18
3.2. Governance framework	18
3.3. Policy Period and Interim Review	18
<b>Annexures</b>	<b>19</b>
A.1. Annexure-I	19
Madhya Pradesh technology initiatives and success stories	19
A.2. Annexure-II: Potential Use Cases of Emerging Technology	20
Potential Use Cases of Artificial Intelligence and Analytics	20
Potential Use Cases of Blockchain	21
Potential Use Cases of Drones	22
A.3. Annexure III – Glossary	23



# 1. Introduction

India is celebrating Azadi ka Amrit Mahotsav to mark its 75th anniversary of independence. The second most populous nation has grown steadily in the last few years to become the fifth largest economy on earth. Banking on its demographic dividends, India has confidently proclaimed its target of becoming a \$5 trillion economy by 2025-26.

Madhya Pradesh is striving hard to enhance its contribution in national GDP. The State has set a GSDP target of \$ 550 Bn and crafted an Atmanirbhar Madhya Pradesh roadmap to achieve this. State's domestic output was approximately Rs. 11.69 lakh crores in FY22, and it has grown at an annual growth rate of approximately 12.57% over the period FY2019-FY2022.<sup>1</sup> With its abundant natural resources and industrial infrastructure, it has the potential to accelerate its growth - given the right mix of government policy and investment.

Science, technology, and innovation play a significant role in driving economic growth, job creation, social development and good governance and are the key drivers behind productivity growth, which delivers greater economic output and returns. The pace of technological innovation and the emergence of new technologies have presented possibilities for a reassessment of growth avenues and embarking on new policy initiatives.

This policy aims to promote research, scientific temper, use of new technologies and innovation to develop a vibrant innovation ecosystem in Madhya Pradesh. This will enable citizens, enterprises, and government to contribute, collaborate and innovate towards a prosperous Madhya Pradesh. The policy will also emphasize the promotion of traditional knowledge systems, development of indigenous technologies, and innovation at the grassroots level to align with the national goal of 'Atmanirbhar Bharat'.

## Vision

The "Madhya Pradesh Science, Technology, and Innovation Policy – 2022" (MPSTIP–2022) envisions building scientific temper in society, strengthening the innovation ecosystem, fostering Science & Technology (S&T) enabled entrepreneurship and citizen services, preserving traditional knowledge systems, and encouraging inclusion and participation of the grassroots levels in the research and innovation ecosystem.

## Objectives

The "Madhya Pradesh Science, Technology, and Innovation Policy – 2022" (MPSTIP) has the following objectives:

- i. To position Madhya Pradesh as the top science, technology, and innovation (STI) destination.
- ii. To position Madhya Pradesh amongst the top 5 states in the 'India Innovation Index' by 2030 (from its

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<sup>1</sup> Estimates based on Reserve Bank of India, "Handbook of Statistics on Indian Economy", available here: <https://www.rbi.org.in/scripts/PublicationsView.aspx?id=21102>



existing 13th rank), through improvement in identified ‘innovation enablers’ such as human capital, investment, and knowledge workers.<sup>2</sup>

- iii. To build a vibrant STI ecosystem that will help Madhya Pradesh increase its knowledge output in terms of indicators such as – research publications, new businesses, startups, grassroots innovations, industrial designs filed, and patents filed.
- iv. To increase the state’s overall expenditure on science and technology and increase the private sector’s expenditure on R&D in the state.
- v. To foster a spirit of healthy competition amongst academic and research institutions of Madhya Pradesh and provide incentives for getting reputed national and international science and technology awards such as the ‘Shanti Swarup Bhatnagar Award for Science and Technology (SSB)’.
- vi. To promote STEM education, especially amongst girls, right from the primary level by enriching the curriculum with STEM experiments and competitions. The target would be to increase the enrolment ratio in STEM courses at UG, PG and PhD levels.
- vii. To develop a model framework to conserve and promote the Traditional Knowledge Systems through scientific validation and appropriate commercialization.
- viii. To keep the innovations connected to grassroots needs.
- ix. To promote innovation-led growth across economic sectors like agriculture, healthcare, education, mining, energy, and infrastructure, and create the necessary R&D and innovation infrastructure required for private enterprises to drive growth in these sectors.
- x. To leverage emerging technologies for building proactive, efficient, and transparent G2C and G2B systems which would anticipate people’s needs and deliver services at their doorstep.
- xi. To move up in the skilling value-chain by creating world-class human resources in new and emerging technologies such as Metaverse, Quantum Computing, 5G, Semiconductors, IoTs, Blockchain & Distributed Ledger Technologies, AI, and AR/VR.
- xii. To harness the power of data in promoting an open, privacy-preserving, and responsible innovation ecosystem for startups. The vast repository of government data can be leveraged for creating an accessible sandbox environment.
- xiii. To foster national and international linkages for enhanced technology transfer to facilitate the acquisition, adoption, and utilization of emerging technologies.

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<sup>2</sup> The India Innovation Index presents state-wise rankings based on the innovation landscape and performance of the country’s states and union territories. The five innovation index enablers are – human capital; investment; knowledge workers; business environment; safety, and legal environment.



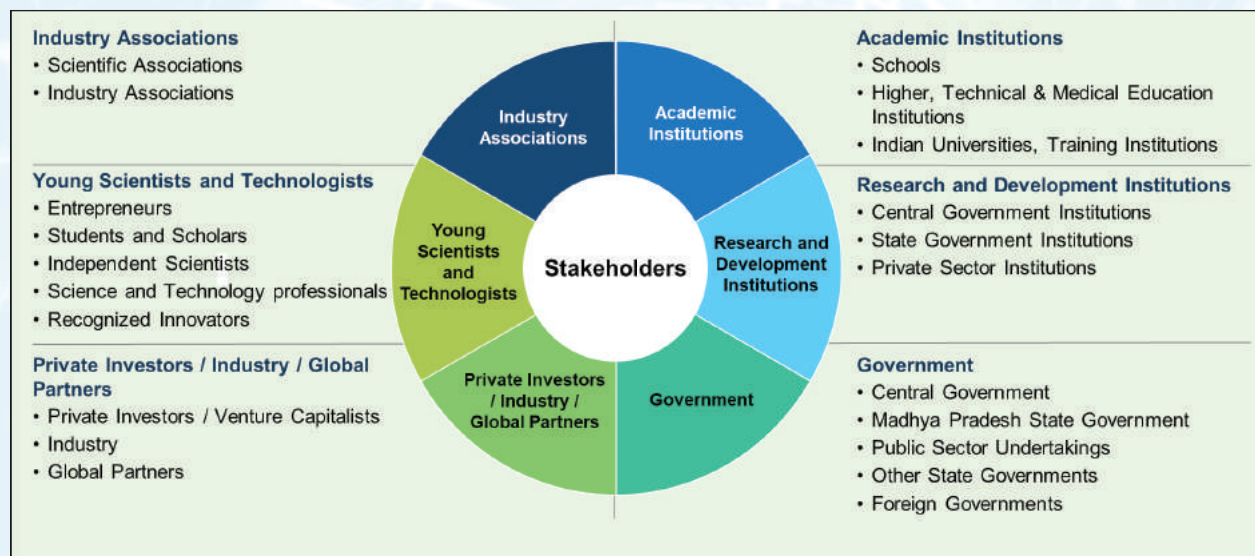
## 2. Policy Focus Areas

The MPSTIP 2022 policy will focus on the following broad areas to achieve its objective and deliver on its vision.

### 2.1. Building a Science, Technology, and Innovation Ecosystem

#### 2.1.1. Creating an ecosystem

This policy would aim to create a robust ecosystem to provide a common forum for knowledge sharing, collaboration, funding, and innovation for stakeholders from industry, academia, startups, scientific bodies, society, and the government, which will serve as a hub for the implementation of STI initiatives. The aim is to strengthen multi-stakeholder collaboration for knowledge creation and innovation.



#### 2.1.2. Strategic actions for the STI ecosystem

- i. Establish an “Innovation Promotion Group” (IPG) with key stakeholders from different groups and regions to serve as a central node of the innovation ecosystem and act as its foremost driver.
- ii. Targeted initiatives at the school level to stimulate interest in science and math from an early stage and induce students to pursue STEM subjects at the senior-secondary and undergraduate levels. Initiatives will include – experimental science programs; establishment of science laboratories; exciting math and science competitions at block, district, and state levels; establishing a ‘young scientist’ award for every district; innovation challenges with reward incentives; science and mathematics exhibitions throughout the state especially in rural areas; and opportunities for school students to meet stakeholders from academia and industry to seek guidance and showcase experiments/ideas.
- iii. Engage the top institutes (IITs, IIMs, AIIMs, NITs, IIITs, NIDs, NIFTs) and encourage each one of them to adopt a district of MP for promoting locally relevant innovation and science education in that district.





- iv. Establishment of innovation clusters, incubators, and accelerators in institutions (such as IIT, IIIT, etc.) and as stand-alone bodies to – (i) help early-stage startups gain seed funding, mentorship, training, and leverage industry-best practices through interaction with private players; (ii) promote innovation, and exchange of ideas and experiences, through seminars, conferences, and meetups.
- v. Establish a ‘State Innovation Fund’ for promoting innovation and excellence in the functioning of government. It could also be used for viability gap funding for startups which work towards creating digital public goods.
- vi. Target to increase the number of recognized startups and incubation centres in MP and ultimately increase MP’s knowledge output – a performance indicator in the India Innovation Index that is derived from indicators such as grassroots innovations; publications; new businesses, startups, industrial designs filed, patents filed, etc. – all of which will get a fillip through the ecosystem.
- vii. Mentorship forums to facilitate student interaction with the larger stakeholder group (R&D group, academia, industry representatives) to help students understand the opportunities and requirements in STEM fields from an early stage.
- viii. Establish an appropriate ecosystem in academic and research institutions to commercialize their research and products.
- ix. Develop a platform to facilitate collaboration and convergence between National and State level Academic and R&D Institutions.

### 2.1.3. Making science engaging and fun

This policy aims to re-introduce science to students, and society at large, by making it meaningful, engaging, collaborative and hands-on. The goal is to foster appreciation and wonder for scientific principles, and, in turn, give rise to an inquisitiveness about science and technology, a yearning for learning science, and inspire both students and young adults to participate in this envisaged transformation.

- i. An online student-science platform will be set up by the Government of MP which will serve as central science and technology repository for students and young adults in the state. The platform will host content for initiatives which will be developed through public-private partnerships, such as:
  - a. Science experiments for students with videos, guides, and kits.
  - b. Rich animated multimedia content will be developed to explain scientific concepts in an engaging story-telling manner.
  - c. Information about science fairs, state-level innovation challenges, competitions, and meetups.
  - d. Student grants for small-scale experiments.
  - e. Science scholarships for pursuing science and technology courses as well as courses on online platforms.
  - f. Scholarships for short-term exchange programs with universities in India and outside India to pursue STEM courses.
  - g. Repository of careers in science and technology.



- h. Internship or shadow opportunities for young adults in industry, university labs, R&D labs, and startups.
  - i. Science challenges with a local context to guide students to think about solving regional challenges and problems.
  - j. Information about all centres of scientific and creative learning in the state.
  - k. Access to Indian and global content on science – including video series, documentaries and learning content.
  - l. Emerging technology resources such as online courses and repository of use cases.
  - m. Forum for industry and private sector outreach for their science and technology-related CSR activities and R&D initiatives.
- ii. A centre for creative learning will be set up in collaboration with leading education institutes (such as IIT, NIT, IIIT, etc.). This centre will work as a resource for hands-on experiential learning as opposed to the typical reading-based pedagogical approaches prevalent in the education system. The centre will promote conceptual learning based in exciting science experiments and will onboard professors, and college students and provide opportunities for high-school students to get involved through internships, workshops, competitions, etc.
- iii. A ‘Science Park’ will be planned to create an educational and recreational science centre steeped in all-things science for students as well as tourists. The science park will host several attractions and initiatives, such as:
- a. A Science Museum, containing:
    - Thematic galleries showcasing science concepts and innovations (aviation, space, biology, genetics, natural ecosystems, climate, etc.)
    - ‘Science Inventions Gallery’ showcasing the history of the world’s greatest scientific inventions.
    - An ‘Exploratorium’ showcasing interactive science experiments.
    - A planetarium which will host astronomy programs and organize stargazing events.
  - b. An emerging technology exhibit demonstrating case studies capturing innovative emerging technology applications for local problem-solving.
  - c. ‘Traditional and modern Indian scientific exhibit’, which will showcase themes from India’s rich scientific legacy and modern-day achievements including – scholars and scientists and their contributions from ancient times till the present; India’s traditional sciences such as Ayurveda; India’s modern successes and achievements such as India’s space program.
  - d. A state-of-the-art theatre to showcase science films; documentaries; stream science events (for example satellite, rocket launches, etc.); and host science talks and seminars.
  - e. A ‘Coding lab’ that will run “Learn to Code” courses and exciting activities and provide certifications to students in collaboration with the private sector.
  - f. A “Curiosity Lab” will be established that will partner with the private sector and academia to develop new science experiments and immersive experiences; encourage students to build science



models and build and maintain an application to create a community of curious scientists.

- iv. Science-based tourism will be promoted to inspire interest in sites of scientific importance:
  - a. Identification and development of potential Astro-tourism sites (like the Ujjain planetarium, Dongla observatory and the proposed Mandu Astro-park)
  - b. Development and conservation of archaeological sites, monuments, and spiritual heritage sites in collaboration with UNESCO and initiatives to showcase Madhya Pradesh's architectural scientific heritage.

#### 2.1.4. Follow-up policies for building the STI ecosystem

The MPSTI policy would have the maximum impact when it is supported by government initiatives on both sides of the innovation ecosystem curve – the demand side as well as the supply side. The key interventions on the demand side would be to promote investment in IT and electronics manufacturing and support tech entrepreneurship. From the supply side, the government would need to facilitate the development of high-quality human resources and create a thriving open data ecosystem. To achieve this, it is proposed to bring out government policies in the following four sectors -

- i. **Madhya Pradesh Electronics and Information Technology (IT) policy (MPEIT)**

The government aims to promote investment in IT and electronics manufacturing to increase innovation-driven manufacturing and industrial activity; increase the share of manufacturing in MP's GSDP and deepen the STI ecosystem through the upstream and downstream linkages that increased manufacturing activity will generate. To achieve this, the state government launched the "Madhya Pradesh IT, ITeS & ESDM Investment Policy and Scheme, 2016". This has been amended over time to maintain MP as an important investment destination in this sector. The policy will be reviewed and augmented to make MP among the most important investment destinations in the IT, ITeS & ESDM sector.

The policy will also aim to support investment in strategic sectors like semiconductor, data centers and green hydrogen. Policies for these sectors would be closely aligned with National Policies like India Semiconductor Mission (ISM) and National Hydrogen Mission (NHM) of Government of India.

- ii. **Madhya Pradesh Technology Startup Policy (MPTSP)**

Madhya Pradesh has a nascent and vibrant startup ecosystem, with thousands of DPIIT recognized startups. To enable this ecosystem to grow, thrive and lead the innovation-revolution from the front, the government would aim to provide special fiscal and non-fiscal incentives and schemes for startups. To bolster the Madhya Pradesh Startup policy 2022, which focuses on MSME-led growth, the government will promote startups in service/technology sectors – such as FinTech, HealthTech, EdTech, logistics, and other consumer services, and design schemes to support seed funding; reduce compliance costs; support patent-funding, and ease local procurement, all of which will help startups to focus on their business models and profitability.

- iii. **Madhya Pradesh Skill Policy (MPSP)**

The STI ecosystem will grow and sustain through increased inclusion and participation of skilled labour, who will form the backbone of innovation-led growth in the state. To ensure that the youth of MP are market-ready and equipped to take on the challenges of the tech-world, a policy will be designed to encourage increased interaction of industry and education institutes and promote –



industry and association feedback (such as NASSCOM, BFSI Council, IAMAI) in curriculum design and identification of industry relevant courses; addition of skill-based learning to help final year students of degree/diploma courses to be job-ready; access to online and other courses focusing on emerging technologies, etc.

iv. Madhya Pradesh Data Policy (MPDP)

A data policy would be needed to leverage and unlock the value of data; derive analytical insights for research and product development; identify target areas for innovation-funding and support the data-requirements of the start-up ecosystem. Towards this end, this policy will aim to make government databases accessible. To ensure data privacy, the government would also take appropriate steps for data anonymization and masking.

v. Madhya Pradesh R&D Policy (MPRDP)

R&D develops new knowledge, technology and techniques and hence acts as a major driver of innovation which in turn leads to sustainable economic growth of a society. This policy will strive to provide a conducive environment to promote the role of the private sector in R&D and create a support system for R&D activities.

### 2.1.5. Leverage learnings from technology initiatives and success stories:

The government of Madhya Pradesh has taken several initiatives in the past to leverage technology solutions for better governance and innovation-led development and growth. MP is among the first states to link crop insurance registration with land records and use satellite images and remote sensing models for crop-advisory patterns and yield estimation for insurance payments. Other key initiatives of the government include – Food Innovation Hub Platform in collaboration with WEF; CM Helpline and Samadhan portal; Samagra portal; and face recognition model to support the Sarthak application. Further details of MP's success stories can be found in Annexure-I. This policy will also aim to encourage engagement of start-ups and industry for improvement of e-governance initiatives of the government.

## 2.2. Research and Development

Research and development in the science and technology sector is crucial for achieving the vision and objectives laid out in this policy. This policy recommends a variety of R&D initiatives:

### 2.2.1. R&D focus sectors

This policy aims to promote R&D to deliver innovation in sectors like biotechnology, agriculture, renewable energy, fintech, water conservation, climate change, infrastructure and logistics to drive economic growth for the state and the country. Strategic sectors like semiconductor and green hydrogen would also be a priority while promoting R&D investment in the state.

### 2.2.2. R&D Expenditure

The state government recognizes that there is a need to step up expenditure on R&D and encourage private enterprises to increase their investment in R&D activities. Private investment in R&D, with the right incentives, will deliver productivity growth for the companies and make them more competitive, and deliver direct and indirect economic and human capital benefits for Madhya Pradesh through economic linkages. The government will also earmark funds for focused R&D in areas like FinTech, Robotics, MedTech, clean energy and green hydrogen, among others.



### 2.2.3. R&D Incentives

The policy aims to set up a framework to provide incentives to the private sector for R&D investment in the state. These incentives will be in the following areas –

- i. The government will provide incentives for private companies that will set up R&D labs in the state.
- ii. A portion of the cost incurred for R&D for patents, trademarks, industrial designs, and GI marks will be covered by the government.

### 2.2.4. R&D for traditional knowledge, heritage, and grassroots innovation

This policy will focus on promoting traditional knowledge and heritage as well as indigenous grassroots innovation. Towards this end, the government will –

- i. Promote initiatives to digitize indigenous art using advanced technology and create digital products (such as Non-Fungible Tokens).
- ii. Promote the use of blockchain to authenticate indigenous art and help artists build their portfolio and claim recognition.
- iii. Promote the use of multimedia approaches such as VR and AR for the dissemination of cultural heritage and transform the way culture is experienced.<sup>3</sup>
- iv. A state-level ‘Traditional Knowledge Repository’ will be developed in line with TKDL, which will seek to document, validate, and promote traditional knowledge, tribal medicines, and practices.
- v. Government departments such as AYUSH, MFP-PARC, and Science & Technology will jointly take initiatives to organize workshops on primary and secondary processing of medicinal and aromatic plants to provide farmers with an alternate income source.
- vi. Develop necessary R&D infrastructure in HEIs to facilitate collaboration of AYUSH and modern scientific technologies (like Bioprospecting, Biochemical testing, composition analysis, nanotechnology, functional genomics, and proteomics-based research etc.) to identify the commercial potential of indigenous herbs and traditional knowledge and protect potential discoveries through suitable Intellectual Property Rights (IPRs).
- vii. Development of a Traditional Medicine incubator to help startups working on medicinal plant-based product development and provide them with seed funding for R&D work.

### 2.2.5. R&D for climate change and clean energy

The prospect of decarbonizing and achieving net zero emissions is one of the most pressing challenges facing the global economy at the present time. The government of MP aims to promote clean energy, green hydrogen, and climate-tech initiatives in its efforts towards sustainable development and the use of advanced technology solutions – such as AI, blockchain, connected devices, biotech, etc. – to meet climate change challenges. Investment in areas such as – the development of electric vehicles; precision

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<sup>3</sup> Bekele MK, Pierdicca R, Frontoni E, Malinverni ES, Gain J. A survey of augmented, virtual, and mixed reality for cultural heritage. J Comput Cult Herit. 2018;11:1–36.



farming for lower GHG emissions; biotechnology in food production; establishment of renewable energy departments in universities – will be encouraged through appropriate initiatives and incentives for the private sector.

### 2.2.6. Goals and policy targets for R&D

With the efforts of this policy towards R&D, and with the aspiration to increase the MP's ranking in the Innovation Index, the state will aim to achieve the following targets -

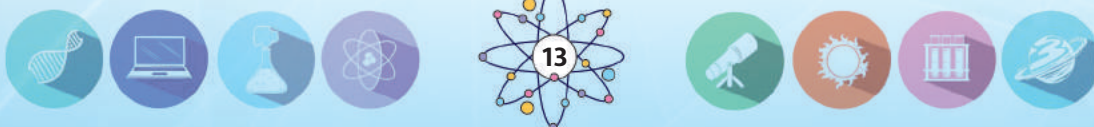
- i. Increase expenditure on higher and technical education and expenditure on R&D.
- ii. Increase research activities like publications, patents, copyrights, consultancy activities that will help in raising the NIRF ranking of the institutes within MP by 2025.
- iii. Increase in knowledge-intensive employment.
- iv. Increase in the number of private R&D units in the state.
- v. Increase in the number of R&D Institutions funded by the state.
- vi. Increase the number of incubators (especially tech incubators) significantly by 2030.
- vii. Increase the number of grass root innovations and provide support to develop minimal viable products (MVP) and profitable business models.
- viii. Increase in the number of DPIIT-recognized startups in the state by 2030.
- ix. Increase in the number of patent applications filed in the state.
- x. Increase in the number of trademark applications filed.
- xi. Increase in the number of designs in industrial design applications filed.

## 2.3. Capacity Building and Skill Development

The government will have substantial focus on building human capital to achieve the objectives of the policy.

### 2.3.1. Strategic actions for capacity building

- i. Partner with education institutes and private enterprises to set up innovation centers in schools and universities. Initiatives will be taken to prepare course curriculums to ensure that students enrolled in these centers can pursue courses that add skill for R&D roles or emerging technology-related roles in the industry.
- ii. Earmark funds to provide additional grants and scholarships to those pursuing R&D in universities and R&D labs set up by the private sector.
- iii. Facilitate identification of frontier research areas for PhD students in science and technology and promote enrollment and research in these areas by providing incentives.
- iv. Promote the establishment of Master of Science (Research) (MRes) programs in STEM courses with the possibility of movement to PhD-track to encourage research-oriented knowledge output and mindset at the master's level.



- v. Promote knowledge-sharing and provide financial support for organizing seminars and conferences within the STI ecosystem to enable multi-stakeholder discussions and industry-academia collaborations.
- vi. Encourage science and technology departments at universities to partner with the private sector to create online courses in STEM fields and set up mechanisms for providing this content to students across the state.
- vii. Promote collaboration with universities abroad and arrange short to medium-term term professor visits to teach courses at universities in the state.
- viii. Initiate special programs to impart digital skills and awareness to citizens to make at least one person digitally competent in every household.
- ix. Courses in the emerging areas of life sciences, geo-spatial technologies, AR/VR, AI/ML, IoT, data science, semiconductors, robotics, renewable energy technology and drone technologies etc. will be introduced in polytechnic courses.

### 2.3.2. Centre of Excellence (CoE) for STI

A center of excellence (CoE) for emerging technologies in collaboration with the private sector will be set up in the state to encourage innovation in key sectors and provide human capital support to MSMEs for leveraging technology for their businesses. The proposed centers will host subject matter experts from the industry; host programs for businesses and startups; create knowledge products to support MSMEs and startups and serve as a hub for assistance – relating to business, technology, procedure, funding, etc. – for all stakeholders.

### 2.3.3. Goal and policy targets for capacity building

With the efforts of this policy towards capacity building and skill development, the government will aim to achieve the following targets:

- i. Increase enrolment in PhD programs.
- ii. Increase enrolment in engineering and technology courses (at undergraduate, postgraduate, and diploma levels).
- iii. Increase the number of higher education institutions with National Assessment and Accreditation Council (NAAC) grade A and above.
- iv. Increase the number of colleges connected through National Mission on Education through Information and Communication Technology (NMEICT).
- v. Increase enrollment in vocational education courses.
- vi. Increase enrollment in professional skill development courses.

## 2.4. Leveraging STI for Good Governance

India is ready for emerging technologies such as blockchain, drones, artificial intelligence, the internet of things, augmented reality, virtual reality, robotics, etc. These are going to play a crucial role in government and industry alike, whether it is planning or decision-making; accelerating development or analyzing deployment, problem-solving or product development; discovering new trends or drawing out correlations. Madhya Pradesh aims to be a leader in leveraging STI in good governance. A few of these technologies are discussed in this section.



#### 2.4.1. Artificial Intelligence and Data Analytics

AI is poised to disrupt our world. With intelligent machines enabling high-level cognitive processes like thinking, perceiving, learning, problem solving and decision making, coupled with advances in data collection and aggregation, analytics and computer processing power, AI presents opportunities to complement and supplement human intelligence and enrich the way people live and work. Recent advancements in natural language processing (NLP), machine learning, and speech and image recognition have made it possible for the government to predict and anticipate problems rather than react to them.

A few examples of potential usage of AI&DA are – route planning of public transport, tax entity and tax fraud-related analytics, etc. For an indicative list of use cases, please refer to Annexure II.

#### 2.4.2. 5G

5G is the next revolution in cellular technology and will bring the world closer with the enhancements it offers in terms connectivity speed, utility, and applications. Features associated with 5G would help reduce delay times and enable seamless real-time access to technology. There are several innovative applications of 5G technology – hospitals equipped with 5G devices that enable remote patient monitoring; smart ambulances that communicate with doctors in real time; digital wallets that connect phones, wearables, cars, and other devices to create seamless financial transactions; and 5G-enabled factories in which connections can be maintained among more sensors than ever before.

#### 2.4.3. Internet of Things (IoT)

The Internet of Things (IoT) refers to an aggregation of endpoints embedded with sensors, software, network connectivity and computing capability that are uniquely identifiable and communicate over a network. The endpoints, which are physical objects such as devices, vehicles, appliances, become interconnected, make themselves recognizable, and can communicate information about themselves and access information that has been provided by another source. Industrial IoT (IIoT) refers to its use in the manufacturing and industrial sectors.

#### 2.4.4. Blockchain

Blockchain, the immutable, encrypted, decentralized/distributed ledger technology that is disrupting digital payments, digital identity, logistics, records/documents management and many other day-to-day activities, is slowly but surely moving from an emerging technology to a mainstream technology. The proof of concepts, especially using permissioned blockchains, are being scaled to pilots and are being moved to production. The security and scalability of blockchain platforms has improved significantly. We are also witnessing the formation of more consortiums and collaborations in the enterprise blockchain space. Specific use-cases rooted in centuries-old industries such as insurance may need more trials before being automated. Adoption of blockchain platforms would be faster in the "gig" economy considering the role of third-party intermediaries must be limited or eliminated.

A few examples of potential usage of blockchain are - track and trace of agricultural and tribal products (like basmati rice, tribal handicrafts); digital records management (like health, education, vehicles, registration), etc. For an indicative list of use-cases, please refer to Annexure-II.

#### 2.4.5. Drones

Drone or unmanned aerial vehicle (UAV) is poised to play a huge role in the government space. Drone Technology has become one of the most promising emerging technologies across the globe due to its various potential applications, not just limiting to military usage, but also to civilian and governance usage.





Multiple industries are utilizing drones for myriad tasks—from surveillance to monitoring of projects, from detection to prevention, and from improving current methods/processes to transforming and innovatively handling new requirements. Today, multiple governments across the world have started using drones for tasks which previously required physical presence/many people. There are many applications of drones in various sectors such as agriculture, mining, police, disaster, forest, irrigation, land survey, health, power etc. For indicative list of use-cases, please refer to Annexure-II.

A few examples of potential usage of drones are – delivery of medicines; delivery of organs for transplant; sand mine monitoring and surveillance; spraying nutrients and insecticide in agriculture; and crowd monitoring during rallies and events, etc. For an indicative list of use-cases, please refer to Annexure-II.

#### 2.4.6. Augmented Reality/Virtual Reality

Augmented Reality/Virtual Reality (AR/VR) constitutes an audio or visual overlay on the physical world that uses a display to provide digital content to augment a user's real-world view. Augmented reality (AR) presents digital information, objects, or media in the real world through a mobile device or headset which may appear as either flat graphical overlay or as a '3D' object, while VR immerses users in a fully digital environment through a headset or surrounding display. The blending of the physical and virtual worlds is revealing a new area for businesses and industries to explore.

#### 2.4.7. Quantum Computing

Quantum computing's significance lies in its ability to comprehend and simultaneously consider an infinite range of scenarios. The technology will move to commercial use in a few years and will be a significant breakthrough in IT. This dramatic shift will affect both how and how quickly computers are able to solve increasingly complex problems. Instead of performing calculations or testing infinite combinations of hypotheses sequentially, quantum computers can process almost infinite combinations of scenarios simultaneously – finding answers to questions that would otherwise be impossible to solve in a lifetime. Some early applications may include – fraud detection; sequencing human genomes and profiling; finding treatments for disease and instantaneously comparing a current patient's symptom profile with a global case archive going back decades; modelling and optimizing passenger and commercial traffic in real time across high-density cities and commuter belts, etc.

#### 2.4.8. Robotics

Robots offer sensing, control, and intelligence to automate and assist human tasks and activities and have a variety of applications that will transform operations with new capabilities. Robotics is often segmented into three areas – (i) application specific, which includes robots designed to conduct specific tasks, (ii) multipurpose robots, which can perform several functions and movements and may function autonomously, and (iii) cognitive robots, which are capable of decision making and reasoning which enables them to function within complex environments.

## 2.5. Data for STI ecosystem

### 2.5.1. Data for Innovation

Technology companies and startups are built on data-driven insights gathered from various devices and applications. The government too has large volumes of data about people, services, etc. Enabling easier access to data can stimulate innovation and data-driven services/products. Hence, the GoMP would take initiatives to identify datasets available with various government departments; define data quality



standards; institute data privacy mechanisms and explore the possibility of subscription-based data products.

### 2.5.2. Data for Policy Making

Data sharing within government departments is crucial for strengthening evidence-based policymaking. With appropriate consent mechanisms for data usage in place, the government can use the latest tools and technologies at its disposal for data-driven and evidence-based informed policymaking. Towards this end, the GoMP will take policy initiatives for data sharing and data integration across various departments of the government.

### 2.5.3. Data for Better Governance

The government stores and processes a large amount of data as part of government service delivery to citizens and businesses, most of which are also digital. With the consent of citizens, the data residing with the government may be analyzed to draw insights for improving governance. The GoMP will strive to increase the availability of usable data, establish mechanisms for accountable usage (data security, data privacy, etc.), and enhance the capacity and culture for data analysis.

### 2.5.4. Data for Inclusion

The government will target to leverage data for better inclusion to ensure that social benefits and schemes reach the individuals and families they are meant for.

### 2.5.5. Unlocking the value of data

The data with the government may be utilized for the good of society by providing it to academic & research institutions, start-ups, etc. to fuel innovation while preserving individual privacy. The GoMP will take policy initiatives for dataset identification, enrichment, packaging, and sharing while protecting individual privacy.

### 2.5.6. Data Protection

The GoMP will establish mechanisms to ensure data is trustworthy, secure, and responsibly & coherently used. To provide for data protection till the Personal Data Protection bill is enacted, the government will adopt industry best practices on personal data protection. Once the Personal Data Protection bill is enacted, the government will ensure compliance to the legal provisions as well as industry best practices on personal data protection.

## 2.6. Collaboration with Institute of Excellence

Collaboration with organizations/institutes of national as well as international repute would pave the path to excellence especially in terms of technological advancements. Such collaborations would help the STI ecosystem to grow with existing support. The state, with due policy support, would collaborate with such Institutes of excellence in various sectors for sustainable growth. This collaboration can be executed in form of MoUs, mentorship programs among academic institutions and technology transfer. Institutes and universities of Madhya Pradesh will strive to collaborate with Institute of Excellence (of global repute) for execution of short-term exchange programs, sharing research infrastructure/activities and knowledge transfer. An ecosystem with sound industry-academia linkage is also of utmost importance in bridging the skill gap, advancing research, and achieving new breakthrough. Government departments and industries will also be supported for collaboration with organizations/institutes of excellence for promotion of R&D activities and technology transfer.



## 3. Policy Implementation Framework

### 3.1. Financing framework

The Madhya Pradesh Science, Technology, and Innovation Fund (MP-STIF) will be created by the Government of Madhya Pradesh.

A budget head, known as Science and Technology Budget (STB), shall be created to allocate funds to science and technology initiatives. This budget head shall be utilized exclusively for the purpose of implementation of this policy. All identified departments of the Government of Madhya Pradesh shall allocate a certain percentage (to be determined by the government) of their annual budget in their respective STB. The departments shall be able to utilize this budget in their respective projects. A statistical mechanism to trace and track the progress of STI initiatives and expenditures shall be developed to facilitate data driven decision support and budget allocation system.

The guidelines for STB and MP-STIF shall be released in due course.

<b>Chief Secretary (Chair), Principal Secretaries or Secretaries of departments</b>	<b>Apex Committee</b> Annual	<b>Policy Governance, Interdepartmental coordination, Review and implementation of the policy</b>
<b>Principal Secretary Science and Technology (Chair), Secretaries or their representatives from other stakeholder departments</b>	<b>Steering Committee</b> Quarterly	<b>Strategic Direction, Stakeholder Collaboration, Policy Implementation, Monitoring and Policy Review</b>
<b>Consultants, Advisors, Experts</b>	<b>Strategic Team</b> Monthly	<b>Support in policy drafting, Implementation, Monitoring</b>

### 3.2. Governance framework

The Department of Science & Technology will be strengthened. An institutional mechanism like a Directorate will be created. A strategic team will be immediately placed in the department to support the implementation of this policy. The team will manage various projects that will be initiated to fulfill the mandate of this policy; help in drafting new policies; coordinate investment opportunities and provide overall support to the department for policy implementation.

A Science and Technology Advisory Group under the chairmanship of Principal Secretary, Science and Technology will also be established. It will consist of representatives and experts from academia and industry and will advise on all matters relating to the policy and its implementation approach.

### 3.3. Policy Period and Interim Review

This Policy shall come into force with effect from the date of issuance of Government order and shall remain in force for a period of ten years or till the declaration of a new or revised policy, whichever is earlier. Periodic Impact assessment studies will be conducted to review the policy in interim every five years, or as needed.



## Annexures

### A.1. Annexure-I

#### Madhya Pradesh technology initiatives and success stories

Key innovation-led initiatives and success stories in MP are given below:

- i. The 'Food Innovation Hub Platform' in collaboration with the World Economic Forum - a multistakeholder market-based partnership platform focused on deploying innovations and emerging technologies in the food and agriculture sector in the state. This platform will provide a public-private-philanthropic market-driven model to unlock and strengthen the collaborative power of innovation, implementation, and impact. It can be readily emulated and lays the groundwork for other government ministries as well as private sector partners to collaborate with the government.<sup>4</sup>
- ii. Land Record Modernization – an ambitious initiative to digitize over 15 crore land records and leverage the data for other use cases, such as revenue management system; land, and settlement surveys; crop insurance registration; e-registry, etc.
- iii. Crop-specific maps created by combining satellite images, survey data and layouts provided by farmers have provided crucial information for all stakeholders in the crop-insurance system. In Madhya Pradesh, crop insurance registration has been linked with the land records of the state, which has succeeded in preventing erroneous insurance cover. Remote sensing models for crop-advisory patterns have been deployed. Further, in FY21, satellite-based technical remote sensing was used for the first time for estimating the average yield in insurance payments.
- iv. CM Helpline and Samadhan Portal - These are exemplary digital initiatives in good governance that have strengthened public administration, improved public relations, accountability, and transparency. MP has been a frontrunner among the states in its initiatives for governance and for setting up a robust public grievance redressal mechanism through digital initiatives.
- v. Samagra Portal – A social-security initiative of the Government of MP to improve Government-to-Consumer (G2C) interaction. It ensures that all eligible families in the state receive the financial assistance and government scheme-benefits they are entitled to. This initiative covers all social security schemes of the government, such as those relating to maternity, scholarships, marriage, pension, poverty, etc. and helps the government in budgetary and other planning.
- vi. Quantum Lab at Military College of Telecommunication Engineering (MCTE) in Mhow, Madhya Pradesh and Artificial Intelligence Centre set up by the Indian Army are significant developments towards building human capital in areas such as Quantum Key Distribution, Quantum Communication, Quantum Computing and Post Quantum Cryptography.
- vii. Face recognition model to support Sarthak App – The Directorate of Skill Development (DSD) conducts various courses on skill development wherein candidates enroll and undergo training. The trainers are required to record the attendance of the candidates for each batch of training

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<sup>4</sup> <https://www.weforum.org/agenda/2022/09/madhya-pradesh-agriculture-food-system/>



in a day. DSD was looking for a solution to auto-record the candidate's attendance wherein a Face Detection module was developed that detects and counts the faces in an image captured by the trainer in the respective batch of training.

- viii. CM Helpline Portal– (Also available over call '181') which acts as a bridge between citizens and the Government and helps to lodge grievances and get timely resolution. A citizen can lodge a grievance if he/she is facing a problem and needs resolution from the government/state departments. The Government of MP is also working towards prediction model of CM Helpline complaints using machine learning which would help departments to take proactive action to avoid/reduce complaints and will be a step ahead from 'Good Governance to Proactive Governance'.

## A.2. Annexure-II: Potential Use Cases of Emerging Technology

This section provides the potential uses cases of emerging technologies such as blockchain, drones, artificial intelligence as a reference. The respective departments, in consultation with Department of Science and Technology, may identify suitable use cases as per their respective priorities.

### Potential Use Cases of Artificial Intelligence and Analytics

Domain	Potential Use Cases
Health	<ul style="list-style-type: none"> <li>• Cataract detection</li> <li>• Public health emergencies detection</li> <li>• Telemedicine</li> <li>• AI-powered Robotic Surgery</li> <li>• Preliminary Diagnosis system</li> <li>• Nursing Assistant</li> </ul>
Education	<ul style="list-style-type: none"> <li>• Identification of students who require additional guidance or assistance to navigate resources.</li> <li>• Different and personalized learning through intelligent instruction design to identify knowledge gaps and orient students towards appropriate topics.</li> <li>• Attendance monitoring systems</li> <li>• Interactive Learning platforms</li> </ul>
Smart Cities	<ul style="list-style-type: none"> <li>• Incident response time reduction through analysis of live and historical data.</li> <li>• Identify real-time traffic patterns</li> <li>• Pedestrian and object detection</li> <li>• Preventive maintenance and risk assessment</li> </ul>
Taxation	Risk-based investigation of tax evasion
Disaster Management	<ul style="list-style-type: none"> <li>• Monitoring social media to identify emergencies</li> <li>• Classifying emergency calls based on their urgency</li> </ul>



Domain	Potential Use Cases
Agriculture	<ul style="list-style-type: none"> <li>• Pest and Disease Identification</li> <li>• Crop prediction</li> </ul>
Telecom	<ul style="list-style-type: none"> <li>• Network credibility and predictive maintenance</li> </ul>
Mining	<ul style="list-style-type: none"> <li>• AI and IoT based check gate for surveillance</li> </ul>

## Potential Use Cases of Blockchain

Domain	Potential Use Cases
Registry	<ul style="list-style-type: none"> <li>• Land Record Management System</li> <li>• Property Card Management System</li> <li>• Vehicle Lifecycle Management System</li> <li>• Health Record Management System including organ and tissue donors</li> <li>• Student Lifecycle Management</li> </ul>
Supply-Chain	<ul style="list-style-type: none"> <li>• Track and trace of agricultural products (pomegranates, apples, etc.)</li> <li>• Pharma supply chain</li> <li>• Vaccine Supply-Chain/Cold-Chain</li> <li>• Excise Supply Chain, Coffee Supply-Chain, Tea Supply-Chain</li> <li>• Organ and tissue distribution system</li> <li>• Evidence Chain of Custody</li> </ul>
Identity	<ul style="list-style-type: none"> <li>• Distribution of Grants</li> <li>• Fundraising</li> <li>• Certificate and Document Attestation</li> <li>• Eligibility Management</li> <li>• Public Distribution System</li> <li>• Self-Sovereign Digital Identity</li> </ul>
Audit & Verification	<ul style="list-style-type: none"> <li>• Financial Reconciliation and Risk Management System</li> <li>• Payment Ledger</li> <li>• ATM Reconciliation</li> <li>• Validation of job credentials</li> </ul>



## Potential Use Cases of Drones

Domain	Potential Use Cases
Mining	<ul style="list-style-type: none"> <li>• Mines/minerals monitoring and surveillance</li> <li>• Stockpile measurement</li> <li>• Volumetric analysis</li> <li>• Boundary Demarcation</li> </ul>
Homeland Security	<ul style="list-style-type: none"> <li>• Crime offenders tracking</li> <li>• Crowd monitoring during rallies and events</li> <li>• Traffic planning and monitoring</li> <li>• Crime investigations scene mapping</li> <li>• Identification of illegal activities such as bootlegging</li> </ul>
Forest and Wildlife	<ul style="list-style-type: none"> <li>• Forest cover mapping</li> <li>• Illegal activities monitoring</li> <li>• Poaching monitoring</li> <li>• Wildlife activity monitoring</li> <li>• Biomass estimation using hyperspectral</li> </ul>
Urban and Smart City	<ul style="list-style-type: none"> <li>• 3D model of a city/town for better planning and decision making</li> <li>• Property tax mapping</li> <li>• Base map creation</li> <li>• Identify encroachments</li> <li>• Terrain mapping for planning</li> <li>• Watershed analysis</li> </ul>
Agriculture	<ul style="list-style-type: none"> <li>• Crop survey and acreage estimation</li> <li>• Crop condition assessment; Crop spraying</li> <li>• Precision Farming: assessing the optimal quantity of water and fertilizers to be used</li> <li>• Land health monitoring; Detection of cannabis on fields</li> <li>• Damage Assessment for insurance claim</li> </ul>
Infrastructure projects	<ul style="list-style-type: none"> <li>• Power lines survey, monitoring, and condition assessment</li> <li>• Wind turbine inspection</li> <li>• Construction progress monitoring</li> <li>• Land demarcation and surveying</li> </ul>



Domain	Potential Use Cases
Disaster Management	<ul style="list-style-type: none"> <li>• Real-time surveillance</li> <li>• Search and Rescue</li> <li>• Damage assessment mapping</li> <li>• Delivery of emergency goods</li> </ul>
Tourism	<ul style="list-style-type: none"> <li>• Monitoring of tourists to ensure minimal disturbance to wildlife</li> <li>• Tourism promotional activity</li> <li>• Asset condition monitoring and surveillance</li> </ul>
Traffic Management	<ul style="list-style-type: none"> <li>• Improve traffic planning and management on Real-time monitoring</li> <li>• Road surface condition monitoring</li> <li>• Accident investigation</li> </ul>
Healthcare	<ul style="list-style-type: none"> <li>• Epidemic Control</li> <li>• Cleanliness &amp; Hygiene</li> <li>• Healthcare delivery</li> </ul>
Oil & Gas	<ul style="list-style-type: none"> <li>• Emergency Response</li> <li>• Asset Safety Monitoring</li> <li>• Security</li> </ul>
Insurance	<ul style="list-style-type: none"> <li>• Claim Management and settlements</li> <li>• Improved Pricing</li> <li>• Protection against Fraud</li> </ul>
New and Renewable Energy	<ul style="list-style-type: none"> <li>• Demarcation of available land for New and Renewable energy projects</li> </ul>

### A.3. Annexure III – Glossary

Abbreviations	Description
3D	Three Dimensional
5G	Fifth Generation
ADAS	Advanced Driver Assistance Systems
AI	Artificial Intelligence
AIIM	All India Institute of Medical Sciences





AR	Augmented Reality
ATM	Automated Teller Machines
AYUSH	Ayurveda, Yoga and Naturopathy, Unani, Siddha and Homeopathy
BFSI	Banking, financial services and insurance
CM	Chief Minister
CRRRI	Central Road Research Institute
DA	Data Analytics
DPIIT	Department for Promotion of Industry and Internal Trade
DSD	Directorate of Skill Development
DTC	Delhi Transport Corporation
ESDM	Electronic System Design and Manufacturing
G2B	Government to Business
G2C	Government to Consumer
GERD	Gross Expenditure on Research and Development
GHG	Greenhouse gases
GI	Geographical Indication
GoMP	Government of Madhya Pradesh
GPS	Global Positioning System
GSDP	Gross State Domestic Product
HEI	Higher Education Institution
IAMAI	Internet and Mobile Association of India
IIIT	Indian Institute of Information Technology
IIM	Indian Institute of Management
IIT	Indian Institute of Technology
IPG	Innovation Promotion Group
IPR	Intellectual Property Rights
IT	Information Technology



MCTE	Military College of Telecommunication Engineering
MFP- PARC	Minor Forest Produce Processing & Research Centre
ML	Machine Learning
MoU	Memorandum of Understanding
MP	Madhya Pradesh
MPDP	Madhya Pradesh Data Policy
MPEIT	Madhya Pradesh Electronics and Information Technology
MPRDP	Madhya Pradesh R&D Policy
MPSP	Madhya Pradesh Skill Policy
MPSTIP	Madhya Pradesh Science, Technology, and Innovation Policy
MPTSP	Madhya Pradesh Technology Startup Policy
MRes	Master of Research
MSME	Micro, Small and Medium Enterprises
MVP	Minimum Viable Product
NAAC	National Assessment and Accreditation Council
NASSCOM	National Association of Software and Service Companies
NFT	Non-fungible token
NID	National Institute of Design
NIFT	National Institute of Fashion Technology
NIRF	National Institutional Ranking Framework
NIT	National Institutes of Technology
NITI	National Institution for Transforming India
NLP	Natural language processing
NMEICT	National Mission on Education through Information and Communication Technology
PG	Postgraduate
SSB	Shanti Swarup Bhatnagar
STB	Science and Technology Budget



STEM	Science Technology Engineering Mathematics
STI	Science Technology Innovation
STIF	Science Technology and Innovation Fund
STIP	Science Technology and Innovation Policy
TKDL	Traditional Knowledge Digital Library
UAV	Unmanned aerial vehicle
UG	Undergraduate
UNESCO	United Nations Educational, Scientific and Cultural Organization
VR	Virtual Reality
WEF	World Economic Forum









**Department of Science & Technology**  
**Government of Madhya Pradesh**