

An Al Opportunity Agenda for India

04 Executive Summary

06 Introduction

07 India's AI Opportunity

Improving access to quality healthcare
Boosting agricultural productivity and sustainability
Improving educational and employment opportunities
Harnessing India's linguistic and socio-cultural diversity
Enhancing citizen engagement with public services
Improving financial inclusion

12 An Affirmative AI Policy Vision for India

13 Investing in Innovation Infrastructure

Strengthening and democratising compute capacity
Adopting a cloud-first approach
Enhancing the accessibility and quality of open government datasets
Investing in R&D
Pro-Innovation Legal Frameworks

20 Building an Al-ready workforce

Modernising Skilling Programs for the AI Era Supporting workers in transition

Promoting Inclusive Adoption and Accessibility

Promoting inclusive access to foundational infrastructure for AI, with particular attention to marginalised communities

Government Adoption of AI

Small Business and Traditional Industries

Enabling Regulatory Framework

27 Conclusion

Executive Summary

We stand at a pivotal moment in the development of artificial intelligence (AI) in India. India's outstanding tech talent, growing economy and vibrant start-up ecosystem mean that the country is well placed to fulfil its potential for AI global leadership. By maximising the potential of AI, India can drive productivity growth, raise living standards and tackle some of the country's most pressing social problems. To do so, stakeholders must come together to build a **comprehensive AI opportunity agenda** to help deliver the IndiaAI Mission and harness the power of AI for the benefit of India's citizens.

With the right policy framework in place, AI can help accelerate the transformation of India's **economy**, **society**, and **public services**.

First, if fully harnessed, AI has the potential to substantially boost the Indian economy. AI will play a crucial role in delivering the target of a \$1 trillion digital economy by 2028, which is expected to account for 20 percent of India's GDP. A Google-commissioned report estimated that at least INR 33.8 lakh crore of economic value from AI adoption can be achieved in India in 2030.

Secondly, AI can accelerate positive social transformation and social inclusion in India. Applied to agriculture, AI can improve agricultural sustainability and help prevent diseases. Agrostar, for example, launched a multilingual mobile app using Google Cloud that is helping to boost crop yields and encourage sustainable practices for small farmers in India. This is contributing to raising rural living standards in poorer parts of the country.

Thirdly, India has a unique opportunity to become a global leader in leveraging AI for public services. Further integrating AI across India's Digital Public Infrastructure (DPI), including in healthcare, education, e-governance and finance, will help unleash AI's potential and accelerate the benefits of DPI.

At Google, we are deeply committed to working with public and private sector stakeholders to realise India's Al ambitions. Our work with our partners in India has three core components:

- Investing in foundational infrastructure for AI development: Google's ongoing investments in India's compute infrastructure, including the launch of cloud regions in Mumbai and Delhi, demonstrate its commitment to the country's digital growth. These efforts are crucial for scaling operations and democratising AI technology across India, fostering innovation and development in various sectors.
- Improving AI skills through training: Google is continually developing its AI courses, such as the AI Essentials online course, and partnerships with the Indian public sector to help workers enhance their AI skills. Google in India has a clear goal to empower 10 million people with AI digital literacy including students, job seekers, educators, startups and developers and civil officials, and offer technical knowledge to help contribute towards building an AI-ready workforce.
- Developing innovative AI services and use cases:
 Google is partnering with public and private sector stakeholders to foster AI innovations in essential sectors and build a robust AI ecosystem across the country.



- Through a <u>collaboration</u> with the Government of Maharashtra, Google will leverage its Al capabilities to provide AI-enabled solutions across sectors like agriculture, healthcare, sustainability, education, and startups in the State.
- Google and the Government of Tamil Nadu are <u>collaborating</u> to drive technological advancement and foster Al innovation in the State, focusing on initiatives in key areas such as Al start-up enablement, skilling, and industrial ecosystem enablement including MSMEs, to create impactful, scalable Al solutions.
- Google is contributing to the agriculture sector in partnership with local players through Al-powered solutions that address challenges across the entire farming lifecycle. By leveraging Al, stakeholders gain landscape insights, digital management tools, farmerfocused resources, real-time crop prices, and personalised information platforms. All these Al-driven collaborations foster innovation, inclusivity, and efficiency, ultimately benefiting farmers, consumers, and the environment.

Building on these efforts, we offer three key recommendations in this report on how India can harness AI responsibly and to its fullest potential:

To maximise the AI Opportunity for India, collaborative efforts across government, industry, and civil society must prioritise three key areas:

- Invest in infrastructure and innovation –
 optimising the opportunities presented by this
 technology by investing in AI research and
 development, access to and quality of digital
 infrastructure and compute capacity, and
 providing a balanced regulatory environment
 to convert ideas and data into new discoveries,
 products and services.
- Build human capital and an AI-empowered workforce - investing in people to ensure they can use and benefit from AI, from students to workers, and from small businesses to traditional industries.
- Promote widespread adoption and universal accessibility - harnessing Al across governments and all sectors of the society to address major societal and economic challenges and ensure the benefits of Al are widely shared.



Introduction

The choices made by governments, industry, and civil society at early stages of technological development will determine the speed and scale of adoption and the extent to which all parts of Indian society can benefit. AI has the potential to fundamentally change the ways we live, work and learn through its ability to assist, complement, empower and inspire people in almost every field of human endeavour. It is already opening up new possibilities in India, such as helping with flood forecasting, making it easier to identify diabetic retinopathy, supporting agricultural sustainability and maternal healthcare, improving reading proficiency and gaining a richer understanding of language diversity across India.

Google believes that AI can drive innovative solutions tailored to India's defining challenges. The possibilities are immense: from addressing major public health challenges, to boosting productivity and living standards, and providing high-quality fulfilling jobs for many more Indians.

Together, we must ensure that AI is introduced safely in a way that improves wellbeing, helps solve India's complex challenges and enables India to lead globally in unique areas of research and innovation. It is important that the private sector works in partnership with the Government, civic society and other bodies to help India meet the ambitious goals outlined in the IndiaAI Mission.

Building on Google's three-pillar agenda for <u>responsible Al</u> <u>progress</u> – unlocking opportunity, promoting responsibility, and enhancing security — this paper proposes three key recommendations for Indian policymakers, companies, and civil society to deliver Al's benefits to as broad a range of people as possible. To achieve this, we must work in partnership to:

- 1. Invest in innovation infrastructure;
- 2. Build an AI-ready workforce; and
- 3. Promote inclusive adoption and accessibility.



India's AI Opportunity

With its world-leading AI skills and start-up ecosystem, technologically optimistic population and strong public and private sector investment in digital transformation, India can leverage its unique strengths to harness the AI opportunity. AI has the potential to bring real societal benefits to India, boost economic growth, lift living standards and provide India's economy with the competitive advantages it needs to be a global leader.

Improving access to quality healthcare

Al has the potential to transform healthcare, potentially saving millions of Indian lives through earlier diagnosis, broader access and better understanding of diseases.

The use of AI in imaging and diagnostics is already speeding up the diagnostic process. Google Cloud is working with <u>Karkinos Healthcare</u>, an <u>AI-powered</u> oncology platform, to provide hundreds of thousands of underinsured Indians with easier access to cancer risk assessments, screening and treatments.

Al is also being used to tackle health problems that have a particularly devastating impact on parts of the Indian population. The direct causes of maternal mortality are largely avoidable and treatable with sufficiently early intervention. Google has partnered with ARMMAN to help them build a solution that uses Al to identify Indian women at risk of dropping out from their health information programme, which is designed to target preventative care information to expectant and new mothers. The Al-powered early targeting system helps ARMANN personalise interventions and retain these individuals.

New AI applications are also improving accessibility to healthcare for people living in remote or rural areas. <u>Practo</u>, India's largest digital healthcare start-up, seeks to promote access to healthcare and increase the ease of navigating the system by bridging the gap between patients and healthcare providers. It uses AI and data analytics to deliver affordable and personalised healthcare insights for people in underserved communities.







Boosting agricultural productivity and sustainability

Agriculture is an essential part of India's economy, with 70% of rural households depending on agriculture for their livelihood and 82% of farmers being small-scale. Extreme climate events such as floods, droughts, and infestations are devastating for the livelihoods of India's agricultural workers. Al-driven data analytics can help India's farmers minimise these climate risks and optimise agricultural productivity and sustainability.

AnthroKrishi and Google Partner Innovation, two teams at Google, are <u>leveraging</u> AI to tackle this challenge. To enhance agricultural sustainability, the teams are currently exploring the use of AI-powered technologies to organise and utilise India's agricultural data. By combining satellite imagery and machine learning to draw boundaries between fields, their work has the potential to enable sustainable farming practices and improve crop yields.

Al is also empowering India's farmers with access to real-time crop pricing information, levelling the playing field with buyers and safeguarding farm livelihoods. Jiva, a mobile app aimed at improving smallholder farmers' livelihoods, provides services for farmers built with Google's Vertex Al. This includes providing farmers access to adequate financing, high-quality agricultural inputs, agronomic advisory services, and a fair market to sell crops at harvest.

Al is further assisting farmers by providing early warning of potential crop threats, enabling them to implement timely mitigation strategies. A <u>recipient</u> of Google.org's grant funding, Wadhwani Al <u>supports</u> Indian farmers with pest control through CottonAce, its Al-powered early warning system. <u>Cropin</u>, an Indian start-up, provides farmers with valuable insights into potential infestations and diseases by combining Al, remote sensing, and geographic information systems.

Farmer Empowerment: This initiative, in partnership with Protean, ONEST, and ONDC, empowers farmers with end-to-end solutions. By leveraging Google's locationbased insights, AI recommendations, and generative AI







capabilities, farmers gain access to valuable information, wider markets, and simplified processes for listing and selling their produce.

Farmer Bot: This AI-powered voicebot provides farmers with real-time crop price information in multiple Indian languages. By integrating with the e-NAM portal API and utilising Google Cloud's Chat Bison model, Farmerbot ensures accessibility and delivers accurate market data to farmers.

Improving educational and employment opportunities

High-quality education is integral to maintaining India's rapid economic growth. Despite considerable improvement in recent decades, India still has important educational gaps, as highlighted by the 2023 Annual Status of Education Report (ASER). All can help bridge these gaps, support underserved communities to gain access to high quality education and improve employment opportunities.

To this end, Google is partnering with the <u>Rocket Learning Foundation</u> to use AI to improve early education for children in India. Rocket Learning provides an AI coach that creates localised content, automated grading and personalised learning paths, making education more accessible and effective.

Al is not only changing what the skills are that need to be adopted, but also how these skills can be taught and disseminated. It presents an opportunity to personalise learning, reach more people, and maximise impact. Initiatives like the Read Along Initiative (Bolo), which uses voice-recognition technology to help improve learning skills, demonstrate Al's potential.

Additionally, AI is helping job seekers identify suitable opportunities. <u>APNA</u>, a professional networking platform <u>using</u> Google Vertex AI, is connecting millions of Indian workers with opportunities and delivering personalised job-matching based on their skills and experience.





Harnessing India's linguistic and socio-cultural diversity

India's vast linguistic diversity and the presence of multiple dialects – even within a single district like Muzaffarpur – underscore the need for innovations that bridge the linguistic divides. Project Navrassa, based on Google's Gemma family of open models, is already training large language models (LLMs) on multiple Indic languages to make AI accessible across a wide Indian audience.

As part of its commitment to ensuring an equitable Al landscape that reflects India's linguistic and socio-cultural diversity, Google has also launched <u>Project Bindi</u> (Bias Interventions for Natural Language Processing and Data in the Indian context). The project aims to address biases related to technology access and socio-cultural factors including gender and caste, helping to ensure the responsible development and implementation of Al across India.



Al holds significant potential to build on India's successful Digital Public Infrastructure (DPI) model, facilitating innovation, reducing bureaucracy, and boosting citizen engagement through personalised services.

India is leading the way in using AI to improve public services. According to a <u>report by EY</u>, generative AI is now extending these benefits to more citizens across India, particularly in underserved communities.

In collaboration with Axis My India, Google Cloud introduced an AI-powered multilingual super-app designed to build awareness of government social welfare schemes, healthcare benefits and day-to-day amenities. AI has allowed the app to provide personalised, real-time answers to citizen queries about public services, in their preferred language.







Improving financial inclusion

Improving financial inclusion remains a crucial goal in India. According to the 2021 World Bank Findex, India has a large unbanked population, accounting for nearly 17 percent of global unbanked adults. This issue often intersects with other social challenges, disproportionately affecting poorer and rural Indians. To tackle this, organisations are increasingly turning to AI to enhance financial inclusion.

India's Unified Payments Interface (UPI), to which <u>Google Pay</u> has played a pivotal role, has made significant strides in this area. Al is now further offering new ways for underbanked communities to access financial services. Platforms like <u>OnFinanceAl</u>, for example, are using Al to analyse data on mobile phone usage patterns and e-commerce payments, to help identify and onboard unbanked individuals.





An Affirmative AI Policy Vision for India

The examples above only scratch the surface of what is possible. There is potential for AI to do so much more for India, significantly improving the lives of everyone in the country. However, as we have seen from prior waves of technology, these benefits are not automatic. Unless people trust and see the benefits in using the technology, it will not be adopted at scale.

The <u>IndiaAl Mission</u> has clearly displayed India's ambition to develop a robust Al ecosystem that catalyses large-scale socio-economic transformation. If <u>India</u> wants to fully harness Al's transformative potential, it must focus its attention on what it wants to achieve, not just what it wants to avoid.

In this light, we offer three key recommendations on how India can harness AI responsibly and to its fullest potential:



Invest in infrastructure and innovation - meeting the moment of this technology by investing in compute capacity, cloud infrastructure, cybersecurity measures, open government datasets, AI research and development; and establishing policy frameworks / principles that enable responsible innovation.



Build an AI-ready workforce - investing in skilling to make sure people can use and benefit from AI, from students to workers, and from small businesses to traditional industries.



Promote inclusive adoption and accessibility - harnessing AI across governments and all sectors of the society to address major societal and economic challenges and ensure the benefits of AI are widely shared, while adopting a regulatory framework that supports a healthy AI ecosystem.



Investing in Innovation Infrastructure

Countries have historically excelled when they support technological change and harness it to improve living standards. India's openness to technological development positions it well in this regard. For India to unlock the immense AI opportunity, it will require sound and deliberate investment in innovation infrastructure, which includes not just technical infrastructure but also legal and policy frameworks that enable responsible AI innovation.

There is no one AI investment strategy that will work for all governments, but one basic formula for success is to invest in basic and applied research and technologies (such as graphics processing units and supercomputers), cloud infrastructure, and open government datasets – and then to put in place policies encouraging private sector innovation and product development that are built on top of these foundational initiatives. Such a model can drive innovation leadership by creating a sense of shared responsibility between the public and private sectors for developing AI and other emerging technologies.

Strengthening and democratising compute capacity

Substantial investment in compute capacity – essential for building India's own foundation models and delivering AI solutions at scale – will propel India on its path to global leadership in AI. The <u>IndiaAI Mission</u> has outlined the clear direction of procuring 10,000 or more Graphics Processing Units (GPUs) through partnering with the private sector. This provides important momentum. Looking ahead, India will benefit from a fair and transparent procurement process for these GPUs and other AI compute infrastructure.

Meanwhile, India will benefit from taking a holistic approach to strengthening compute capacity, further articulating government objectives in promoting investment in cloud adoption, data centres and server optimisation algorithms, and development of software to build AI systems. This is important for ensuring that all three layers of the compute stack – hardware, infrastructure, and software – meet the growing demands of Indian start-ups and research communities to promote AI innovation.





Democratising access to compute is key to strengthening India's AI ecosystem. The success of India's Digital Public Infrastructure (DPI) in fostering digital inclusion may be instructive in how to inclusively scale up compute capacity. Increasing investment in subsea cables can further deliver better connectivity by expanding the supply of international bandwidth, which is a crucial enabler of high-performance computing.

Adopting a cloud-first approach

Cloud computing is the gateway through which businesses and governments can fully harness the power of Al. Its vast computational resources, scalable data storage, management, and analysis capabilities are crucial for developing and deploying Al applications. The Indian Government has led important cloud-first initiatives and focused on improving the public sector's readiness for mass cloud adoption. As part of Meghrai – the national cloud computing initiative that prioritises the adoption of cloud solutions over traditional on-premise IT systems – the Ministry of Electronics and Information Technology (MeitY) has implemented a cloud-first policy and developed guidelines that help Indian government departments with cloud adoption.

In order to maximise the benefits of AI, we recommend that governments:

- Continue to articulate and adopt a Cloud First policy. By showing the benefits of cloud-based AI solutions in delivering citizen services, the Indian Government can catalyse private sector use of AI tools on the cloud. Emerging homegrown cloud solutions providers, such as NeevCloud which launched the country's first AI SuperCloud, have underscored the potential of cloud deployment in helping democratise access to AI and supercomputing for enterprises and startups.
- Establish clear frameworks to ensure successful government-industry collaboration, such as data governance and responsible AI guidelines, procurement guidelines, well-defined performance

metrics, and transparent vendor management. The roadmaps should also prioritise promoting competition to create value for governments and avoid restrictive practices that hinder long-term flexibility.

- Conduct targeted cloud and AI opportunity assessments, focusing on services with the greatest potential for citizen impact. Sectors like healthcare, education, and transportation should be prioritised. This can be done in partnership with industry, which can help governments deploy AI solutions on cloud.
- Implement policies that address cybersecurity concerns. The PwC's 2024 Global Digital Trust Insights survey finds that 52% of global business leaders have heightened concerns about cyber attacks facilitated by generative AI usage, underscoring the importance of addressing the security challenges to the cloud. Meanwhile, AI can be harnessed to detect and analyse potential cybersecurity threats, strengthening cybersecurity defences in India.

Google Cloud: Bringing Al-driven security operations to India

Google is committed to developing quality cloud services and using AI to strengthen cloud security in India. Google opened its first two Cloud regions in India in Mumbai (2017) and Delhi (2021) and expects further expansion over the next few years. Additionally, Google Cloud announced the plan to use Gemini in Google's new security operations (SecOps) region in India. Google Cloud's AI-driven security operations aim to supercharge our public and private sector customers' security operations, to reap the benefits of secure cloud infrastructure.



Enhancing the accessibility and quality of open government datasets

Data held by central and state government agencies can be great enablers of growth and innovation. Enabling access to these diverse, high-quality government datasets is important to the commercialisation and scaling up of AI solutions in India. While India holds an advantage in the vast quantum of raw data that can be used for training AI models, the <u>fragmentation</u> and accessibility of government datasets can hinder AI development and adoption in the country.

To tap on the potential of its data to empower Al innovation, India will benefit from deepening efforts to make open government datasets easily accessible across sectors and regions. India's INDIAai programme, launched in 2021, was an important early sign of the Government's commitment to opening up the Government's anonymised data to researchers and start-ups.

Project Vaani

A Google-funded initiative led by the Indian Institute of Science, <u>Project Vaani</u> aims to <u>collect</u> speech data of 1 million Indians and open-source it for use in automatic speech recognition and speech-to-speech translation.

Now one of the largest datasets of Indian dialects ever to exist, Vaani will contain more than 150,000 hours of audio across all districts in India upon the project's completion. The vast data will boost the creation of an AI-based LLM that captures the diverse Indian languages and dialects. This will lead to the development of AI use cases that are relevant and tailored to Indians across the country.





Investing in R&D

Sustained investment in long-term AI R&D, while nurturing a culture of industry-academia collaboration, will be crucial to ensure the global competitiveness of India's AI ecosystem and talent development.

Public-private partnerships will be pivotal to accelerating research across the AI ecosystem in India. Both governments and industry can support academic and civil society researchers through programmes such as tech transfer frameworks, fellowships, and direct support for research. Google Research, for example, has partnered with Indian academic institutions such as IIT Madras. Such public-private initiatives must include a broad range of participants to reflect the geographic, linguistic and cultural diversity of Indian society.

India can also leverage its strong relationships with Global South countries to create a conducive global R&D environment for Al. A novel approach which the Indian Government could consider supporting globally to augment local Al research would be the establishment of a Global Resource for Al Research (GRAIR) that would pool financial, technical and data resources across borders to help countries overcome resource constraints. If successful, the initiative could make Al accessible to many more of the world's entrepreneurs and scientists.

Support the establishment of a Global Resource for AI Research

Inspired by successful models such as European Center for Nuclear Research (CERN) and the International Space Station (ISS), the GRAIR would be a collaboratively governed, multinational AI research infrastructure and research consortium working to ensure ethical development, equitable access, and the pursuit of AI applications that foster local innovation. A collective computing resource such as the GRAIR would also help to address concerns about AI's carbon footprint, as it would reduce duplicative efforts and environmental impact.

The proposed GRAIR would comprise three key elements. A cloud-hosted Global Dataset Library would feature diverse, curated, high-quality datasets, with continuous programmes addressing representational gaps. A Distributed Compute Network would span data centres across multiple countries, particularly those currently lacking dedicated AI infrastructure, providing researchers worldwide with essential computational resources. An Operations Team would manage infrastructure, outreach programmes, and user initiatives to ensure smooth functioning of the resource.

A GRAIR could undertake a range of activities, depending on the priorities of its members, including:

- Issue periodic requests for proposals (RFPs) that would allow researchers and organisations to apply for compute time.
- Solicit proposals focused on creating high-quality datasets where gaps exist e.g. data related to low-resource languages and cultural knowledge.
- Support in-person or remote safety testing, evaluations, and red-teaming on AI models for locally relevant characteristics and development of associated benchmarks and testing suites.
- Support countries at different levels of development in building up domestic AI workforce capabilities, including application developers, tech entrepreneurs and researchers, through training and accreditation programmes.



Building a responsible AI research ecosystem in India

While AI has the potential to make our lives easier and address some of society's most complex challenges — such as preventing disease, making cities work better and predicting natural disasters – there are important questions about fairness, bias, misinformation, security and the future of work. Answering these questions requires deep collaboration among industry, academia, governments and civil society. This is why Google is committed to building and supporting a responsible AI research ecosystem in India.

In 2023, with the support of a USD 1 million grant from Google, the Indian Institute of Technology Madras (IIT Madras) opened its Centre for Responsible AI (CeRAI), a first-of-its kind multidisciplinary centre aimed at ensuring ethical and responsible development of real-world AI applications in India. CeRAI has convened responsible AI workshops to discuss key responsible AI challenges such as fairness, explainability and accountability, privacy, and security. CeRAI also continues to focus on producing high-quality research outputs, curating technical resources, and offering specialised training programmes on responsible AI. This commitment to supporting a robust responsible AI research ecosystem in India is aligned with Google's efforts to share responsible AI best practices with the broader AI community.

Last September, Google launched the <u>Digital Futures Project</u>, establishing a 20 million dollars fund, an initiative that aims to bring together a range of voices to promote efforts to understand and address the opportunities and challenges of artificial intelligence (AI). Through this project, we are supporting researchers, organising convenings and fostering debate on public policy solutions to encourage the responsible development of AI. In India, the Digital Futures Project has supported the Aapti Institute to conduct exploration and research on bias and digital integrity in the context of AI development and deployment. This research recognises the need to unpack the risks associated with large-scale AI deployment, while attempting to delineate strategies that leverage its transformative potential proactively.



Google

Pro-Innovation Legal Frameworks

Al is too important not to regulate – and too important not to regulate well. At this moment, the challenge faced by all policymakers is how to govern Al in a way that mitigates risks and potential harms without impeding beneficial innovation. There is a risk that conflicting and fragmented regulatory approaches will block innovators and governments around the world from harnessing trustworthy and beneficial Al applications to achieve strengthened economies, find cures for cancer, and ensure longer, better lives for billions of people.

India is actively formulating and implementing policy frameworks governing key aspects of AI regulation. Google believes that building and optimising holistic policy frameworks can unlock public trust in AI and AI-derived opportunities in India.

We believe there are seven major policies that policymakers in India should consider to ensure Al researchers and innovators can convert ideas and data into new discoveries, products, and services.

- Adopt a risk-based and proportionate approach to AI regulation focused on use cases: This is
 crucial to provide clarity to developers, deployers, and regulatory agencies about which risks to mitigate
 in specific contexts and which uses are completely disallowed. A risk-based approach will encourage
 alignment around addressing the most severe concerns related to particular AI applications. This
 approach recognises that AI is a general-purpose technology that will be applied in different ways in
 different contexts.
- 2. A copyright framework that supports innovation and R&D: A strong predictor of a country's leadership in AI is its copyright framework, particularly when it is able to support broad usage of data inputs and datasets by AI systems for learning and interaction with diverse information sources. To achieve this, copyright frameworks must incorporate input from users, scientists, innovators, researchers, and creators in the policymaking process. Creating exceptions to India's Copyright Act (1957) to allow for innovation in AI development and model training could help ensure copyright owners are appropriately protected while not stifling innovation. A general AI framework must enable the limited use of copyrighted data that allows startups and innovation companies to keep the large language models updated and relevant.
- 3. Facilitate better cross-border data flows: Deepening India's links to the global data ecosystem will be essential for catalysing India's indigenous AI development and deployment. Providing increased support to trusted cross-border data flows can enhance the capability of partners to work together to ensure AI systems are trained on demographically and geographically diverse datasets, which helps mitigate potential bias.

Data flows also empower Indian firms by helping them significantly reduce IT costs, leverage AI technologies, serve cross-border customers and access global markets. A 2021 <u>study</u> published by the Information Technology and Innovation Foundation estimated that increasing data restrictions is associated with a 7% decrease in gross output traded and a 2.9% decrease in productivity over 5 years. Creating flexible mechanisms that enable cross-border data flows can help India maximise economic opportunity while safeguarding privacy and sovereign objectives.



- 4. Cohesive government Al policy: A cohesive approach to Al regulation is one that acknowledges the cross-cutting nature of the technology, focusing on end applications rather than the underlying technology. In India, Al governance typically requires participation from multiple agencies. It is therefore vital that India develops an inter-agency approach that effectively coordinates and balances the emerging Al-related work streams, avoiding a siloed approach to national Al regulations.
- 5. Conduct a regulatory gaps analysis to assess relevant legislations' application to AI: The Indian Government will benefit from undertaking holistic audits of regulations relevant to AI across the ecosystem, to have a clear view of the existing regulatory landscape. The focus should be on examining whether existing regulations sufficiently address the emerging risks from AI. Any new regulations on AI should only be considered and introduced where legislative gaps are identified.
- 6. Promote international alignment and interoperability on AI regulations: India can be a pioneering force in promoting regulatory interoperability that helps advance AI innovation and adoption globally. As a founding member and the lead chair in 2024 of the Global Partnership on Artificial Intelligence (GPAI), India can spearhead important discussions around AI, including: promoting the use of common AI technical standards; amplifying the interests of the Global South in AI governance; and encouraging AI adoption among SMEs.
- 7. Improve access to open datasets: Facilitating access to data is crucial for empowering Indian researchers and entrepreneurs to develop reliable, high-impact AI models. Building an open data ecosystem through initiatives that promote data commons and open government datasets, will play a key role in this. To support such efforts, it's essential to establish a robust data infrastructure, especially in critical areas like demographics, transportation, and environmental conditions.



Building an AI-ready workforce

AI will transform the world of work by changing the nature of existing roles and creating millions of new jobs and even new sectors. The required skills will also evolve. Students need to leave education AI-ready and workers require the ability to continually update their skills to remain relevant.

Realising India's global leadership on AI will require an AI-ready workforce – an area which India already has unique strengths. According to a recent Nasscom report, India has the third-largest AI talent base globally. The 2024 Stanford_University AI Index finds that India leads the world in AI skills penetration, with a remarkable 263% growth in AI talent concentration from 2016 to 2023. India produces a significant number of STEM graduates and its Institutes of Technology are known for producing high quality tech talent.

Supported by its education system, India's talent pool has fostered a thriving ecosystem for start-ups, with over 1,900 startups focused on Al-driven solutions in areas such as conversational AI, video analytics, deep fakes detection, and disease detection. Indian workers are also already more likely to be using AI in their day-to-day work, as highlighted in a report by Deloitte which notes that India has the highest proportion of generative AI users in Asia Pacific.

To sustain this momentum, India should leverage these strong foundations to prepare workers for the potential disruption Al can bring. Addressing the Al skills gaps – estimated to be up to 300,000 in 2024 alone – and bridging the gender disparity in Al skills are crucial. India should also leverage its talent and skills to support the Government's mission of building local Al models and engage the Indian diaspora in building Al infrastructure within India.

Compared to prior waves of technology, AI will present unique challenges that will also require new solutions. The question then is: how can Indian policymakers equip the workforce to harness AI, so that it empowers workers, helps them become more productive, bumps up their expertise level, and makes their skills valuable? Additionally, how can potential risks to the workforce be mitigated through partnerships between the government, industry and civil society?





Building an AI-empowered workforce will require a shared vision – and a shared responsibility – across a number of sets of stakeholders:

- Industry has a crucial role to play in developing new skilling programmes that focus on AI preparedness. Given the transformative impact of AI across all sectors of the economy, individual company efforts would be insufficient on their own companies will need to stand up new cross-sectoral AI training partnerships to ensure workers in all industries are ready to harness AI.
- Civil society, foundations, and academia should drive new research to understand what has and hasn't worked in the past in terms of worker preparedness for new technologies, and then apply those insights to ensure that the benefits of AI are able to be felt across society.
- Crucially, <u>policymakers</u> have an essential role to play in making sure that India's population have the skills able to make the most of the AI opportunity. Policymakers must help scale up AI training programmes so that they reach all communities, while building more effective "trampolines" to catch workers that are impacted by AI and reskill them so they can quickly bounce back into new and better jobs. The expansion of the <u>IndiaAI Future Skills</u> programme will be an important part of ensuring that foundational AI skills reach well beyond major Indian cities and into more rural and underserved areas.

Modernising Skilling Programs for the AI Era

To tailor policy interventions, it will be important to understand how AI is both similar to and different from prior waves of technology. Early research indicates that generative AI may help up level certain skills, enhance labour productivity, create new occupations, and democratise access to higher paid occupations. However, as generative AI can automate non-routine cognitive tasks, it may impact a wider range of tasks and occupations than earlier technologies.

We are only now building our understanding of what kinds of new skills Al-enabled work will require. There are some things we know already. This includes the importance of basic Al literacy and how critical thinking, cross-disciplinary problem-solving, effective collaboration, and empathy are likely to increase in value. Nevertheless, there are other open questions about Al's impact on work that will need further study. These include how best to use Al to support re-skilling and how to minimise the risk of "skill atrophy", as routine tasks that previously provided training opportunities for novice employees are increasingly automated. Companies, civil society, and policymakers will need to constantly evolve skilling programmes to address these questions.

We need an education and training system that prepares workers to thrive in a dynamic environment and to augment their existing skills and talents with AI. This must extend beyond the secondary education system to equip all students and workers with foundational AI skills. <u>FutureSkills Prime</u>, a joint initiative by the MeitY and the trade association, <u>Nasscom</u>, is offering affordable digital upskilling courses, including in AI.

In a country with a burgeoning young population like India, treating AI as a core component of the education and professional development systems can deliver important benefits. According to a report by Educational Perspectives on Digital Technologies in Modeling and Management, integrating AI in vocational education and learning will significantly enhance skills acquisition in India by 2030. AI-based tutorial and simulation systems can meaningfully personalise learning and provide interactive educational content.

Encouragingly, the Central Board of Secondary Education (CBSE) has introduced AI as a subject in its affiliated schools to familiarise students with AI concepts. It is important to build on and expand existing government <u>initiatives</u> to leverage AI in the classroom and transform how students learn.

Looking ahead, India will benefit from further supporting educators to update curriculum frameworks, doubling down on STEM education with an emphasis on AI literacy (while avoiding narrow recommendations like 'learn to code' that may be less relevant if generative AI can cover basic coding skills), and emphasising skills-based learning models, including apprenticeship programmes.

Supporting workers in transition

Every major technological revolution disrupts existing roles while creating new ones, and AI will be no exception. It is important for Indian workers across sectors, in both urban and rural areas, to gain the skills that help them stay ahead of industry changes. This means that skills development must not stop when people leave school or college, and that one should instead embrace a "whole career" approach to learning and skills.

Al is already helping to democratise access to skills platforms, particularly benefiting underserved groups in rural areas historically excluded from technological advancements. While the transition to an Al era may entail some job losses in the short term, there is long-term potential for Al to generate more jobs in India.

India must continue developing programmes and strategies focused on skills for workers in transition and new entrants to the workforce. Google is continuing to update the Google Career Certificates (GCC) programmes to help learners in India attain critical digital skills. Over 80% of GCC graduates are already reporting a positive career outcome within six months of completion (e.g. a new job, promotion or raise). The continued evolution of the IndiaAl Future Skills programme should consider, in partnership with industry and academia, how the skills environment will continue to change and what that might mean for skills courses that are provided.

Key steps that Indian policymakers can take to build an Al-empowered workforce and support workers in transition include:

- Encouraging companies that have developed career certificate and apprenticeship programmes to work across sectors to develop more comprehensive cross-sectoral skilling and certificate programmes that reflect the full spectrum of skills needed for an AI-driven future.
- Building reskilling into the skills element of the IndiaAI Mission and ensuring that workers have the capability to update their skills at a variety of points in their career. The \$15 million AI Opportunity Fund: Asia-Pacific a collaborative effort with Google.org and Asian Development Bank is supporting underserved workers and job-seekers to build AI capabilities and confidence across the region, including India.
- Developing an AI adjustment assistance programme to provide support for workers impacted by AI, with a tailored set of skilling options that can adapt to different worker needs in different geographies, and a focus on lower-wage workers and rural or underserved communities.



Promoting Inclusive Adoption and Accessibility

In addition to building AI and preparing students and workers, India will benefit from ensuring that AI is applied in a universally accessible and useful way to help solve real world problems. To do this, we have identified four key goals:

- Promote inclusive access to necessary infrastructure to access and benefit from AI, with particular attention to marginalised communities;
- 2. Increase governmental adoption of AI to make people's lives easier and better and address major public priorities;
- 3. Ensure that small businesses and traditional industries are able to adopt AI applications; and
- 4. Regulate AI applications in a way that facilitates their adoption across different industries.

Promoting inclusive access to foundational infrastructure for AI, with particular attention to marginalised communities

As earlier noted, AI has the potential to positively transform India's society and economy significantly. Indeed, many of the most substantial benefits will be realised in rural areas and agriculture, where AI can play a crucial role in tackling poverty and bridging the urban-rural economic divide. However, fulfilling and maximising these benefits requires robust infrastructure to be in place throughout India.





Bridging the urban-rural digital divide, especially in <u>access</u> to the internet, is crucial. There are a number of ways that India can ensure underserved and diverse communities are engaged in <u>each element</u> of the AI design and implementation process:

- Building safeguards into model design to ensure that different communities within India are taken into account. Google is continuing to undertake research into how fairness can be ensured with an often complex and sometimes overlapping range of social groups.
- Inter-disciplinary and participatory design processes, with AI developers working directly with different communities that might be impacted by their systems.
- The Government should incentivise fundamental research on the development of responsible and inclusive AI and ensure that stakeholders from different groups are included in the research process. This should also involve convening research conferences and responsible AI workshops to help socialise India's own models of fairness into the development of global responsible AI frameworks.
- Ensuring that a rich variety of datasets are utilised, including those of diverse and underserved groups.
 Such Indian specific datasets are crucial in making sure that AI solutions are developed for the local context.

Government Adoption of AI

The Indian Government can lead by example in AI adoption and, in turn, promote economy-wide adoption of AI in two ways. First, it can leverage AI to improve the delivery of services to citizens, which has the additional benefit of familiarising people with the underlying technologies and building trust that AI can be used in helpful ways. Second, by adopting AI, it can further strengthen its domestic technology sector. The scale of government deployment and investment can ultimately help further catalyse a domestic AI ecosystem and, by requiring standards for AI system performance, can also

help mature the quality and safety of commercial and enterprise AI products.

An integral element of governmental use of AI is ensuring that AI is built into public services as part of India's Digital Public Infrastructure (DPI). AI can shift DPI from being an important element of public service delivery to using DPI to genuinely transform public services around the citizen. AI can be used to analyse complex data sets, anticipate potential issues such as financial distress and craft proactive interventions. As early examples of what is possible, Indian Government's projects such as <u>Bhashini</u> have shown the benefits of ensuring that digital services reach all citizens, regardless of language.

Additionally, AI can revolutionise the delivery of welfare services. A Bengaluru-based NGO, <u>Societal Thinking</u>, has highlighted that AI could empower India's underserved communities to better engage with the state. For instance, AI-enabled personalisation can tailor services to individual needs of underserved citizens. Furthermore, AI streamlines Indian citizens' interactions with government agencies. India's diverse population also enriches datasets for AI development. Finally, AI solutions can evolve over time in order to work at scale, based on the data that becomes available on the effectiveness of their results.

India will benefit from continuing to assess the most effective uses of AI in local and regional public service delivery. Based on such comprehensive national AI opportunity assessments, the Government can then consider whether such initiatives can be scaled nationally, potentially through partnering with the industry. This process may include identifying and addressing any procurement barriers to AI adoption and moving towards more transparent rules that facilitate fair competition and accelerate AI adoption.

It is also essential to build awareness and understanding of AI within all government departments. Working with industry through training courses, such as Google's <u>AI Essentials</u> course, presents an effective way of equipping the public sector with foundational AI knowledge.



Finally, the Indian Government will need to build adequate AI expertise to effectively harness AI. Policymakers should build and scale up "in-house" AI skills for the government IT workforce. Google took a similar step a few years ago requiring all software engineers to enrol in an internal machine-learning curriculum.

Small Business and Traditional Industries

India's business services, finance, transportation, education, retail, and healthcare are <u>expected to</u> benefit significantly from AI, driven by their focus on digitalisation, productivity, efficiency, and personalised experiences. For start-ups and SMEs across sectors, early use of AI could prove transformative, boosting their productivity and ability to reach new customers.

MSMEs form a key pillar of India's economy, <u>contributing</u> 29% to GDP in 2021-2022. As MSMEs stand to benefit from greater AI adoption, government support on MSMEs' AI deployment becomes crucial. For example, the Ministry of Micro, Small & Medium Enterprises (M/o MSME) can play a helpful role in engaging with MSMEs to evaluate their state of AI readiness.

The private sector also has a critical role to play in enabling MSMEs' AI adoption. A useful step is to give MSMEs access to the essential AI technical infrastructure. A number of technology companies, including Google, are working to improve access to compute capacity for small businesses. Private-sector solutions can also be invaluable in helping small business owners develop AI skills - the Grow With Google Educators programme, for example, provides digital upskilling for educators and teachers, including those providing skills training within companies. Public-private initiatives to support the creation of impactful AI use cases for small businesses should also be encouraged, with Google's Accelerator Programme for Indian startups as a positive model.

India's manufacturing sector is rapidly adopting AI, with 54% of Indian manufacturers already using AI and advanced analytics, a 20% increase over a two year

period. Flagship manufacturers are quickly introducing Al into their factories, design processes and customer engagement. <u>Tata Steel</u>, for example, is using Al to help predict when machinery might fail and <u>Mahindra Group</u> is using Al for quality control and customer personalisation.

To fully harness Al's potential for traditional industries like manufacturing and agriculture and fulfil the Indian Government's "Make In India" ambitions, it is important that the Government identifies barriers to increasing the use of Al within these key sectors. As an example, digital infrastructure and skills training will be essential for Al adoption in agriculture, particularly among smallholders.

To further address this AI implementation gap, the Indian government should build on existing work and:

- Identify priority national sectors that have the highest need and/or the lowest uptake of AI tools, such as the agriculture, manufacturing, healthcare, and energy sectors, and work with these sectors on "proof of concept" initiatives to model effective AI deployment.
- Give small businesses a "digital jumpstart" through new models of technical assistance and engagement, including digital coaches who can help businesses understand and leverage AI to capitalise on new opportunities.
- Improve access to capital, including through low-interest loan and grant programs designed to support AI-driven transformation. The Indian Government can build on its grant initiatives like those included in the IndiaAI Mission. Singapore's Infocomm Media Development Authority (IMDA) recently announced a plan to provide funding support to up to 300 SMEs to trial generative AI enterprise solutions developed by IMDA.



 Target AI training resources towards small businesses and traditional industries in underserved communities to build confidence and competency.

Enabling Regulatory Framework

The Indian Government has proactively recognised the need to create frameworks that empower Indian enterprises, including SMEs and traditional industries, to embrace AI, rather than hinder their adoption. Indian regulators should further consider what approaches will facilitate the adoption of AI, including adoption by SMEs with fewer resources. Any AI regulation should therefore be proportionate, light touch, risk-based and focused on applications, recognising that AI is a general purpose technology. Regulatory requirements should be calibrated to the particular risk and use case to avoid inhibiting low risk AI innovation and adoption of AI technologies, at large.

The use of common international and technical standards can also facilitate AI adoption and growth for SMEs. Common standards mean that where a SMEs is required to show its compliance with a regulation, it can do so by showing adherence to the common standard, rather than having to meet a bespoke requirement. It will be beneficial for the Government to maintain its engagement with international standards bodies focused on the responsible development of AI systems, in particular the ISO.



Conclusion

As the Indian Government looks to realise the potential of AI technologies to serve Indian society, and increase the public's trust in AI, it has a critical global role to play in developing AI policy frameworks whereby safety, security, innovation, and opportunity are addressed cohesively. We look forward to partnering with the Indian Government, industry, and civil society to build an AI-driven digital future that works for everyone.

