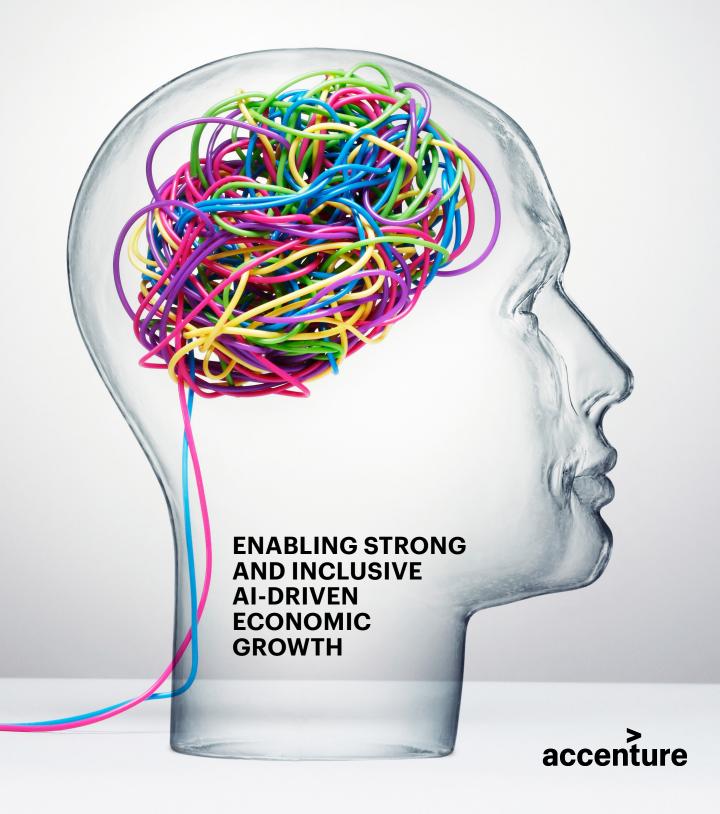
# REWIRE FOR SUCCESS

**BOOSTING INDIA'S AIQ** 



# BOOSTING INDIA'S AIQ



ENABLING STRONG AND INCLUSIVE AI-DRIVEN ECONOMIC GROWTH

Artificial intelligence (AI) has reached a tipping point. The combination of the technology, data and talent that make intelligent systems possible has reached critical mass, driving extraordinary growth in AI investment. Across the world, G20 countries have been building up their "artificial intelligence quotient," or AIQ. The power of AI starts with people and intelligent technologies working together within and across company boundaries to create better outcomes for customers and society. But India is not fully prepared to seize the enormous opportunities that AI presents. Even with a tech-savvy talent pool, renowned universities, healthy levels of entrepreneurship and strong corporations, the country lags on key indicators of AI development. Much work remains. According to our analysis, AI has the potential to add US\$957 billion, or 15 percent of current gross value added, to India's economy in 2035. To avoid missing out on this opportunity, policy makers and business leaders must prepare for, and work toward, the Al revolution.

The era of AI has arrived. Established companies are moving far beyond experimentation. Money is flowing into AI technologies and applications at large companies. The number of patents filed on AI technologies in G20 countries has increased at a more than 26 percent compound annual growth rate since 2010. Funding for AI startups has been growing at a compound annual growth rate of almost 60 percent. Governments in leading G20 countries are embracing AI for public good.

Both public and private organizations around the world are taking advantage of the exponential growth in valuable data and computing power. And with the recent convergence of a transformative set of technologies, economies are entering a new era in which AI has the potential to overcome the physical limitations of capital and labor, and open up new sources of value and growth.

The AI stakes in India are high. The country remains the most competitive in South Asia, yet trails many other G20 countries in AIQ.

That is despite Indian companies adopting AI technology at a larger scale, the country's investments in tech infrastructure and the improving tech skills of its citizens. To fully seize the opportunities presented by AI, India's policy makers, universities, corporations, entrepreneurs and workers need to come together and do much more. Indeed, to boost its AIQ, India must harness both an innovative private sector and a supportive policy and regulatory framework—pursuing a balanced approach to AIQ enhancement across stakeholders.

# THE OPPORTUNITY FOR AI-DRIVEN GROWTH



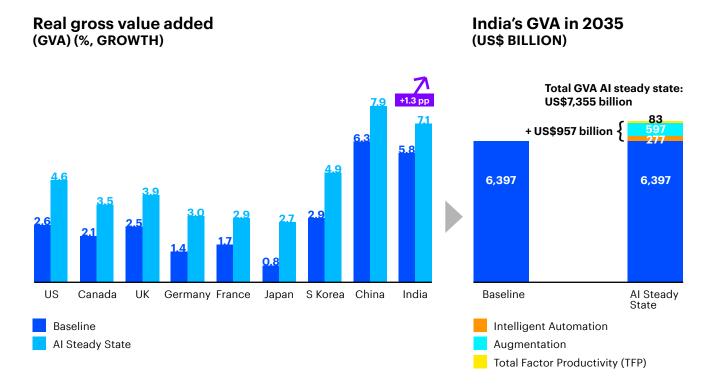
Al is a new factor of production that can augment labor productivity and innovation while driving growth in at least three important ways:

- 1. Automating complex, physical-world tasks that require adaptability and agility—what we call "intelligent automation".
- 2. Complementing and enhancing the skills and abilities of existing workforces.
- 3. Driving innovations in the economy. Over time, this will become a catalyst for broad structural transformation as economies using AI will not only do things differently, but they will also do different things.

With these three impacts, AI has the potential to add up to an entire percentage point to the annual economic growth rates of the countries analyzed. Indeed, AI is expected to raise India's annual growth rate by 1.3 percentage points by 2035—in a scenario of intelligent machines and humans working together to solve the country's most difficult problems. This amounts to an addition of US\$957 billion, or 15 percent of current gross value added (a close approximation of GDP), to India's economy in 2035 compared with a scenario without AI (see Figure 1).

### Figure 1. The economic impact of AI on select G20 countries

By 2035, Al has the potential to double annual growth rates in terms of gross value added.



Source: Accenture and Frontier Economics

### WHERE ARE THE MOST PROMISING OPPORTUNITIES?

For big companies and industries, AI can boost growth and profitability and transform businesses. Take manufacturing. The sector could see a share-of-profit increase of 39 percent due to AI-powered systems whose ability to learn, adapt and evolve over time can eliminate faulty machines and idle equipment.<sup>II</sup>

For entrepreneurs and young companies, AI can serve as a tool to take on much larger incumbents. India's own Flipkart, founded a decade ago, is working on an AI system to make smarter decisions in ordering, distribution and product pricing on its platform. This will enable the online retailer to boost efficiency and reduce the cost of products for customers—and allow it to compete with global companies such as Amazon in India.<sup>iii</sup>

For society as a whole, AI can improve public safety and even save lives (see Sidebar 1). Indian Railways, along with RailTeI, is working with the Indian Space Research Organisation to devise safety mechanisms, using AI and machine learning to make travel by trains safer.<sup>™</sup>

### **HOW TO MAKE THE MOST OF THESE OPPORTUNITIES?**

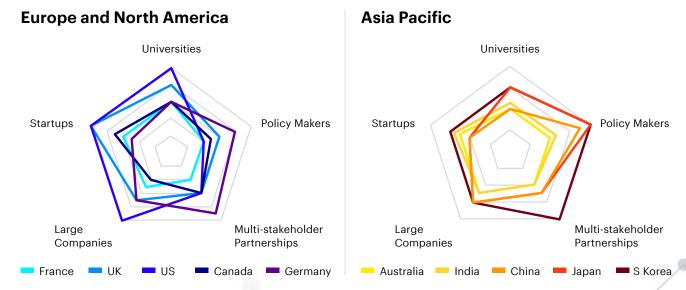
# BOLSTERING THE FIVE-PILLAR ECOSYSTEM



Accenture analyzed AI innovation in 10 leading countries in Asia, Europe and North America. Our research shows that vibrant AI ecosystems are based on five pillars: universities, large companies, startups, policy makers and multi-stakeholder partnerships (see Figure 2). The relative role of these five varies from market to market, partly depending on the maturity of specific industries and the political culture of each country.

### Figure 2. Contrasting regional approaches to AI development

Vibrant AI ecosystems are based on five pillars though their relative role varies from market to market.



Source: Accenture Research, see "About the Research" for methodology

# UNIVERSITIES AND RESEARCH INSTITUTES

Universities and research institutes are the seedbed for AI ecosystems and offer fertile ground for leading scientists and engineers to get their start and develop their ideas into new businesses. But beyond fundamental research, it is the ecosystem that develops around them that makes universities a key pillar of Al. Consider Cambridge and Oxford universities in the United Kingdom. where several startups that achieved major AI breakthroughs and later became prime acquisition targets took shape. Google bought DeepMind in 2014, Apple purchased VocalIQ in 2015, and Microsoft purchased SwiftKey last year.

In India, AI research has been motivated by societal need—the need to bridge language barriers in the country (speech and natural language processing to make useful information accessible to people in different languages) or the need to enable disadvantaged sections of society to reap the benefits of information technology (text-to-speech for visually impaired persons), for example. The country established a number of hubs to focus on different areas of research, including expert systems at the Indian Institute of Technology (IIT), speech processing at the Tata Institute of Fundamental Research, parallel processing at the Indian Institute for Science, image processing at the Indian Statistical Institute and natural language processing at the Center for Development of Advanced Computing.<sup>v</sup> But it took India until the start of this decade to set up AI research and innovations to explore how artificial intelligence can drive economic growth. Though they have come late, these initiatives, particularly around talent development, have been instrumental in fostering India's entrepreneurial activity in recent years (see Sidebar 2).

#### Sidebar 1.

### AI TENDING TO INDIA'S HEALTH

India's healthcare providers have embraced artificial intelligence, recognizing its significant value in better diagnostics with data intelligence and in improving patient experience with AI-powered solutions.

Take Manipal Hospitals, headquartered in Bengaluru, which is using IBM Watson for Oncology, a cognitive-computing platform, to help physicians identify personalized cancer care options across the country.

In cardiac care, Columbia Asia Hospitals in Bengaluru is using startup Cardiotrack's Al algorithms to predict and diagnose cardiac diseases, disorders, and ailments.

And in eye care, Aravind Eye Hospital is working with Google to use AI in ophthalmology for diabetic retinopathy screening. Also, the government of Telangana is planning to use Microsoft Intelligent Network for Eyecare (MINE), an AI platform, to reduce avoidable blindness, which would make it the first state in India to deploy AI for eye care screening as part of the Rashtriya Bal Swasthya Karyakram program under the National Health Mission.

Accenture, for its part, has developed an Al-powered smartphone solution to help the visually impaired improve the way they experience the world around them and enhance their productivity in the workplace. The solution, called Drishti, was initially developed and tested through a collaboration with the National Association for the Blind in India.

### Sidebar 2.

## AI TALENT AND INNOVATION ECOSYSTEM

In 2016, India produced 2.6 million graduates with STEM (science, technology, engineering and mathematics) skills—the foundational skills to build AI technologies. This new talent pool is the country's biggest asset to drive innovation. But practical proficiency levels and employability of many graduates have remained low, according to recent studies. This puts the onus on large companies, industry bodies, universities and research institutes to nurture the new skills demanded by AI and fund core research to lower the entry bar for smaller players in the ecosystem.

On the upside, the Karnataka government is showing the way by investing in the Centre of Excellence for Data Science and Artificial Intelligence (CoE-DS&AI) in Bengaluru. This is in partnership with the IT industry body, Nasscom, which is setting up a similar CoE in Hyderabad. Further, the IT Ministry's National Institute of Electronics and Information Technology (NIELIT) plans to formulate new courses to train people in Al and blockchain.

In fostering a vibrant talent ecosystem, the country also benefits from the presence of large multinational companies, including Accenture, that have set up Al innovation centers in India. Intel India, for example, will offer 60 courses under its Al Developer Education Program with the goal of training 15,000 scientists, developers, engineers and students on Al by 2018.

## • STARTUPS

Entrepreneurial dynamism in AI varies greatly from country to country. Measured by startup financing deals and dollars from venture capitalists between 2010 and 2016, the United States' AI startup ecosystem dominates, followed by China, which is gaining pace.

India ranked third among G20 countries in 2016 measured by the number of AI startups, which have increased since 2011 at a compound annual growth rate of 86 percent—higher than the global average. But the size of funding is substantially smaller than in the United States and China, reflecting the limited success of India's AI startups in achieving scale so far. Machine learning, recommendation engines and computer vision are the most popular segments, accounting for almost 80 percent of total funding. Internet, including businessto-consumer (B2C) offerings, is the bestperforming sector both in terms of total number of startups and funding received, followed by mobile and telecom. Other sectors in India seeing positive developments are healthcare, software and industrials.

One example of the value of breakthrough innovations created by India's startups is SigTuple. Its data-driven intelligence platform for healthcare management can analyze blood slides and generate an entire pathology report without requiring a pathologist, enabling easy access of medical tests to people in remote areas and at a fraction of the cost.vi

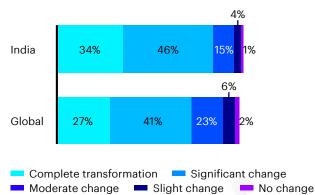


Big industry players that have the financial strength and business experience to invest in Al research and development (R&D) typically lead the strategic charge on global competitiveness for their country. Among US players, large technology and digital platform companies such as Google, Amazon, Facebook and Apple are spearheading Al innovations and becoming magnets for entrepreneurship. Baidu, Tencent, and Alibaba are doing the same in China. Our preliminary analysis indicates that digital platform companies are the driving force of Al innovations in India also, in line with global trends (see Sidebar 3).

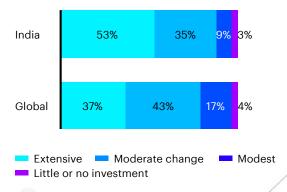
Among incumbent industry players, leading Indian banks have rolled out, or are pilot testing, Al-powered conversational chatbots for their websites and/or mobile applications. Tata Motors has collaborated with Microsoft to leverage the latter's connected vehicle technology that uses AI, advanced machine learning and the Internet of Things to enhance driving experience.vii This is just the start. In an Accenture TechVision 2017 survey of business and IT executives, nearly 80 percent of respondents in India-higher than the 68 percent global average—believe that AI will transform their organization significantly or completely over the next three years. And more than 88 percent of respondents in India anticipate making moderate-to-extensive investments in one or more Al-related technologies over the next three years (Figure 3).

### Figure 3. Business transformation and investment in AI

**Q:** To what extent do you believe Al will transform your organization over the next three years? Please select one.



**Q:** To what extent do you anticipate making investments in the following Al-related technologies over the next three years? For example, machine learning.



Source: Accenture TechVision 2017 Survey of 5,400 business and IT executives across 31 countries



When it comes to AI, policy makers must do two things at once: manage the fears about the impact of AI on society while encouraging innovation. But this won't happen without the concerted efforts of many actors, including those in government. So what are governments doing to improve access to the essential ingredients of successful AI innovation? Analysis of the 10 countries shows a clear pattern of hybridization, with one type mainly driven by private sector companies in countries such as the United States and the United Kingdom, and one largely promoted by the government, for instance, in China or Japan (Figure 2). In both types of hybridization, governments have a critical role to play to ensure the three factors of successful AIQ development-technology, data and people -are accessible to all stakeholders of the Al ecosystem.

In India, the Ministry of Electronics and Information Technology, working with Nasscom, has recently created a "policy group" to work out a policy framework and road map for emerging technologies, including AI, blockchain and big data analytics. Also, the Ministry of Commerce and Industry has constituted a "task force on AI" to explore possibilities for leveraging AI for development across various fields in manufacturing and services. Although these are promising starts, India's policy initiative is not comprehensive yet and lags other G20 countries. For instance, Japan unveiled an overarching AI strategy in 2016 for building its tech-infused, ultrasmart "Society 5.0."



The collaboration among these stakeholders, usually through some partnership negotiated between the public and the private sectors, is critical to the development of an accessible AI ecosystem. Consider what is happening in Europe. The European Commission has set up the Partnership for Robotics in Europe (SPARC), a publicprivate partnership to develop a robotics strategy for the region. With €700 million EC funding for 2014-2020, coupled with private investment of €2.1 billion, it is believed to be the biggest civilian research program in this area in the world. And the manufacturing hub in Germany's Stuttgart-Tübingen area is transforming itself into a Al research hub, with critical support from the country's industrial giants Daimler, BMW, and Bosch. Most recently Amazon committed to contribute US\$1.5 million to this collaborative research effort and a further US\$500,000 to fund individual research awards.xi

Both these programs, the European Commission's SPARC and Germany's Cyber Valley collaboration, attract high levels of private sector funding and participation to execute on the region's vision on Al. India's task force on Al is technically a public-private collaboration—between government departments, the IITs and research institutes, large Indian companies and consultants—but does not yet draw on research funding and the deployment of services from private sector players to the same extent as the European programs.

### Sidebar 3.

### **DIGITAL PLATFORMS DO INTELLIGENT BUSINESS**

In line with global trends, digital platform companies in India are fast adopting Al. Ola, one of India's leading ride-hailing apps, is using data science and machine learning to track traffic, improve customer experience, understand driver habits and extend the life of a vehicle. Myntra, the online-fashion retailer acquired by Flipkart, is using Al to process fashion data and predict trends to launch a fully automated clothing collection without any intervention from a human designer. Online commerce players, including Myntra, Quikr, Lenskart and Urban Ladder, use the Locus Al platform to optimize intra-city logistics and to potentially predict product demands and returns. And Paytm is using machine learning to detect and prevent fraud; the platform makes 20,000 recommendations per second to its 225 million user base—each of them in under 20 milliseconds.

These companies recognize that the most critical levers at their disposal to develop their AlQ are access to data, technology, people. Ola, which maintains a vast database of drivers, customers and every single trip that has taken place on its platform, is deeply rooted in data intelligence to build innovative solutions. Myntra uses a combination of open source technology tools such as Google's TensorFlow and Caffe and then builds its own Rapid tech platform on top. And finding the right talent is vital to the success of Paytm Labs, hence its location in Toronto for easy access to data science experts.

# STEPPING UP TO THE OPPORTUNITY



To boost its AIQ, India must harness both an innovative private sector and a supportive policy and regulatory framework—pursuing a balanced approach to AIQ enhancement across stakeholders. Despite the debate surrounding the workforce and ethical risks of AI, there is a far greater risk to general economic well-being, workers' earning potential and global competitiveness if India inhibits the development of AI. Indeed, government and policy makers must act now to address the barriers to growth—with the help of enterprises, entrepreneurs, innovators, and researchers. The future development of AI in India is not just a regulatory issue. It requires a comprehensive response, particularly on issues relating to the regulation of data, research and development, collaboration between academic researchers and industry, alignment of infrastructure development, and retraining the country's workforce.

To understand how to foster growth and innovation while safeguarding consumer rights and ethical considerations, India's AI stakeholders should consider the following five recommendations:

# FORGE A NATIONAL AI PLAN AND MULTI-STAKEHOLDER PARTNERSHIPS IN KEY SECTORS

A first step for India is to create a comprehensive, long-term vision and road map for AI in the country's economic development. Recently, the government drew up a seven-point strategy that would form the framework for India's strategic plan to use AI.xiii The national AI plan with clear milestones should be set as a priority. Here, India can follow the lead of China, which has laid out clear targets for AI development in phases, initially by 2020 and going forward by 2030.xiiii

For India, the next step is to forge partnerships among governments, industries and civil societies to develop guidelines and best practices. This will allow all the parties involved to come together to solve the range of technical issues and ethical questions raised by Al applications and employ technologies aligned to the national plan.

# STRENGTHEN INDIA'S AI R&D ECOSYSTEM, INCLUDING THROUGH BETTER INTERNATIONAL COOPERATION

The government, inviting participation of large companies, should strengthen R&D in AI to facilitate innovation and promote accessibility to smaller participants in the ecosystem. This means increasing the R&D spending on AI to support India's broad-based economic growth,

in addition to the existing AI research funding for specific societal needs. Similar to what the Canadian government is doing. It is investing C\$125 million in a Pan-Canadian Artificial Intelligence Strategy to strengthen research in AI, also intended to attract and retain top academic talent.\* Further, the government of India must encourage international collaboration on research in core technologies, particularly in AI safety and security.

### ENABLE AND BROADEN ACCESS TO DATA

Al innovation depends on massive quantities of data. The full economic and social potential of these emerging technologies will be met only if data is widely accessible. The government has a key role to play, particularly in opening up data to small enterprises—which, unlike large corporations, might not have the resources to accumulate a critical mass of data. The government is leading by example with the Open Government Data (OGD) Platform India, a single point of access for the public to datasets, documents, services, tools and applications collected by the ministries. The goal is to increase transparency and open avenues for innovative uses of government data.xv

Along these lines, the government should encourage scientific and research institutions to share data and collaborate over such platforms, which can help support the development of vibrant AI ecosystems. They should also clarify rules regarding the intellectual property ownership of AI-generated content/system and datasets used to train the system, which will encourage further innovation by members of the ecosystem. And they must do this while balancing consumers' privacy concerns and state interests. This will not be easy. As such, a policy framework that recognizes and formalizes the ownership, rights and responsibilities of various entities in the value chain may be in order.

### CREATE A WORKFORCE OF THE AI FUTURE, FOSTERING INCLUSIVE WORKFORCE MODELS

To work in AI, people will need an entirely new set of skills and capabilities. Companies must make radical changes to their training, performance and talent acquisition strategies. At the same time, the central and state governments of India must step up efforts to equip its citizens with the multidisciplinary and STEAM skills—science, technology, engineering, arts, and mathematics—demanded by AI. For example, the UK government has pledged £84 million to train an additional 8,000 computer science teachers at a new National Centre for Computing, and plans to work with industry to produce teaching resources for the subject.xvi

And both the public and private sectors must make every effort to train disadvantaged groups: minorities, women, and disabled persons.

## EMBRACE SMART REGULATION TO SAFEGUARD RESPONSIBLE AI

AI will be more beneficial to humanity if governments follow a set of guiding principles on "responsible AI"—human-centric by design, accountability, fairness, honesty and transparency. The challenge for India's policy makers is approaching AI with the twin goals of promoting trust and preserving maximum flexibility to innovate. This requires smart regulation that adapts to the shorter innovation cycles of AI. One example is autonomous vehicle insurance. Looking to the future, the UK Department for Transport has proposed new two-way insurance policies that cover motorists whether they are driving or not. When the car is in driverless mode, insurance companies would recover the costs of claims from the party responsible for the crash, which may be the manufacturer.

Policy makers and standards bodies in India should work with businesses to learn how they are developing their own responsible AI practices. These private sector efforts will help inform future public policy.

# A CALL TO ACTION

At a time when India is striving to rekindle productivity and growth, Al promises to fill the gap. A full and responsible implementation of Al will open new economic opportunities that would not otherwise exist. The guiding principle should be to create "people first" policies and business strategies, centered on using Al to augment and extend people's capabilities for the benefit of humankind.



Just as individuals can boost their IQ through mental exercises, we believe India can also take steps to boost its AIQ. Business and policy leaders will have to bring an India-focused, "people first" mindset to the effort. Time is short. Among the world's largest companies and economies in AI, only a small minority demonstrate high levels of AIQ. India must join them in the coming years to enjoy the greatest potential for growth and sustained market leadership.



### **RESEARCH METHODOLOGY**

Conducted between January and May 2017, Accenture undertook the research and analysis on behalf of the G20 Young Entrepreneurs' Alliance to publish two global reports: "Boost your AIQ: Transforming into an AI Business" and "Embracing AI: Enabling Strong and Inclusive AI-driven Economic Growth." The analysis on India was updated in October. The research program included:

Analysis of Artificial Intelligent Quotient (AIQ) development in 10 G20 countires (Australia, Canada, China, France, Germany, India, Japan, South Korea, United Kingdom and the United States) using the approach given below:

### **STAKEHOLDERS**

### PARAMETERS TO ASSESS AIQ DEVELOPMENT

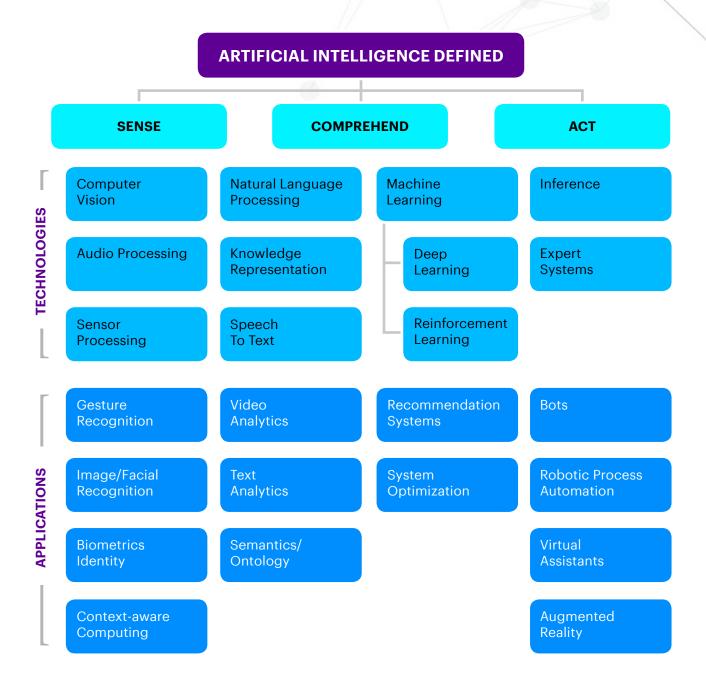
- 1. UNIVERSITIES
- Number and citation of patents on AI technologies filed by universities (sources: DWPI from Thomson Innovation ® Thomson Reuters 2017
- Evidence of startups seeded by universities and partnerships with industry
- STARTUPS
- Investment in AI startups: number of deals, financing dollars and growth rate for 2011–2016 (source: CBInsights, Tracxn)
- Evidence of startups' performance at the country level, e.g. time to IPO, number of startups acquired by companies, startup business growth where ascertainable
- 3. LARGE COMPANIES
- Number and citation of patents on AI technologies filed by companies (source: DWPI from Thomson Innovation ® Thomson Reuters 2017)
- Number of announcements on AI keywords (source: Web crawling of news)
- 4. POLICY MAKERS
- Evidence of policy and regulatory initiatives, including direct funding to develop AI through national and international collaboration (source: media releases)
- 5. MULTI-STAKEHOLDER PARTNERSHIPS
- Evidence programs that bring together stakeholders across public and private sectors to move Al forward (source: media releases)

AIQ development at the country level was done using a mix of secondary data, qualitative analysis and AI-powered Web crawling tools.

For each country, we identified evidence of AI activity at the four stakeholders and their partnerships, and assigned an initial score on a scale of 1 to 5. The overall AIQ development is the relative positioning of each country in the group of 10 countries.

We validated the AIQ development findings with more than 50 leading AI experts from different fields.

### Assessment of AI technologies and applications in search strings:



As a system that possesses human-like intelligence and learning capabilities

As a collection of technologies that, together, enable human-like intelligence

Note: Classification of technologies versus applications or capabilities is subject to individual interpretation. The list is not exhaustive.

# MODELING THE GVA IMPACT OF AI

Al has the potential to have a broad-based disruptive impact on society, creating a variety of economic benefits. While some of these benefits can be measured, others, such as consumer convenience and time savings, are far more intangible in nature. Our analysis focuses on measuring the GVA impact of Al.

We began with a modified growth model developed by Robin Hanson, professor of economics at George Mason University, Virginia, United States. We looked at the additional increase in growth that would occur as a result of AI by contrasting it with the baseline growth rate.

In our model, we defined labor as a continuum of tasks that can either be performed by a human or artificial intelligence—not work solely done by humans. The intent was to introduce intelligent systems as an additional workforce capable of handling activities that require an advanced level of cognitive agility.

To estimate the shares of workers' tasks that could be performed by intelligent machines (AI absorption rates), we drew on research by Frey and Osborne who take a task-based approach to identifying roles and occupations that are affected by AI.XVII The estimates are aggregated at country and industry-level, taking into account the different mix of occupations and industries within each country. These figures were adjusted to reflect:

### Assumption about long-run employment:

We assume that employment will be constant in the long term.

### • Differences between Al's technological potential and actual potential achieved:

We considered the uptake of Al—from zero to the maximum technological potential. We assumed that a 50 percent uptake would be reasonable in the time frame analyzed, that is, Al substitution is assumed to achieve 50 percent of its technological potential.

#### Capacity of countries to absorb AI technologies:

A key driver of the impact of AI on growth is how well each country is positioned to benefit from the emergence of new technologies and how ready it is to integrate them into its economy—measured by what we refer to as a country's "national absorptive capacity" (NAC). This includes factors such as access to a sophisticated information and communication technology infrastructure, a reliable regulatory framework, and considerable public and private investments in the digital economy. All economies that derive a significant AI dividend rank high on this index. This is a relative measure where countries are compared to the top performer, the United States. For further details on the importance of national absorptive capacity, see "The Growth Game-Changer: How the Industrial Internet of Things can drive progress and prosperity."XVIIII

With these calculations and adjustments, we arrived at our final estimates of AI absorption rates used in our macro model. Along with the quantitative model, we supplemented our research by conducting interviews with experts from a range of different disciplines and secondary research to provide insights into the capacity of AI to generate economic growth.

### **REFERENCES**

 Accenture, Why AI is the Future of Growth, 2016: https://www.accenture.com/ro-en/\_acnmedia/PDF-33/Accenture-Why-AI-is-the-Future-of-Growth.pdf

ii. Accenture, How AI boosts industry profits and innovation, 2017: https://www.accenture.com/us-en/insight-ai-industry-growth

iii. Forbes, media article, April 2017: http://www.forbesindia.com/column/column/a-bigger-bolder-flipkart/46799/1

iv. Livemint, media release, September 2017: http://www.livemint.com/Politics/2ekZqLSx2u7SYOhu3avk6I/Railways-to-engage-with-Isro-for-rail-safety-says-Piyush-Go.html

 Worldwide AI, A Perspective on AI Research in India, 2012: https://aaai.org/ojs/index.php/aimagazine/article/download/2356/2270

vi. TechinAsia, media article, February 2017: https://www.techinasia.com/artificially-intelligent-pathologist-bags-indias-biggest-funding-healthcare-ai

vii. Tata Motors, press release, February 2017: http://www.tatamotors.com/press/tata-motors-and-microsoft-india-collaborate-to-redefine-the-connected-experience-for-automobile-users/

viii. The Economic Times, media release, September 2017: https://tech.economictimes.indiatimes.com/news/technology/centre-forms-policy-group-to-study-artificial-intelligence/60507141

- ix. Government of India Ministry of Commerce & Industry, press release, August 2017: http://pib.nic.in/newsite/PrintRelease.aspx?relid=170231 / https://www.aitf.org.in/
- x. https://ec.europa.eu/commission/commissioners/2014-2019/ansip/blog/making-most-robotics-and-artificial-intelligence-europe en
- xi. Reuters, media release, October 2017: https://www.reuters.com/article/us-amazon-com-germany/amazon-backs-german-artificial-intelligence-research-hub-idUSKBN1CS1BT
- xii. Hindustan Times, media release, October 2017: http://www.hindustantimes.com/india-news/govt-sets-up-expert-group-for-suggestions-on-artificial-intelligence-policy/story-R4VnrCufgm7xhh1fVlz9IL.html
- xiii. China Daily, media release, July 2017: http://www.chinadaily.com.cn/bizchina/tech/2017-07/22/content\_30210432.htm
- xiv. Digital Journal, media release, March 2017: http://www.digitaljournal.com/tech-and-science/technology/canada-launches-multi-million-artificial-intelligence-strategy/article/488855
- xv. Open Government Data (OGD) Platform India website: https://data.gov.in/about-us
- xvi. http://www.telegraph.co.uk/education/2017/11/22/computer-science-teachers-trebled-chancellor-announces/
- xvii. Frey, Carl Benedikt and Osborne, Michael A., "The Future of Employment: How susceptible are jobs to computerisation?" September 17, 2013. [Accessed 29 June 2016].
- xviii. Purdy, Mark and Davarzani, Ladan, "The Growth Game-Changer: How the Industrial Internet of Things can drive progress and prosperity," Accenture, 2015. [Accessed 29 June 2016].

### **AUTHORS**



REKHA M. MENON
CHAIRMAN AND SENIOR MANAGING DIRECTOR,
ACCENTURE IN INDIA
rekha.m.menon@accenture.com



MADHU VAZIRANI
THOUGHT LEADERSHIP PRINCIPAL DIRECTOR,
ACCENTURE RESEARCH
madhu.vazirani@accenture.com



PRADEEP ROY
THOUGHT LEADERSHIP PRINCIPAL DIRECTOR,
ACCENTURE RESEARCH
p.roy@accenture.com

ACKNOWLEDGMENTS

PAUL BARBAGALLO

LADAN DAVARZANI

DAVID LIGHT

SHRIRAM MISRA

ARUNIMA SARKAR

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