ARTIFICIAL INTELLIGENCE
IS SOUTH AFRICA READY?

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The world around us is changing at a furious pace. It's left many established businesses shaken, with executives questioning their organisations' longevity. To participate in a digital future, business transformation is critical and increasingly urgent. A strategic approach is essential. To help businesses chart the way forward, Accenture has partnered with the Gordon Institute of Business Science (GIBS) to provide insight into digital technologies and the future of business.

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INTRODUCTION

ARTIFICIAL INTELLIGENCE (AI) IS TRANSFORMING THE WAY WE LIVE AND WORK - LIKE NEVER BEFORE. BUT IN SOUTH AFRICA, WHERE THE ADOPTION OF DIGITAL TECHNOLOGIES HAS BEEN SLUGGISH, A TROUBLING QUESTION LINGERS: **WILL THE COUNTRY BE LEFT OUT OF THE AI TRANSFORMATION?**

By most estimates, AI will create a market worth over $35 billion by 2025 and double annual economic growth rates, promising a future of robots and humans working together to solve the world's most difficult problems—side by side and armed with near-unlimited processing and algorithmic power.

In South Africa, the southernmost country in Africa with a population of more than 55 million people, companies find themselves encumbered by legacy technologies and systems, business models, and corporate structures, as well as sunk investments in antiquated infrastructure—all with workforces that may not be ready for the AI revolution that is already underway across the globe. Indeed, like many workers in other countries, South Africans are concerned that AI will eliminate their jobs and even worsen income inequality.

While many South African organisations have begun to embrace the potential of AI, more work remains. This report looks at South Africa's readiness to compete in an AI-driven world and offers recommendations to all stakeholders in the ecosystem on how to start preparing to address the challenges and opportunities presented by AI.

Before they can do so, they must first understand what AI is.

SO WHAT, EXACTLY
IS AI?

BY ITS SIMPLEST DEFINITION, AI COMPRISES DIFFERENT TECHNOLOGIES THAT CAN BE COMBINED IN DIFFERENT WAYS TO SENSE, COMPREHEND, ACT AND LEARN (THINK BIG DATA COUPLED WITH CLOUD CONNECTIVITY AND THE INTERNET OF THINGS).

In practical terms, what this means is working with machines to do our jobs better, create greater efficiencies and drive economic growth. From autonomous driving vehicles to live translations made possible by artificial neural networks, AI is making everything simpler and smarter.
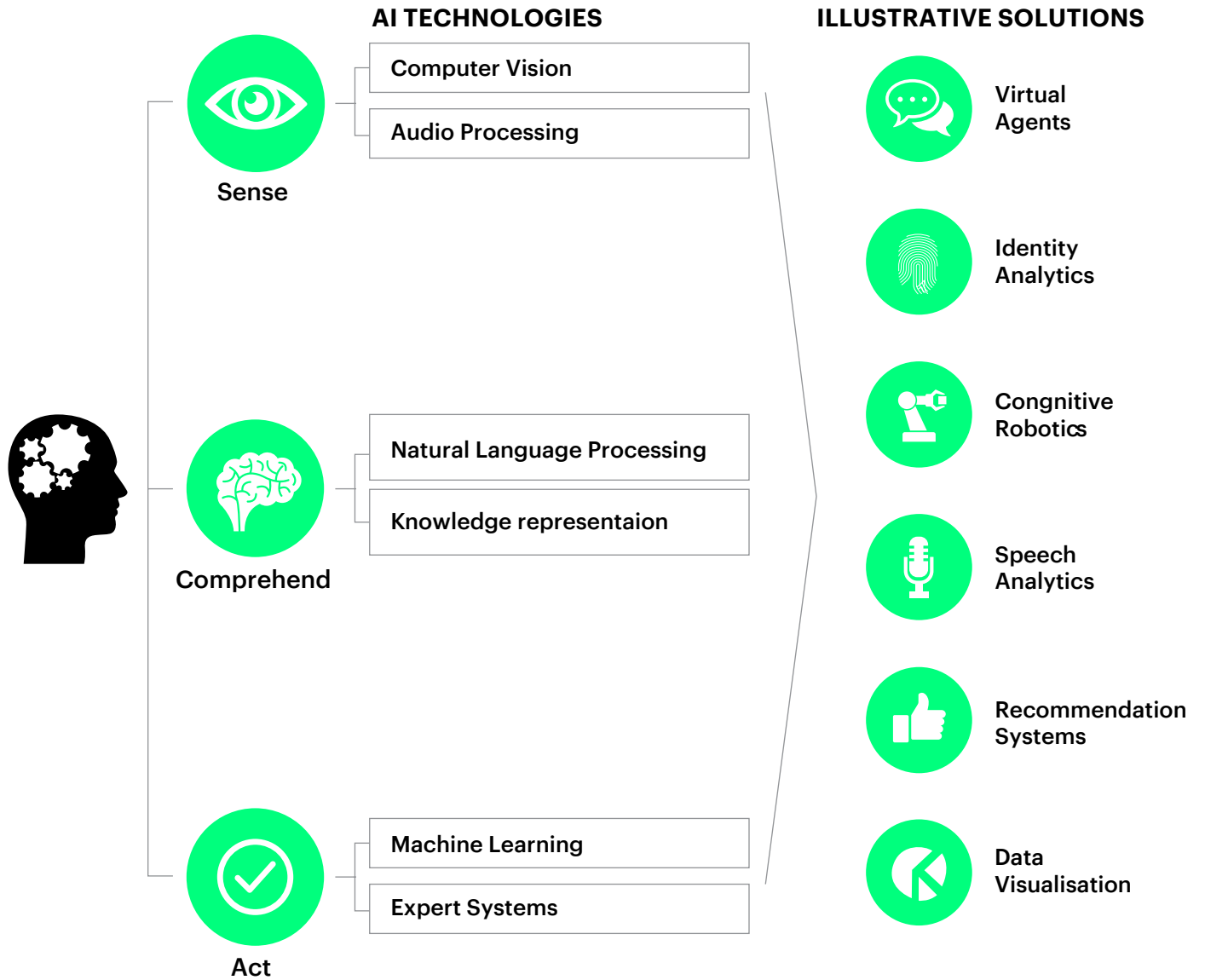
Three key factors are enabling AI to flourish in recent years:

- **(1)** quantum leaps in computing power, driven by the growth of cloud computing;

- **(2)** growth in Big Data, which has seen a compound annual growth rate (CAGR) of more than 50 percent since 2010 as more devices have become connected; and

- **(3)** significant investments in research and development (R&D) of basic AI technologies.
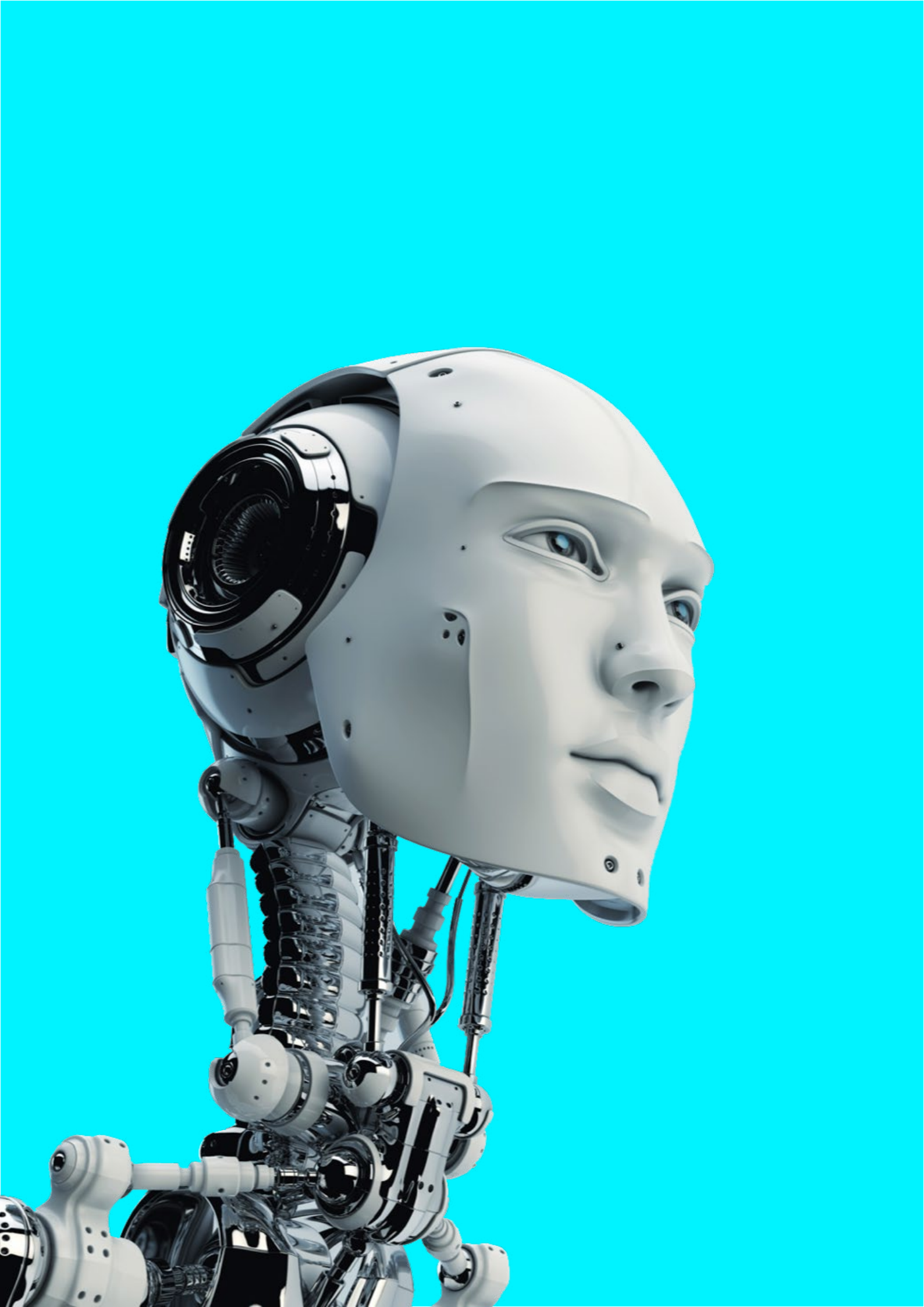
Some emerging AI technologies include computer vision, audio processing, natural-language processing, machine learning and expert systems. These self-directed, self-adaptive technologies combine with data-mining and pattern-recognition, among others, to enable AI solutions such as:

- **Virtual agents**—online chatbots taking the place of call-centre agents and sales-support personnel;

- **Cognitive robotics**—robots that can learn from experiences, the environment, and on their own;

- **Speech analytics**—software that recognises speech patterns to identify emotions and stress to improve communication, guide interactions and extract information;

- **Identity analytics**—solutions that help define access to critical data and systems based on information from authoritative systems; and

- **Recommendation systems**—social-media marketing and content targeting; and

- **Data virtualisation**—retrieval and manipulation of data by an app, regardless of its format or where it is stored.

EMERGING AI TECHNOLOGIES

AI TECHNOLOGIES

ILLUSTRATIVE SOLUTIONS

Sense
- Computer Vision
- Audio Processing

Comprehend
- Natural Language Processing
- Knowledge representaion

Act
- Machine Learning
- Expert Systems

- Virtual Agents
- Identity Analytics
- Congnitive Robotics
- Speech Analytics
- Recommendation Systems
- Data Visualisation

Source: Accenture analysis

WHY DO WE NEED AI?

EVERY YEAR, ACCENTURE'S TECHNOLOGY VISION RESEARCH IDENTIFIES EMERGING TECHNOLOGY TRENDS AND PREDICTIONS THAT WILL DISRUPT BUSINESS OVER THE NEXT THREE TO FIVE YEARS.

In our 2017 research, we predict that in five years, more than half of consumers and enterprise clients will select products and services based on a company's AI, instead of that company's traditional brand. And in seven years, most interfaces will not have a screen and will be integrated into daily tasks. These two predications alone strongly suggest that companies must act now on developing their AI journey.

IN ADDITION, THREE KEY TRENDS BORN FROM ACCENTURE'S TECHNOLOGY VISION WILL DEFINE A FUTURE IN WHICH AI WILL BE A KEY DRIVING COMPONENT:

- **An adaptive workforce:** The bureaucratic management model (which is based on fixed roles and rules designed for times of stable markets and long-term project planning) is a thing of the past. Rather an agile core of workers that help foster innovation and organisational change needed for companies to turn themselves into truly digital businesses.

- **Ecosystem power plays:** The integration of core business functionalities with third parties and platforms to provide more personalised service to customers. These new ecosystems will unlock strategic growth and help design future value chains that will change businesses, products, and even the market itself.

- **AI as the new UI:** A takeover by AI of most user, customer, employee and partner experiences, in the form of "natural" interfaces—voice, gesture, touch, natural language processing. To be sure, these will replace browser-based systems. With deep-learning algorithms, contextual analysis and image-recognition-enabling technology to constantly adapt, AI aligns itself to the wants and needs of the user. In other words, AI becomes the face of a company's digital brand, HR division and more.

In fact, most executives agree that AI will revolutionise the way they gain information from and interact with customers. In South Africa, some 78% of South African executives say they need to boost their organisation's competitiveness by innovating through investments in AI technologies, notably embedded AI solutions and computer vision. But the reality, though, is that only about a third of these organisations are planning significant AI investments over the next three years.

WHAT'S HOLDING SOUTH AFRICA BACK?

A July 2017 roundtable discussion on AI in South Africa hosted by Accenture and GIBS Business School revealed myriad concerns, including data quality, data privacy, workforce readiness and re-skilling, and potential job losses.

"AI AUTOMATES REPETITIVE TASKS … BUT IS THERE ROOM FOR ALL EMPLOYEES?" NOTED ONE ROUNDTABLE ATTENDEE.

Indeed, rather than replacing humans, AI should make people more productive, other attendees said. And organisations implementing AI solutions should bear the burden of reskilling its workforce. Inclusive economic growth must be a driver.

Beyond the average worker, greater organisational competency in data sciences is needed at the C-Suite level in South Africa for AI to reach its potential, they said.

But there's a role to play for policymakers and governments in encouraging the adoption and implementation of AI as well. For example, data privacy should be regulated—and sooner rather than later, attendees said.

In the end, though, everyone agreed that South Africa must build competencies to participate in an AI-driven future. Yet numerous structural deficiencies remain, hampering South Africa's ability to fully integrate new technologies into the economy. Those weaknesses include the quality of education systems—from primary to university levels—and scientific research institutions, as well as weak innovation ecosystems at a national level and poor enabling infrastructure to support growth. These coupled with low levels of trust and a lack of collaborative mindsets hinder the creation of such an environment.

There is some hopeful news, however. With the recent convergence 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. AI can be seen as a new factor of production that can help address future labour shortages and a chronic productivity deficit in South Africa. To estimate the true potential of the impact that AI can make, we developed an economic model built upon three main channels through which value is generated.

1. **Intelligent automation**, which differs from all previous forms of automation in that AI machines can learn and improve over time, rather than degrade.
2. **Augmenting** existing labour and capital, which means that people can be far more productive when supported by machines, and machines themselves can learn and improve their own performance without human supervision.
3. **Innovation diffusion**, which refers to how innovation begets further innovation—for example, by stimulating new ideas and business models among adjacent businesses and industries in a spill-over effect.

On the basis of these three channels, we analysed the South African economy, as well as several other countries around the world, and found that AI has the potential to add up to an entire percentage point to annual economic growth rates in the South Africa by 2035. This would also mean that South Africa could potentially double its economy's size five years earlier with AI embedded in it. [i]

ECONOMIC IMPACT OF AI IN SOUTH AFRICA

Real Gross Value Add by 2035 (%, growth)

■ Economic Growth Forecast without AI
■ Economic Growth Forecast with AI
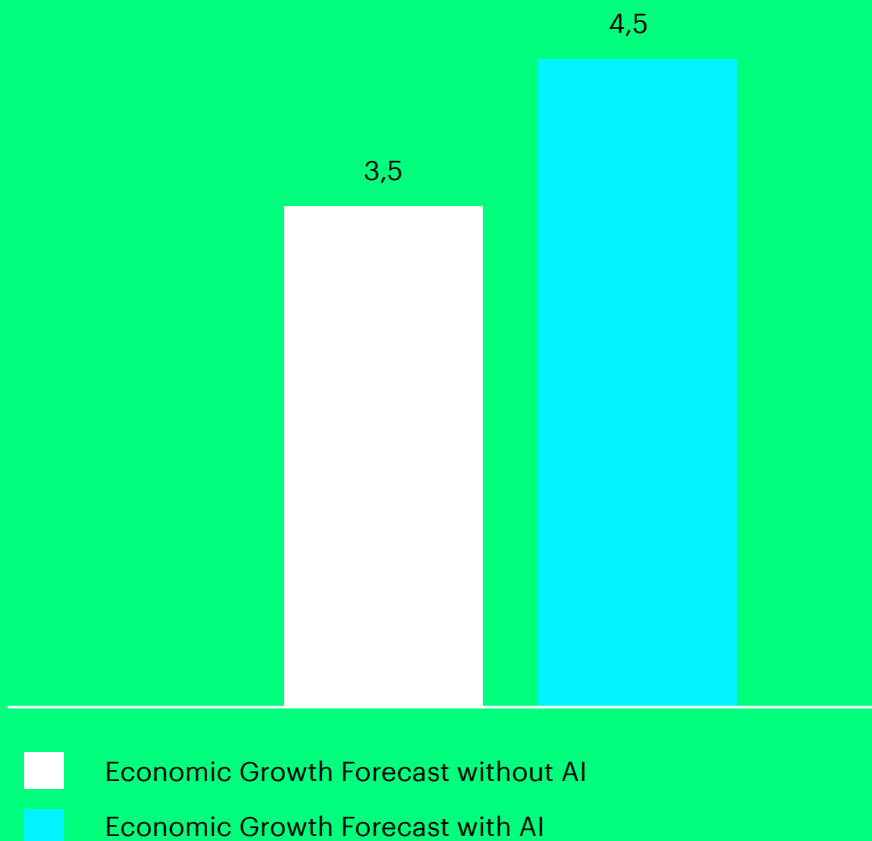
FORGING A PATH TO AN AI FUTURE

WHAT MUST SOUTH AFRICA DO NOW?

1. CREATE A VIBRANT ECOSYSTEM

By analysing AI innovation in several countries, Accenture research shows that vibrant ecosystems are grounded on five pillars or stakeholders that form the basis of building AI success: (1) universities, (2) startups, (3) large companies, (4) policymakers and (5) multi-stakeholder partnerships. The role of these five varies between geographic markets, partly depending on the maturity of industry and the nature of political culture of each country.

One type is driven more by private sector companies in countries such as the United States, though even here the role of technologically-influential government organisations in nourishing the private sector should not be dismissed. That said, in another group of countries, governments play a more deliberate and explicit role, like in China.

Universities. Universities and research institutions 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. For example in France and the UK, many AI startups have been seeded at universities. In India, South Korea and the US, large companies are sponsoring AI research projects and fellowships at universities and research institutions. In China, government spending on university scientific research has grown by double digits annually for the past decade, spurring AI progress.

Startups: Entrepreneurial dynamism in AI varies significantly from country to country. The United States AI start-up ecosystem dominates, based on start-up financing deals and dollars from venture capitalists between 2010 and 2016. However, competition to make the first rank is intensifying. While China's early AI start-up efforts lagged, it is now aggressively catching up to the level of the U.S. South African AI startups are beginning to show signs of progress and those listed by Memeburn's Digital Allstars early in 2017 include:

- Data Prophet, a creator of various machine-learning interventions, mainly for the finance and insurance sector;

- Clevva, which uses virtual advisors on AI platforms to advise sales and technical consultants;

- Aerobotics, which develops AI systems for drones; and

- Stockshop.co.za, which offers AI solutions to financial institutions.

Large companies: Incumbent players that have the financial strength and business experience to invest in AI research and development lead the strategic charge on global competitiveness for their industry and country. But large companies cannot do it alone. In this complex field of AI, collaboration of large enterprises with startups, universities and research institutions is more significant than ever before. Even Apple, which has traditionally kept research breakthroughs to itself, is now letting its AI researchers engage with the greater AI community to benefit from ecosystem collaboration.

Policymakers: What are governments doing to improve access to the essential ingredients of successful AI innovation? In both types of hybridisation (public and/or private sector led), governments have a critical role to play to develop the AI ecosystem. In China, for example, local Chinese governments are spending heavily on university scientific research and extending $800,000 to $1 million in subsidies to leading AI companies to support any AI project established in their province. [ii]

Multi-stakeholder partnerships: Regardless of the model whether public- or private-sector leads, it is seen that multi-stakeholder initiatives have the strongest influence on creating industry cross fertilisation and equal access to AI resources for entrepreneurs, big players, universities and other stakeholders alike. The collaboration of these stakeholders, usually through some partnership negotiated between the public and the private sectors, is critical to the development of an AI ecosystem. A good example is Germany that has a well-established ecosystem connecting the different stakeholders. It's well recognised private-public ecosystem includes the German Research Center for Artificial Intelligence (DFKI), a non-profit multi-stakeholder partnership, which is considered a blueprint for top-level research.

South Africa needs to fundamentally shift its thinking about AI and strategically plan to create a vibrant ecosystem where AI flourishes. A first step in this direction for South Africa is to create a comprehensive long-term vision of the role of AI in the country's economic development. China, for example, has laid out clear targets for AI development in phases, initially by 2020 and going forward by 2030. [iii]

2. TURN AI INVESTMENT INTO AI-DRIVEN GROWTH

In the past five years, startups and large companies have been building up their "artificial intelligence quotient" or AIQ.[iv] For big companies, AI presents the opportunity for business transformation. For entrepreneurs, AI is the asymmetric tool to take on much larger competitors. How can these companies turn AI investment into AI-driven growth?
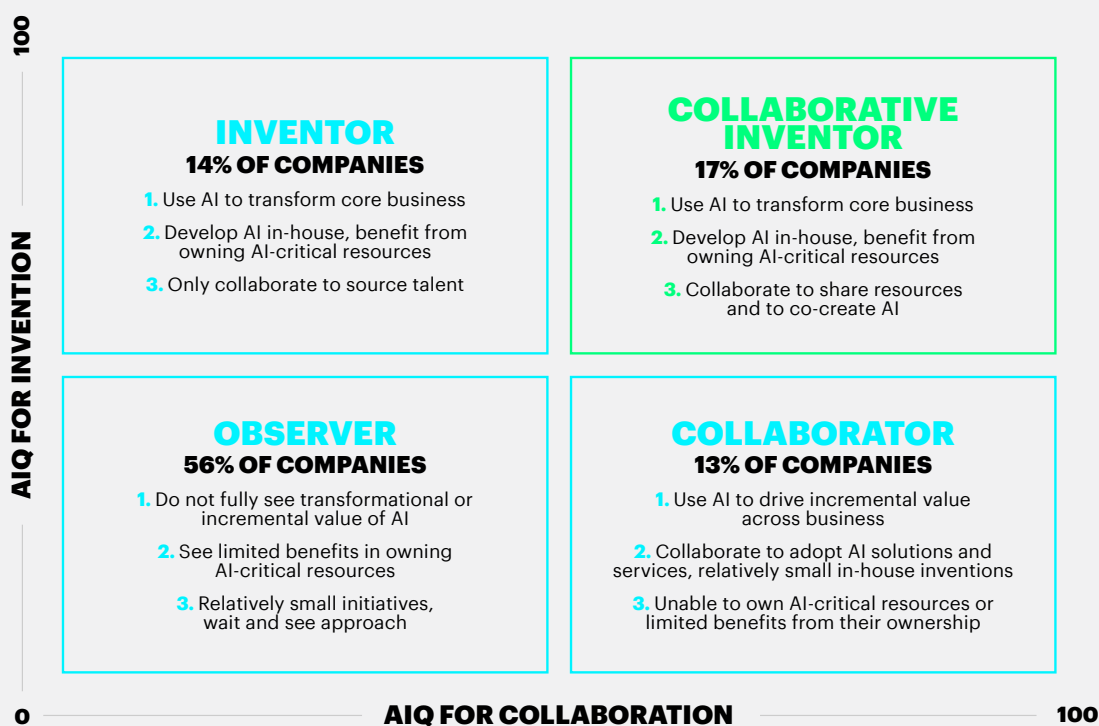
We studied how Fortune Global 100 and Intelligent Global 100 companies— pioneers in the development of AI technologies and applications—used their AIQ in-house for invention and externally for collaboration in the period 2010 to 2016. We found that companies that scored high on both invention and collaboration were the clear leaders, with almost twice the growth rate of other companies in the study.

What did we find? AI is already an attractive value differentiator between firms. In fact, our analysis shows that companies that can move from "observer" status to the "collaborative inventor" position could see their firm's value increase by 90 percent on average. That is a lot of trapped value waiting to be unleashed.

To set AIQ to work, CEOs must put AI at the heart of organisational strategy, ensuring their enterprises harness three factors: technology, data and people. They will find that progress depends on working within complex ecosystems of partners to release trapped value in all three. This is because the ability to integrate technologies, converge data sets and secure diverse talents will determine success.

THE ARTIFICIAL INTELLIGENT QUOTIENT (AIQ) FOR INVENTION AND COLLABORATION

Less than 20 percent of analysed companies are strong on both — we call them "collaborative inventors"

AIQ FOR INVENTION (vertical axis, 0 to 100)

INVENTOR
14% OF COMPANIES
1. Use AI to transform core business
2. Develop AI in-house, benefit from owning AI-critical resources
3. Only collaborate to source talent

COLLABORATIVE INVENTOR
17% OF COMPANIES
1. Use AI to transform core business
2. Develop AI in-house, benefit from owning AI-critical resources
3. Collaborate to share resources and to co-create AI

OBSERVER
56% OF COMPANIES
1. Do not fully see transformational or incremental value of AI
2. See limited benefits in owning AI-critical resources
3. Relatively small initiatives, wait and see approach

COLLABORATOR
13% OF COMPANIES
1. Use AI to drive incremental value across business
2. Collaborate to adopt AI solutions and services, relatively small in-house inventions
3. Unable to own AI-critical resources or limited benefits from their ownership

AIQ FOR COLLABORATION (horizontal axis, 0 to 100)

Source: Accenture Research

3. PRACTICE RESPONSIBLE AI

THE MOST SIGNIFICANT CHALLENGES TO THE ADOPTION OF AI ARE NO DIFFERENT IN SOUTH AFRICA THAN ANYWHERE ELSE. THEY ARE ABOUT PREPARING STAKEHOLDERS THOROUGHLY FOR THE MAJOR INTELLECTUAL, TECHNOLOGICAL, POLITICAL, ETHICAL AND SOCIAL QUESTIONS THAT WILL ARISE AS AI BECOMES MORE DEEPLY INTEGRATED INTO OUR LIVES.

Whether ordering fast-food, booking accommodation, checking luggage at an airport or making a doctor's appointment, chances are consumers will soon be dealing with AI which changes people's relationship with technology – it now works with them, not for them. That changes the relationship with AI from tool to partner or in other words by empowering people with more human AI-powered technology, businesses will transform their relationship with people from provider to partner. A partner does not sell or guide people towards a goal; it helps them navigate the path they have chosen. This suggests that machines will improve human effectiveness and make their work more interesting. Businesses need to prepare their workforce for this AI future, training people to work effectively with machines, to teach those machines by example and even to learn from them.

There is also no question that AI will generate a swathe of new jobs that we do not yet have names for and that new skills in areas like robotics and pattern recognition will flourish – for example just a few years ago there was no job like an app developer.

But it is also true that AI will eliminate other jobs, potentially worsen inequality and erode incomes for some parts of the population. The imperative – starting now – is for policymakers to proactively address and pre-empt the downsides of AI. For example, they must identify the groups that are at risk of being affected disproportionately by job displacement and create strategies that focus on reintegrating them into the AI-driven economy.

Preparing for these new realities is not only about jobs. It also demands carefully crafting rules and regulations. For example, how should a driverless car's algorithm decide to value one person's life over another? Or what happens if a robot analysing medical scans makes an error? How do we apportion accountability? Who decides on the codes of ethics that govern unpredictable, self-learning algorithms?

So, from economic policy to labour displacement and even data protection, AI is both an opportunity and a responsibility for business, government and technology leaders. These stakeholders must address key elements to ensure success including; governance models anchored on a strong value system; ethical guardrails that encourages trust (e.g. privacy, transparency and security) and a strong code of conduct and guiding principles needs to be developed.

NEXT STEPS FOR POLICY MAKERS AND BUSINESS LEADERS

WHETHER ORDERING FAST-FOOD, BOOKING A HOTEL STAY, CHECKING LUGGAGE AT AN AIRPORT OR MAKING A DOCTOR'S APPOINTMENT, CONSUMERS WILL SOON BE DEALING WITH AI. AS EACH INTERACTION BECOMES MORE PERSONALISED, POWERFUL AND NATURAL, AI WILL BECOME THE DRIVING FORCE FOR CUSTOMER SATISFACTION AND LOYALTY, EMPLOYEE AND AGENT ENGAGEMENT, OPERATIONAL EFFICIENCY AND GROWTH.

To prepare organisations for a successful future with AI, policymakers must clear the path to an AI future by preparing the next generation accordingly, address the redistribution effects by advocating a strong code of ethics, prioritise attending to infrastructural barriers and foster a collaborative ecosystem across pillars to support AI development.

Business leaders will need to integrate AI into their strategies and create a new AI playbook that empowers people to do what they do best with technology—imagine, innovate and create. The following cross-industry strategies are key for creating a strong and promising AI future for businesses.

1. DESIGN

- **Take the lead.** Attaining value from AI demands recognition and action from leadership. To create an AI roadmap focussed on growing the business, leaders need a sufficient grasp on AI. This means AI must be made tangible to the C-Suite. They must spend time with real AI machines, and visit AI labs where experts can be probed, ideas can be tested and prototypes can be developed.

- **Create an open AI culture.** Corporate culture must adapt to the presence of its new AI employees. It will demand trust, openness and transparency. It must address not only interactions but employees' concerns over the impact of AI on job security, wages and privacy. Indeed, AI can be used to proactively improve workplace culture.

- **Adopt a holistic AI approach.** Keeping abreast of technology can expose business opportunities, as does staying current with ever-changing customer dynamics. By reducing the distance between business-unit leaders and IT,

businesses will be more able to identify and pick lower-hanging fruits. Introducing change management will also reduce the organisational emotional divide between those that fear AI and those that embrace it.

- **Leverage the Ecosystem.** Explore the AI platforms preferred by customers and forge strategic partnerships. Also consider the value of sharing and enhancing business intelligence through collaboration with other companies and organisations to target higher value return.

- **Take the crowd into the cloud.** Cloud technologies have provided an opportunity to scale rapidly with lower computing costs and without the confines of internal IT structures. The next step in innovation will be to combine the crowd-sourced data in the cloud with AI capabilities to create new and disruptive business opportunities.

2. EXECUTE

- **Reinvent HR into HAIR (Human and AI resources).** As AI becomes part of the workforce, HR leadership will play a much bigger role in business strategy and innovation, as well as accumulate a greater technical understanding of AI technologies and how these will shape the future of work. The HR function will need to incorporate AI technologies in all aspects of its work, from hiring to retirement.

- **Converge data for intelligence.** The true value of AI will not be found in, say, an algorithm or a neural network itself. Rather it will be found in the way data intelligence transforms the business. The performance of AI will depend on the quality and amount of data available. It will also depend on the ability to converge and make sense of data from sources such as Internet of Things (IoT) sensors and social networks. In addition to focusing on data security, regulations and governance, chief data officers must construct an integrated, end-to-end data supply chain to maximise the value derived from enterprise data. This will also increase the impact of, and value derived from, AI.

- **Learn with machines.** AI will transform not only what people learn, but also how they learn. To fully exploit the potential of AI, human and machine intelligence must be tightly interwoven. With AI taking over mundane and low-value-added tasks, a skills gap will open between young professionals and older workers, favouring workers with experience and placing emphasis on human abilities such as judgment, communication, and creative thinking, which will all complement AI technologies.

- **Take a step beyond automation.** With recent strides in AI, companies need to take a step beyond automation to harness the intelligence of dynamic, self-learning and self-governing machines. This means enabling AI-powered machines to self-diagnose technical failures, autonomously order replacement parts and anticipate maintenance needs.

3. MONITOR

- **Measure your return on algorithms.** CFOs will need a new toolbox of financial metrics to properly assess the "Return on AI." Unlike traditional assets that depreciate over time, AI assets, with their self-learning technologies, gain value as time passes. But because of the learning nature of AI, benefits will stem from yet-to-be determined sources. This complexity may deter AI investment decisions, underlining the need for new thinking and new terminology for capital expenditure and valuation models.

- **Analyse and Audit** — the performance of AI against key value-driven metrics, with respect to algorithmic accountability, bias and cybersecurity.
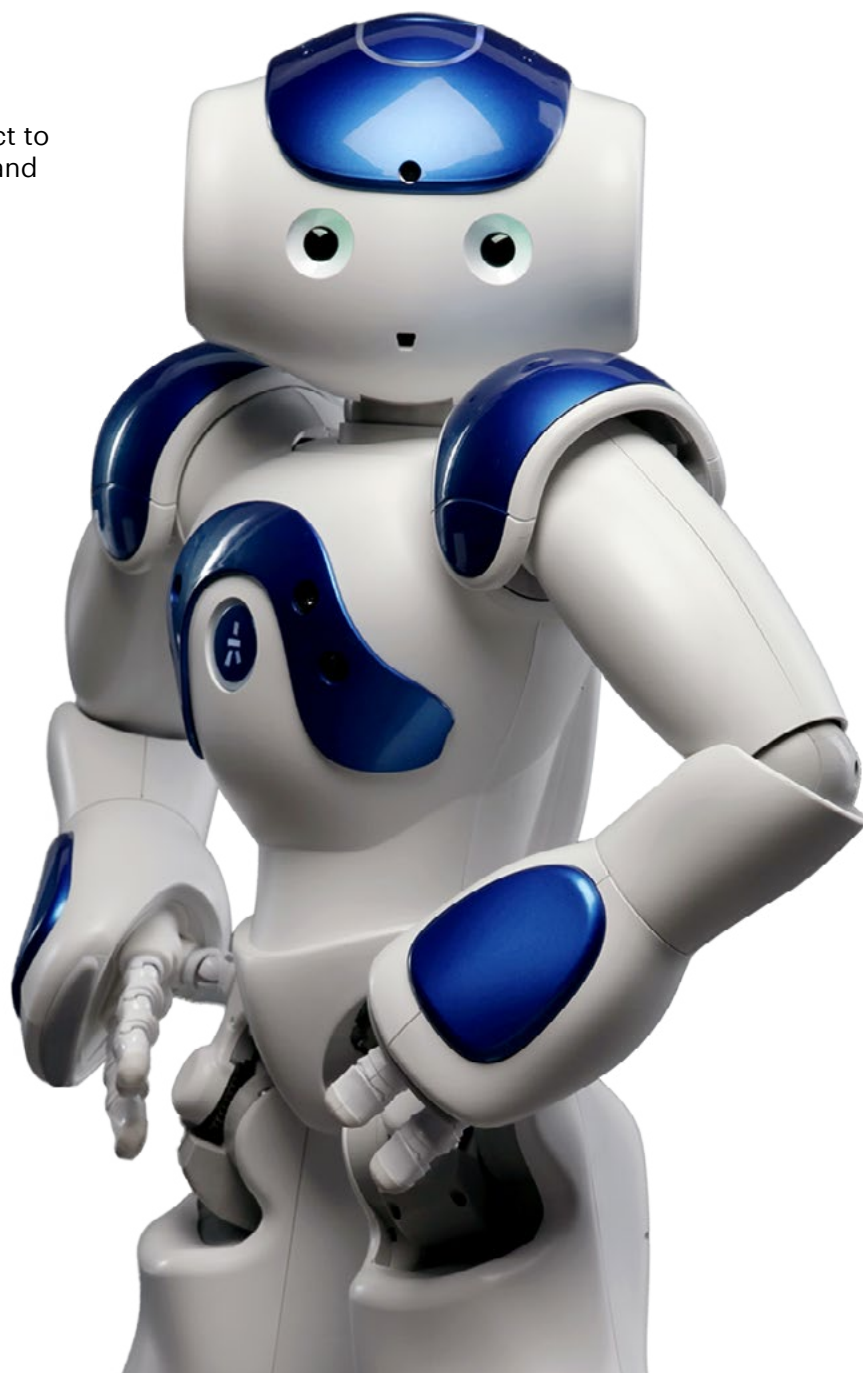
AI IN SOUTH AFRICA

COMPANIES ACROSS THE GLOBE ARE APPLYING AI TECHNOLOGIES TO TRANSFORM THEIR BUSINESSES IN WAYS NOT SEEN SINCE THE INDUSTRIAL REVOLUTION, FUNDAMENTALLY REINVENTING HOW THEY RUN, COMPETE AND THRIVE.

The ability to adapt and change rapidly in response to AI requires a high degree of organisational agility. Companies willing to disrupt themselves to meet emerging capabilities such as AI and machine learning head on—those serious about incorporating AI as an integral part of its business strategy—will experience increased competitiveness and be better prepared for rapid future change.

South Africa is facing myriad structural and cultural hurdles as well as social dilemmas, which may hamper or delay businesses and governments from fully integrating AI technologies into the economy, ultimately impacting the potential upside to growth and competitiveness that AI presents. Transforming the relationship between humans and machines; reimagining business models and processes; creating a thriving ecosystem and unlocking trapped value of data are key ingredients for future success.

South African companies will also need to emphasise education and training, especially for people who are disproportionately affected in employment and income; advocate for and develop a code of ethics for AI; create adaptive, self-improving regulation to keep pace with technological change; and integrate human intelligence with machine intelligence by reconstructing work to take advantage of the respective strengths of each.

Implemented responsibly, people will use AI to amplify human existence and improve how we live and work.

AS MACIEJ KUZIEMSKI OF THE UNIVERSITY OF OXFORD NOTES, THE AI REVOLUTION COULD EITHER PULL THE "BOTTOM BILLION" OUT OF POVERTY AND TRANSFORM DYSFUNCTIONAL INSTITUTIONS OR ENTRENCH INJUSTICE AND INCREASE INEQUALITY. THE OUTCOME WILL DEPEND ON HOW WE MANAGE THE COMING CHANGES.

ABOUT ACCENTURE

Accenture is a leading global professional services company, providing a broad range of services and solutions in strategy, consulting, digital, technology and operations. Combining unmatched experience and specialized skills across more than 40 industries and all business functions – underpinned by the world's largest delivery network – Accenture works at the intersection of business and technology to help clients improve their performance and create sustainable value for their stakeholders. With more than 411,000 people serving clients in more than 120 countries, Accenture drives innovation to improve the way the world works and lives. **Visit us at www.accenture.com**.

ABOUT ACCENTURE RESEARCH

Accenture Research uncovers disruptors, shapes trends and creates data-driven insights about the most pressing issues organisations face. Combining the power of innovative research techniques with a deep hundreds of reports, articles and points of views every year. Our thought-provoking research is supported by proprietary data that guides our innovations and allows us to transform theories into real, practical solutions.

ABOUT GIBS:

Founded in 2000, the University of Pretoria's Gordon Institute of Business Science (GIBS) is an internationally accredited business school, based in Johannesburg, South Africa's economic hub. As the business school for business, we focus on general management in dynamic markets to significantly improve responsible individual and organisational performance, primarily in the South African environment and increasingly in our broader African environment, through the provision of high quality business and management education. In May 2017, the annual UK Financial Times Executive Education rankings, a global benchmark for providers of executive education, once again ranked GIBS as the top South African and African business school. This is the 14th year running that GIBS has been ranked among the top business schools worldwide. In October 2016 the GIBS MBA was ranked among the top 100 business schools globally in the prestigious Financial Times Executive MBA Rankings. GIBS is the only business school in Africa to appear in this ranking.

GIBS is accredited by the Association of MBAs (AMBA), the Association to Advance Collegiate Schools of Business (AACSB), the Council on Higher Education (CHE) and is a member of the South African Business Schools Association (SABSA), and the Association of African Business Schools (AABS). For more information, **Visit www.gibs.co.za**

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