BOOST YOUR AIQ

TRANSFORMING INTO AN AI BUSINESS

Dd

D is for dark data

Ll

L is for Life long learning

G20
Young Entrepreneurs'
Alliance

accenture

BOOST YOUR AIQ

TRANSFORMING INTO AN AI BUSINESS

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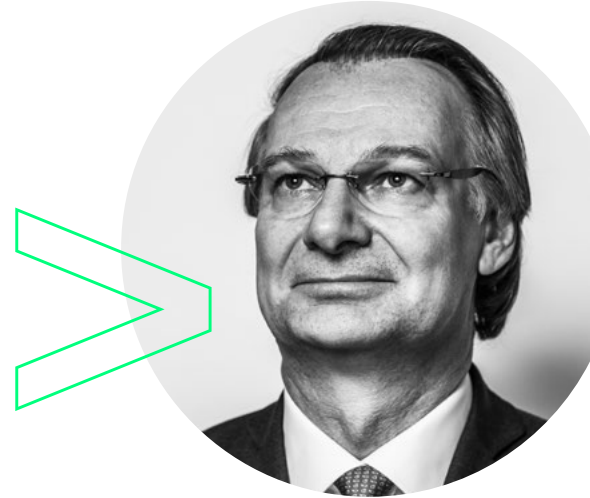
Pierre Nanterme
Chairman & CEO

As economies seek to achieve higher rates of growth and productivity, many business leaders are turning to artificial intelligence (AI) for solutions. The first wave of AI is already bringing intelligence to business processes and improving efficiencies. But the second wave will be more profound and promises some of the greatest advances in innovation since the industrial revolution. It will not only create new economic opportunities, but help solve some of humanity's major challenges, from the sustainable use of the environment to a transformation in health and wellbeing.

The greatest progress will come when large companies and innovative startups work together to unlock the trapped value found in data. That can only happen if public and private sectors make more effort to create the ecosystems that support such collaboration.

Through our role as a co-chair of the B20 Taskforce on Digitalization, Accenture is working with our peers and competitors to help improve policies that encourage innovation and entrepreneurship in digital technology. Adopting people-first approaches to AI is fundamental. Data privacy and fighting cybercrime must never be compromised. But in the mix, we also encourage governments to ensure that the need to protect producer and consumer interests does not hinder innovation or the enterprise economy.

As knowledge partners to the G20 Young Entrepreneurs' Alliance, we are proud to have produced this report with the input of many AI leaders and entrepreneurs. We hope it provides practical steps that raise the AIQ of small and large businesses alike.

Carsten Lexa
G20 YEA President for Germany

The pace at which digitalization is disrupting businesses is accelerating. With the emergence of AI, the competitive dynamics of entire industries will change. That presents enormous opportunities for entrepreneurs, as this report illustrates. Unlike previous waves of technology, we are now seeing startups emerging not just in the United States, Germany or the United Kingdom, but from China, India and Latin America.

But despite this encouraging trend, the enterprise economy is not thriving as much as it could in many parts of the world. Digital is certainly lowering barriers to entry—the cost of new technologies enables many innovators to break into new markets. But can these innovators and risk takers thrive and grow in those markets?

Digital has been at the heart of Germany's presidency of the G20 this year. And the G20 YEA has been making the case for policies that support entrepreneurs in the digital economy. Starting up a company is one thing. Scaling it is another. The combination of digital technologies and progressive government policies can make it easier for entrepreneurs to secure diverse forms of funding, expand overseas, and gain access to the supply chains of larger companies and the public sector itself.

This report plays an important part in giving the world's entrepreneurs the voice they need to create more conducive environments for growth.

ACTING SMART AND FAST

In the past five years, startups and large companies have been building up their "artificial intelligence quotient" (AIQ). Money has been flowing into AI innovators, and industry incumbents have been experimenting with AI to reduce costs and improve customer experiences. Now, investment is about to go full throttle. For big companies, AI presents the opportunity for business transformation. For entrepreneurs, it is the asymmetric tool they can use to take on much larger competitors. New research explains what both must do to turn AI investment into AI-driven growth.

WHAT IS ARTIFICIAL INTELLIGENCE?

AI is a constellation of technologies that extend human capabilities by sensing, comprehending, acting and learning—allowing people to do much more.

Accenture believes that AI will be most successful if enterprises create responsible AI strategies and systems that are aligned to five guiding principles: human-centric by design and embedding accountability, fairness, honesty and transparency.

See "About the research"

FROM EXPERIMENTAL TO EXPONENTIAL

We're on the cusp of a new era for AI: the era of exponentialism.

Funding for AI startups has been growing at a compound annual growth rate of nearly 60 percent since 2010. And the number of patents filed on AI technologies has increased at a 26 percent compound annual growth rate (Fig 1). But impressive as these statistics are, they simply reflect efforts to get the engine moving.

FIGURE 1

ERA OF EXPONENTIALISM —COMING AGE OF AI

Small and large companies have made significant AI investments in recent years.

+57%
GROWTH

AI SPECIALIZED STARTUPS
received over $3.9B in funding in 2016, has grown at a CAGR of nearly 60% since 2010

+26%
GROWTH

NUMBER OF PRIORITY PATENTS
on AI technologies filed by companies and universities has grown at a CAGR of over 25% between 2010 and 2015

Source: Accenture Research, CBInsights, Tracxn,
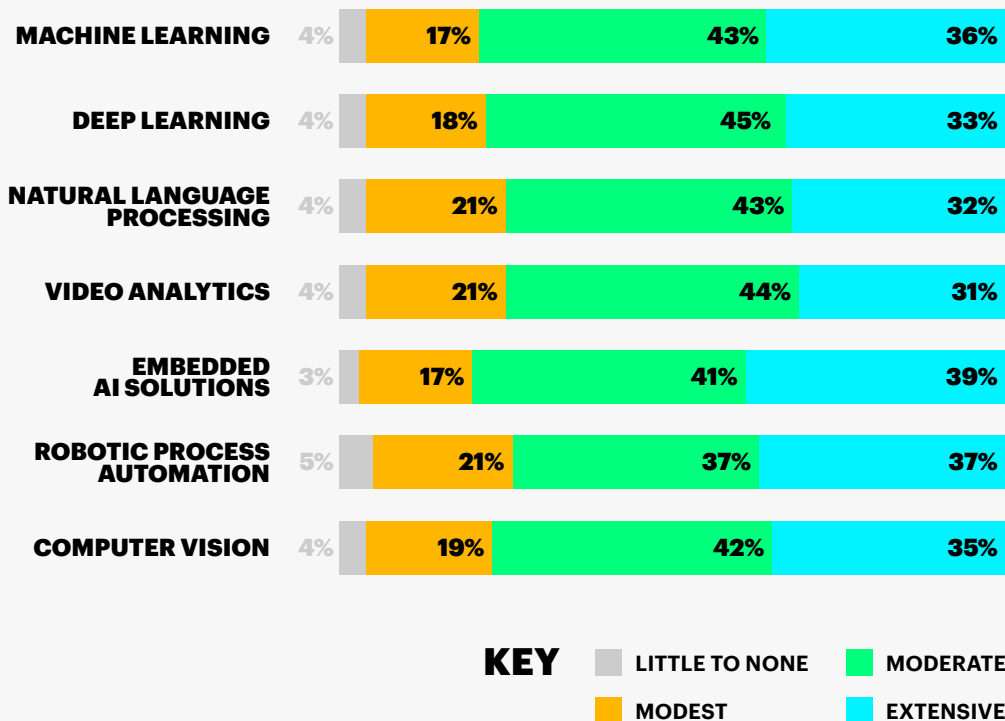DWPI from Thomson Innovation © Thomson Reuters 2017

Companies are no longer content with experimenting, however. In a survey of 5,400 business and IT executives across 31 countries, more than one-third indicated to Accenture that they were set to make extensive investments in each of seven critical AI technologies[1] (Fig 2). They are taking advantage of the exponential growth in valuable data.

What these companies are aiming to undertake is a journey that we call "rotating to the new." They are preparing to transform and grow their core business through the adoption of AI. This way they also create the investment capacity they need to develop new AI-driven businesses that will eventually drive their growth. At some point they will have to make the wise pivot, shifting from the core to the new at just the right time and pace.[2]

FIGURE 2

ERA OF EXPONENTIALISM
—COMING AGE OF AI

Executives plan to make significant AI investments over the next 3 years

Q To what extent do you anticipate making investments in the following AI-related technologies over the next 3 years?

Technology	Little to None	Modest	Moderate	Extensive
MACHINE LEARNING	4%	17%	43%	36%
DEEP LEARNING	4%	18%	45%	33%
NATURAL LANGUAGE PROCESSING	4%	21%	43%	32%
VIDEO ANALYTICS	4%	21%	44%	31%
EMBEDDED AI SOLUTIONS	3%	17%	41%	39%
ROBOTIC PROCESS AUTOMATION	5%	21%	37%	37%
COMPUTER VISION	4%	19%	42%	35%

KEY LITTLE TO NONE MODEST MODERATE EXTENSIVE

Source: Accenture Technology Vision 2017

TURNING INVESTMENT INTO RESULTS

BUT HOW CAN BUSINESS LEADERS MAKE THESE AI INVESTMENTS EFFECTIVELY?

To help companies take the next steps, we created two indexes to see what is working so far. We studied both the Fortune Global 100 and what we call the Intelligent Global 100—pioneers in the development of AI technologies and applications—for the period 2010 to 2016. For those 200 companies, we looked at both their in-house focus (their AIQ for invention) and their outside focus (their AIQ for collaboration). Both are essential (Fig 3).

Companies will need in-house, proprietary capabilities for AI, as they will need to own some of the talent, some of the technology, and some of the data. They will also need to be deeply involved in a broader ecosystem. Neither startups nor incumbents will thrive with a "not invented here" approach.
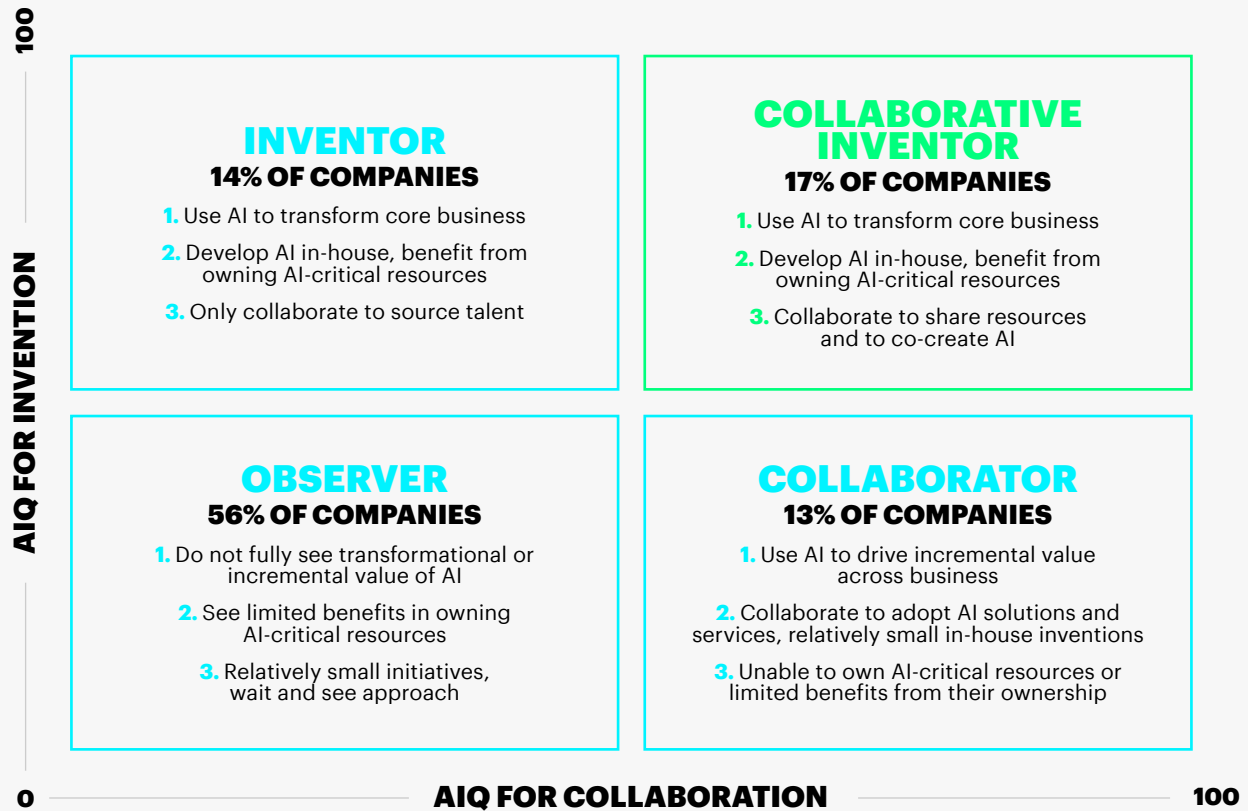
And yet our analysis revealed that less than 20 percent score well on both indexes — companies we call "collaborative inventors" — while 56 percent were weak on both.

FIGURE 3

THE ARTIFICIAL INTELLIGENT QUOTIENT (AIQ) FOR INVENTION AND COLLABORATION

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

AIQ FOR INVENTION (100 → 0)

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 (0 — 100)

Source: Accenture Research, see "About the research"

When we mapped the AIQ of collaborative inventors in our research against other companies on the metric of enterprise value—a measure of a company's total value[3]—we found that the former were the clear leaders.

"Collaborative inventors" increased their enterprise value by 4.2 percent on average since 2013— almost twice the growth rate of 2.3 percent at remaining companies (Fig 4). This indicates that AI is already an attractive value differentiator between firms. In fact, our analysis shows that companies that are able to 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 let out.

FIGURE 4
AIQ FOR ENTERPRISE VALUE

AIQ FOR INVENTION AND COLLABORATION
INDEX SCORE (0-100)

ENTERPRISE VALUE GROWTH
2013-2016 (%)

4.2%

2.3%

KEY ■ Collaborative inventors ■ Other companies
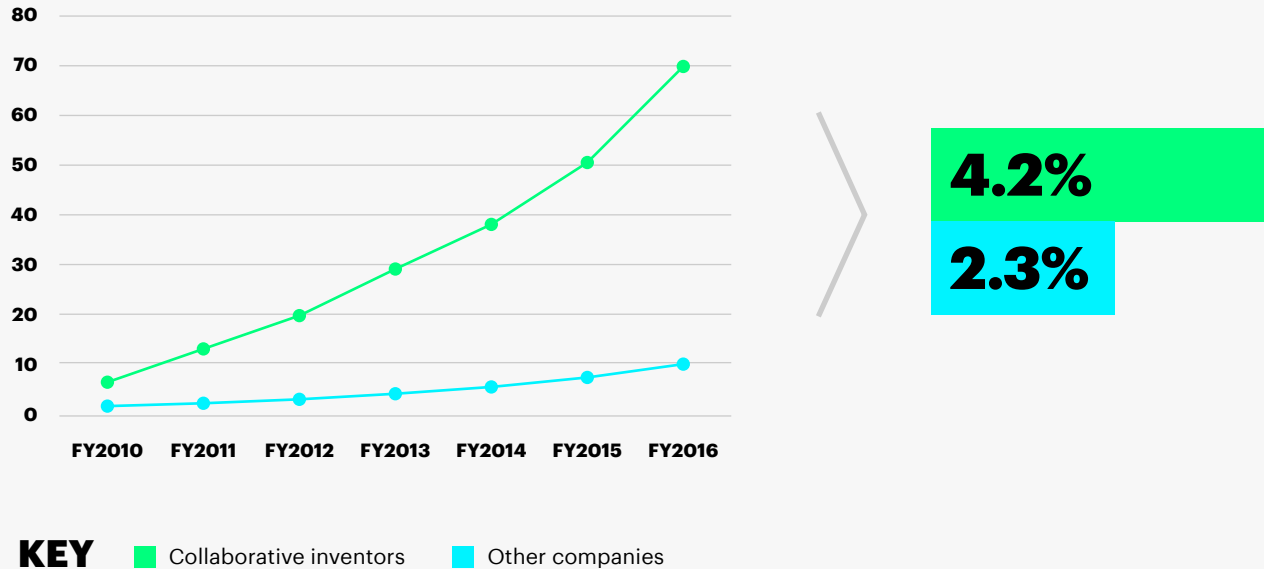
Source: Accenture Research, see "About the research"

This analysis of AIQ and enterprise value focuses on large companies. But we believe that the principle applies to startups and small businesses as well. And they will have to work with large companies to achieve results.
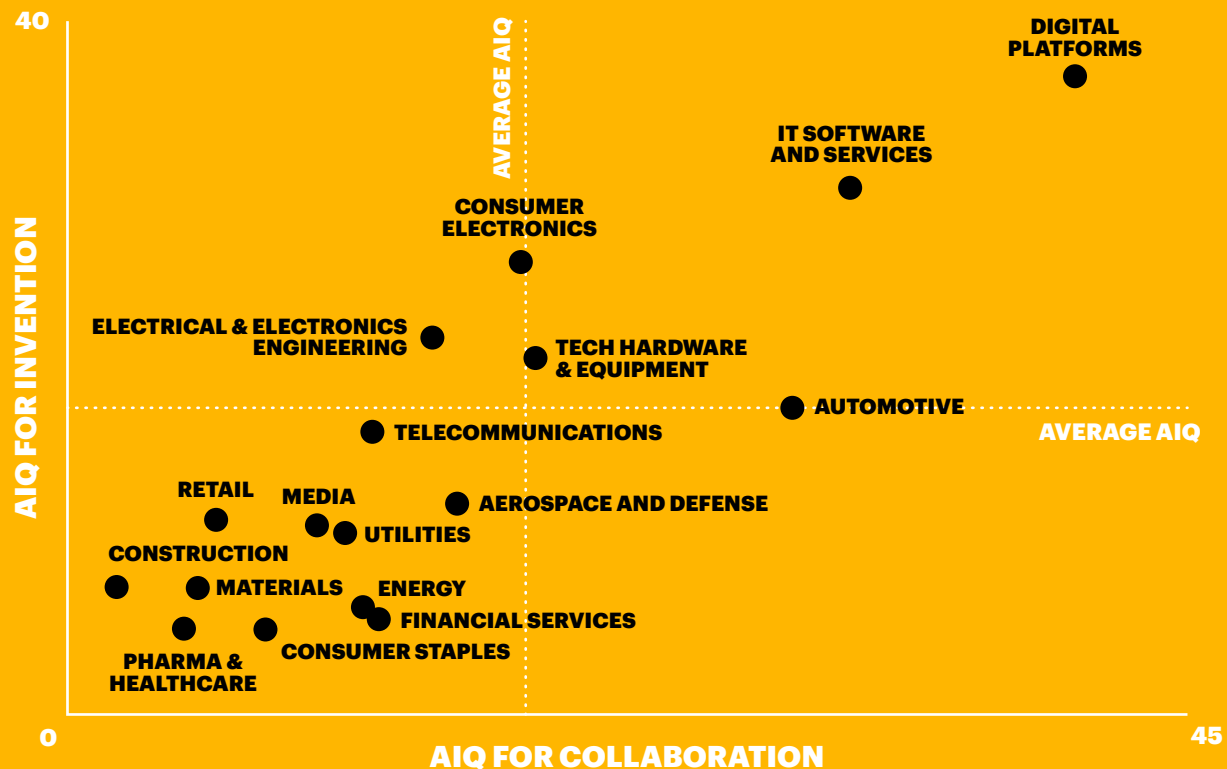
In this complex field of AI, collaboration between large enterprises and startups is more significant than ever before. Apple, which has traditionally kept research breakthroughs to itself, is now letting its AI researchers engage with the greater AI community on open innovation.[4] Open innovation combines the muscle and maturity of incumbents and the ideation and agility of startups—if the partners can successfully bridge the inherent cultural gaps.[5] For example, Fanuc Corporation brought its edge and fog computing into the factory environment by collaborating with Cisco, Rockwell Automation and a Japanese AI startup called Preferred Networks (PFN).[6] PFN also collaborates with Toyota on autonomous driving technologies.[7]

KNOWING THE COLLABORATIVE INVENTORS

Certain sectors are leading on AIQ. Digital platforms, IT software and services, technology hardware and equipment, consumer electronics and automotive generally achieve high AIQ for invention and collaboration. Their momentum has picked up since 2013 when they started to intensify collaboration initiatives to complement the initial wave of in-house research and development (R&D). (Fig 5).

FIGURE 5

AIQ BY SECTOR—PRELIMINARY VIEW*

2010-2016 CUMULATIVE DATA

AIQ FOR INVENTION

AVERAGE AIQ

DIGITAL PLATFORMS

IT SOFTWARE AND SERVICES

CONSUMER ELECTRONICS

ELECTRICAL & ELECTRONICS ENGINEERING

TECH HARDWARE & EQUIPMENT

AUTOMOTIVE

AVERAGE AIQ

TELECOMMUNICATIONS

RETAIL   MEDIA   AEROSPACE AND DEFENSE

CONSTRUCTION   UTILITIES

MATERIALS   ENERGY

PHARMA & HEALTHCARE   FINANCIAL SERVICES

CONSUMER STAPLES

AIQ FOR COLLABORATION

Source: Accenture Research, see "About the research"

* This preliminary sector view is based on a representative sample of 200 companies—pioneers in the development of AI technologies and applications—combining the Fortune Global 100 and what we identified as the Intelligent Global 100. It is illustrative and further study will be accomplished to refine early results across sectors.

KNOWING THE COLLABORATIVE INVENTORS

The media and telecommunications sectors are gradually stepping up their AIQ for invention. While media companies are developing cinematic virtual reality, human-like facial expressions and holographic content, the telecommunications sector is working on machine learning and massive data modeling platforms to support emerging intelligent services.

The financial services, consumer staples and energy sectors are increasing their AIQ for collaboration. They invest in tactical initiatives to adopt AI solutions by collaborating in the broader ecosystem—but do not invent where it makes little financial sense to develop futuristic technologies in-house. For example, BP plc has long-term collaborative agreements with multiple technology partners that run through the company to identify automation and AI opportunities, such as optimizing the design of wells.

Looking at the Fortune Global 100, about 40 companies show noticeable AIQ for invention or collaboration. Yet, only 13 of these companies are collaborative inventors.

SETTING AIQ TO WORK

We believe that AI offers its greatest value by augmenting the work that people do and improving the way they consume and interact with their communities. Success requires a people-first mindset.

AI also presents the opportunity for business transformation by creating intelligent processes in the value chain and intelligent products and services in the market.

For these reasons, commitment to developing AIQ and building an intelligent business must come from CEOs. They alone can lead the organizational, cultural and business model changes that AI demands. CEOs must put AI at the heart of organizational strategy and set AIQ to work by ensuring their enterprises harness three factors:

TECHNOLOGY   **DATA**   **PEOPLE**

They will find that progress depends on working within complex ecosystems of partners to unlock trapped value in all three. This is because the ability to integrate technologies, converge data sets and secure diverse talents will determine success.

ACTIONS FOR INCUMBENTS

TECHNOLOGY
Draw on the power of combinatorial innovation

AI is not a single technology, but a collection of technologies whose value can only be fully captured when several of them are combined. This combinatorial innovation offers powerful possibilities for business model transformation. Amazon Go[8] promises a new kind of physical store with no checkout required. It uses the same types of technologies used in self-driving cars: computer vision, sensor fusion, and deep-learning algorithms. Amazon reached this point by investing heavily in AI R&D and filing a patent in 2014 for the underlying technology.[9]

In-house capabilities: Other companies that see similar potential for change are setting up in-house AI labs or acquiring and investing in AI startups. For example, the State Grid Corporation of China has more than 200 labs, of which at least two are focused on AI—the Sichuan Provincial AI Lab and the Electricity Robot Technology Lab.

External collaboration: But not all businesses warrant such significant financial investments to develop AI technologies in-house. Instead, collaboration may be key. Companies must be able to answer, is this an area of transformative change for us, or simply one where we can gain incremental value? For instance, a credit-scoring simulation tool that enables quick decision making on prospective customers may be a bank's competitive differentiator, and it may do well to own the intellectual property of the underlying algorithm. Conversely, a chatbot to engage with the bank's customers could simply use an external partner's technology, while ensuring the chatbot's smartness is reinforced with proprietary data on customer activity.

"In the last two years Orange has begun investing heavily in AI. So although AI is not part of our core business yet, it soon will be."

ROBIN FERRIERE, DIGITAL ENTREPRENEUR AND VP,
CLOUD & DIGITAL BUSINESS, ORANGE BUSINESS SERVICES

ACTIONS FOR INCUMBENTS

DATA
Recognize the importance of data convergence

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. But leaders must bear in mind several key issues related to data and AI.

Access data: For AI to be effective, access to vast quantities of data is vital—but not a given. Data has the potential to polarize the market, with many companies struggling to compete with the large platform and technology companies who own or take ownership of high volumes of data. For instance, Intel's investments in autonomous driving, including the US$15 billion acquisition of Mobileye which the CEO describes as "our strategy to make Intel the driving force of the data revolution across every technology and every industry."[9]

Converge data: Another challenge is that much data is either "dark" (unstructured, not readily usable) or disparate (hard to combine). Companies will need to invest to open up legacy IT systems to expose or access key data. They will need to be able to converge and make sense of data from sources such as Internet of Things (IoT) sensors and social networks. The greater the data density and variety, the greater are the chances of finding "unknown unknowns"—relationships that were not known to exist or were not looked for at all.

Monetize data: Sustained differentiation in the marketplace requires machines that can process not just flows of real-time data but cycles of evolving data points. Improved understanding of customer activity underpins the ability to monetize data. Companies must, therefore, develop the capability to enable feedback loops of data for reinforcement learning to happen. They should also exploit data network effects—the more users the live model has, the harder it is for a competitor to collect similar high volumes of data to create its own self-reinforcing feedback cycle.

What do you do with all this converged data? Embed AI at the intersection of converged data to create intelligent products and services. For example, Verizon is offering its big data and AI platform to partner carriers. Part of its Exponent offering, this solution helps carriers monetize data by using machine learning and deep analytics to create value from a range of their data, including unstructured customer data.[11]

Share data: Sharing data in a trusted environment is vital. For example, a consortium of German automakers acquired HERE, a provider of mapping data and related services, crucial elements of self-driving technology.[12] The car makers share the data generated by each vehicle to create value for the wider market. Security must be given the utmost attention to give such consortia the confidence to exchange such data on a continued basis.[13] The lesson is important: companies must build on what they do best while also understanding where shared value can be mined, in a situation where trust and security operate.

ACTIONS FOR INCUMBENTS

PEOPLE
Retrain and reskill, continuously

Nurture new skills: AI heralds the emergence of a new range of jobs. An Accenture survey of more than 1,000 large companies already using or testing AI and machine-learning systems revealed the emergence of three entirely new categories of uniquely human jobs— trainers, explainers, and sustainers. Trainers teach AI systems how to perform, process data and behave. Explainers articulate to business executives the inner workings of AI systems, improving transparency. Sustainers ensure that AI is fair, safe and responsible.[14]

Manage diverse skills: The diversity of teams will also grow; AI demands far more multidisciplinary skill sets than are typically brought together in traditional settings: pure mathematics, computer science, data science, neuroscience, psychometrics, behavioral psychology, linguistics and other liberal arts skills will be necessary to both train and work with intelligent machines. This calls for new techniques to manage these new combinations and, more broadly, for judgment and interpersonal skills.[15]

Compounding the challenge is that, in a world where 40 percent of employers already report talent shortages,[16] many of these news skills do not exist in the labor market. So how do companies respond?

Reskill and upskill: Companies must make radical changes to their training, performance and talent acquisition strategies. They will need to reskill and retrain at speed and scale to create skills the wider market cannot provide and to keep current workers relevant and adaptive on a continuous basis. The optimal use of AI will be to augment the capabilities of existing workers, helping them not merely to be more productive, but to deliver more creative, precise and valuable work. This will involve fostering a culture of lifelong learning, much of it enabled by technology: personalized online courses that replace traditional classroom curricula and wearable applications such as smart glasses that improve workers' knowledge and skills as they carry out their daily work.

Success will also depend on partnerships with startups, universities and individual experts to access knowledge and skills at scale. For example, JD.com has extensively trained its internal people using key performance indicators to show diverse levels of cooperation with universities, research institutes, and offered incentives to study for qualifications in AI technology and data science via its university collaborations.[17]

International companies will also want to use a multi-location R&D strategy to capture local nuances—for instance, an algorithm using retail intelligence may work well in the United States, but not in the Chinese market. A multi-location strategy can also prompt world-class innovations—for instance, Korea's global edge in intelligent display systems that feature in smart cars. Location strategies will reflect increasing geographic specialization of AI and the emergence of different AI hubs.

"Today, Germany has at least 5,000 unfilled jobs in AI-related fields."

PROFESSOR WOLFGANG WAHLSTER,
CEO, DFKI (THE GERMAN RESEARCH CENTER FOR ARTIFICIAL INTELLIGENCE)

ACTIONS FOR INCUMBENTS

ASK YOURSELF

TECHNOLOGY

1. How can AI augment and amplify your people to bring new value to your business?

2. Do you have the capabilities to integrate AI technologies with each other and with existing systems and processes?

3. Are you focusing proprietary technology developments on outcomes that truly transform the business and drive new revenue growth?

4. What changes will AI entail to enterprise architecture, infrastructure, business processes and governance?

5. How will deploying AI change the way your machines interact with other machines?

DATA

1. Who owns the data that will drive new value and which partnerships will help to share that value appropriately?

2. Do you have the infrastructure that allows data to be exchanged between internal systems and with partners?

3. Do you have the talents and capabilities to feedback data and insights to improve machine learning and decision making?

4. Have you put in place responsible data practices that can be maintained across the value chain?

5. Who owns the data that AI engines will generate, and how will consumer awareness and choice to opt-in/-out be managed?

PEOPLE

1. Do you have a program to deliver reskilling at speed and at scale to redeploy people from administrative tasks to judgment and interpersonal skilled work?

2. Have you built real-time training capabilities to keep people adaptable to constantly changing technologies?

3. Do you have the management skills to ensure new teams of vastly different disciplines work together effectively?

4. Have you created a more flexible workforce model for less structured, more project-based work?

5. Is your leadership ready to manage in horizontal, not hierarchal, ways to inspire creativity?

ACTIONS FOR ENTREPRENEURS

STARTUPS HAVE A NUMBER OF ADVANTAGES WHEN IT COMES TO AI

As new technologies appear, startups can act with an agility that is beyond the reach of large organizations. Indeed, agility is more important than company size in determining success.

Many startups have invented technologies that large companies often envy—and want to acquire, as illustrated by Google's acquisition of the AI startup Deep Mind[18], Apple's acquisition of machine learning company, Turi[19], and Microsoft's acquisition of natural language processing startup, Maluuba[20]. But the challenges big companies have in harnessing technology, data and talent are, if anything, even greater at startups. As the scale of the technology giants continues to grow exponentially, startups need an even higher AIQ for collaboration to compensate for the high costs of innovation.

Accenture spoke with a number of AI innovators who are part of the G20 Young Entrepreneurs' Alliance. We profile some of these companies and their innovation strategies on pages 22 and 23.

ACTIONS FOR ENTREPRENEURS

TECHNOLOGY
Embrace a platform-based approach

Platforms open access to AI and empower entrepreneurs to harness new technologies, which otherwise may be beyond reach due to their high cost and long development cycles. Entrepreneurs can avail themselves of a range of AI frameworks and technology platforms, such as Gigster, a platform combining top developers and designers on AI, or Microsoft Azure Machine Learning and Amazon Machine Learning services on the cloud. Google, Apple, Facebook, Amazon and Microsoft have all opened their AI bots to third-party developers, giving them the ability to integrate voice commands into their apps.

Extensive use of AI platforms is evidenced at the data science startup, Datanomiq. It partners with big providers like SAP when clients mandate this requirement in select cases. But for the majority of its client projects—80 percent of the total—Datanomiq uses free open source AI tools like Microsoft's Cognitive Toolkit among others.

ACTIONS FOR ENTREPRENEURS

DATA
Automate internal data capture processes and inspire external trust

Often a starting point for entrepreneurs is the imperative to automate internal processes for data capture—including from unstructured or semi-structured sources (for example, videos, images, freeform text) that were traditionally not used. Automation of data capture can ensure the comprehensiveness and quality of data that gains the confidence of clients and partners. For entrepreneurs operating in the business-to-consumer (B2C) space, ownership of consumer and operational data naturally sits with them. Additionally, they can optimize sources like government data and social media platforms. For instance, Facebook and Twitter enable companies to use anonymized consumer data via APIs.

For entrepreneurs operating in the B2B segment, lack of access to client data is often a bottleneck to effectively develop AI's capabilities. These businesses must carefully balance their pursuit of big data by making data investments in-house, and collaborating with clients and partners to share data by creating an environment of trust.

"I worry that data ownership is rarely clear. This can hinder access to data that underpins machine intelligence."

ALEXANDER JAKSCHIK, MANAGING BOARD, ULT AG

ACTIONS FOR ENTREPRENEURS

PEOPLE

**Join the sharing economy —
borrow and connect experts**

Lack of talent is often cited by entrepreneurs as the key barrier to scale the business. For example, LogoGrab recognized the importance of talent and relocated to Dublin in pursuit of technologists, data scientists and freelance developers that would enable it to scale the business.

Startups are fueled by creativity, but unlike big companies, they rarely have enough money to secure the right people. But they often borrow them from universities and the sharing economy of freelancers. Entrepreneurs who are networked with academia have access to fundamental AI research from universities. For example, Lyra launched a carbon calculator app in consultation with Professor Alan Pears, an energy expert at Australia's RMIT University, who also advises large corporates on smart buildings and smart electronics.

Any single startup is unlikely to be consistently rich on technology, data and talent. Recognizing the specific gaps, and being resourceful in collaborating with incumbents and other partners to plug those gaps, is necessary to drive AI forward. Our interviews with entrepreneurs reveal valuable lessons on collaborative intelligence—it is through teaming that many are connecting ideas, people, organizations and AI to create greater value (see Fig 6 and 7).

Accenture has interviewed and assessed a number of AI startups. These companies have different business models that determine their innovation strategies, in particular, whether they develop capabilities more through in-house investments or through external collaboration. The relative position of these companies is only illustrative, alluding to their strategies on technology, data and people.

ACTIONS FOR ENTREPRENEURS

FIGURE 6

ENTREPRENEUR CASE STUDIES—AI PROVIDERS

Entrepreneurs inventing AI solutions are balancing control-collaboration
on data and talent — while technology is typically their core strength
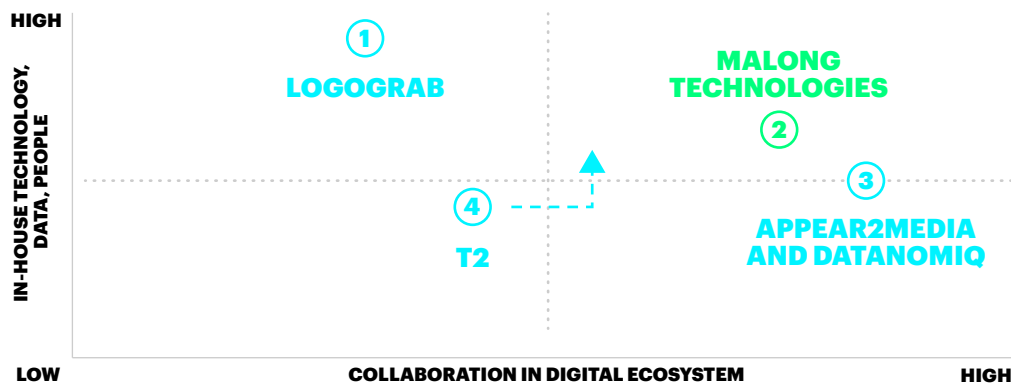
IN-HOUSE TECH, DATA INDEPENDENT: LogoGrab offers image recognition technology to help mainly large U.S. corporates track their brands online. It is therefore not dependent on working with external parties to secure data, and relies on its proprietary LogoGrab Adaptive Learning Engine. Its founders claim this unique technology is their competitive differentiator. The company relocated from Switzerland to Dublin to access interdisciplinary talent that is important to their growth.

IN-HOUSE TECH AND DATA, EXTERNAL PARTNERSHIP TO SECURE SPECIFIC DATA: Malong Technologies' product recognition AI uses deep learning. In one case, it is used to analyze worldwide fashion color trends to help thousands of textile makers predict global fabric demand. Malong collaborates with the China Textile Innovation Center to distribute AI Fashion reports to the textile industry. This gives it access to a unique data source. Remaining data, for example, labels to describe products, is collected by Malong's own infrastructure.

IN-HOUSE TECH, COLLABORATION TO SECURE DATA : Appear2media provides publishers with augmented reality (AR) technology that brings printed material to life through smartphone apps. Its technology is complemented by Datanomiq's data science services. This collaboration completes the value chain by allowing publisher clients to track readers' response to AR campaigns in real-time. It also creates a critical feedback loop of data that gives the two partners secure data on client readership that would otherwise be inaccessible.

IN-HOUSE TECH, PLANS TO COLLABORATE TO GAIN CLIENT DATA: T2 Limited is a software company based in Saudi Arabia that plans to launch an AI solution for text recognition. This will enable its B2B clients to intelligently respond to customer queries on digital channels. But its large corporate clients, who host data on their own systems, hesitate to share data that T2 requires to make its software more intelligent. T2 is now targeting small and medium enterprise clients who are more willing to host and share data with T2.

ACTIONS FOR ENTREPRENEURS

FIGURE 7

ENTREPRENEUR CASE STUDIES—AI USERS

Entrepreneurs adopting AI services must balance control-collaboration
of technology, data, talent — particularly data in the B2B segment
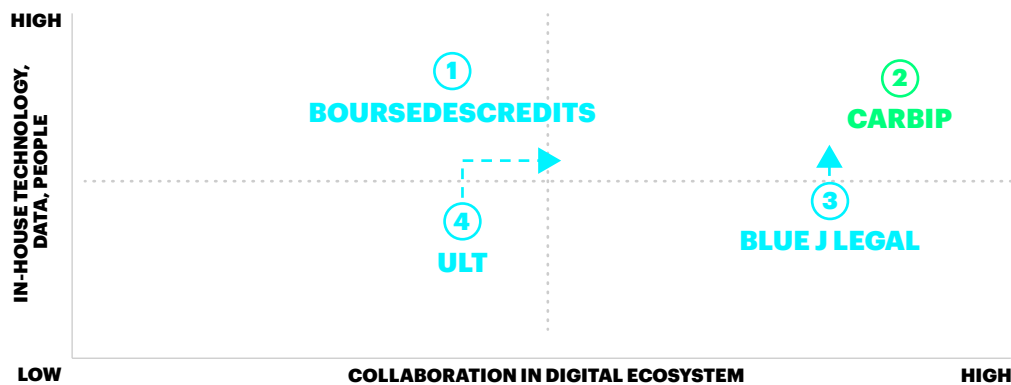
① IN-HOUSE TECH, DEVELOPED INTERNALLY: Boursedescredits has an innovative range of credit simulation tools that allows quick decision making and conversion rates on prospective business. The business model is focused on owning and optimizing data generated on its B2C digital platform. It opted for tailor-made solutions, developed internally, by collaborating with French data scientists and database specialists.

② IN-HOUSE TECH AND DATA, PLUS PARTNERSHIPS FOR DATA ACCESS: Carbip is a B2C car sharing app and also works with B2B customers to improve transportation network systems in the U.S. Carbip partners with insurance companies to acquire and analyze driver data to better assess risk in real time. The business is a combination of data acquisition integrated into customer legacy data, plus machine learning algorithims for things like real time planning and asset optimization.

③ IN-HOUSE DATA, PARTNERSHIP FOR TECH IP, PLANS TO ROLL-OUT OWN TECH: Blue J Legal is a Toronto-based B2B company helping tax professionals make judgments for clients. It uses neural networks to find hidden patterns in case law, based on years worth of documents, to predict court decisions ahead of time. Its "Tax Foresight" tool claims to make predictions that are 90%+ accurate. Blue J Legal collaborates with Microsoft Azure's machine learning platform and presently is rolling out its own AI technology.

④ PLANS TO INVEST IN-HOUSE ON AI DATA/TECH: ULT AG is an engineering company that supplies air filtration and fume extraction machines to manufacturing plants worldwide. ULT is building its own data-AI infrastructure, estimating it will account for 30% of total investment up from 10% today. It potentially plans to collaborate with a data science startup.

EQUATING AIQ AND VALUE

Since the days of Alan Turing, AI has developed during a long period of experimentation that continues today. Now, thanks to virtually unlimited computing power and the decreasing costs of data storage, large companies and startups are on the cusp of the exponential age of AI as they learn to unlock the value trapped in vast volumes of data.

The evidence we have presented proves that—even in this early stage of commercially applied AI—enterprises can enjoy superior growth and generate greater value if they improve their AIQ. They do that by striking a balance between in-house innovation and external collaboration. These collaborative inventors apply their AIQ to harness the technologies, data and talent they need to build new business models.

Among the world's largest companies and even among the most advanced players in AI, only a small minority currently demonstrate high levels of AIQ. Those who join them in the coming years will enjoy the greatest potential for growth and market leadership.

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Managing Director
Office of the CEO
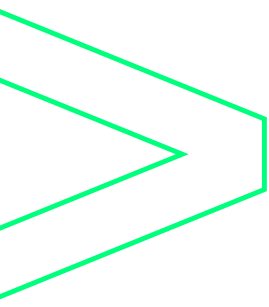
*Sponsor of the Accenture relationship
with B20 and G20 YEA*

MADHU VAZIRANI

Thought Leadership Principal Director
Accenture Research

Our grateful thanks for the valuable insights of the many external industry experts and entrepreneurs who contributed to the report's findings:

ABOUT ACCENTURE

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ABOUT G20 YOUNG ENTREPRENEURS' ALLIANCE

The G20 YEA is a collective of leading entrepreneurially minded organizations representing the G20 countries who seek to promote youth entrepreneurship as a powerful driver of economic renewal, job creation, innovation and social change. The G20 YEA provides leadership to G20 political leaders in promoting youth entrepreneurship through policy recommendations and sharing best practices.

ABOUT THE RESEARCH

Conducted between January and May 2017, Accenture undertook research and analysis on behalf of the G20 Young Entrepreneurs' Alliance. The research program included:

IN-DEPTH INTERVIEWS with more than 45 leading AI experts, corporate executives, entrepreneurs, research institutions, academics and policy representatives from 10 G20 countries (Australia, Canada, China, France, Germany, India, Japan, South Korea, United Kingdom and the United States)

ANALYSIS OF ARTIFICIAL INTELLIGENT QUOTIENT (AIQ) and Enterprise Value using the below methodology.

AIQ METHODOLOGY

INDEX	DATA ON FIVE PARAMETERS

AIQ FOR INVENTION (IN-HOUSE INVESTMENTS)

1 # Patents related to AI technologies (source: DWPI from Thomson Innovation © Thomson Reuters 2017)

2 # Acquisitions of AI startups (source: CBInsights, Tracxn)

3 # Announcements on keywords such as the set up of AI R&D Lab, hiring / acquiring of C-suite, data scientists and other AI skills (source: web crawling of news)
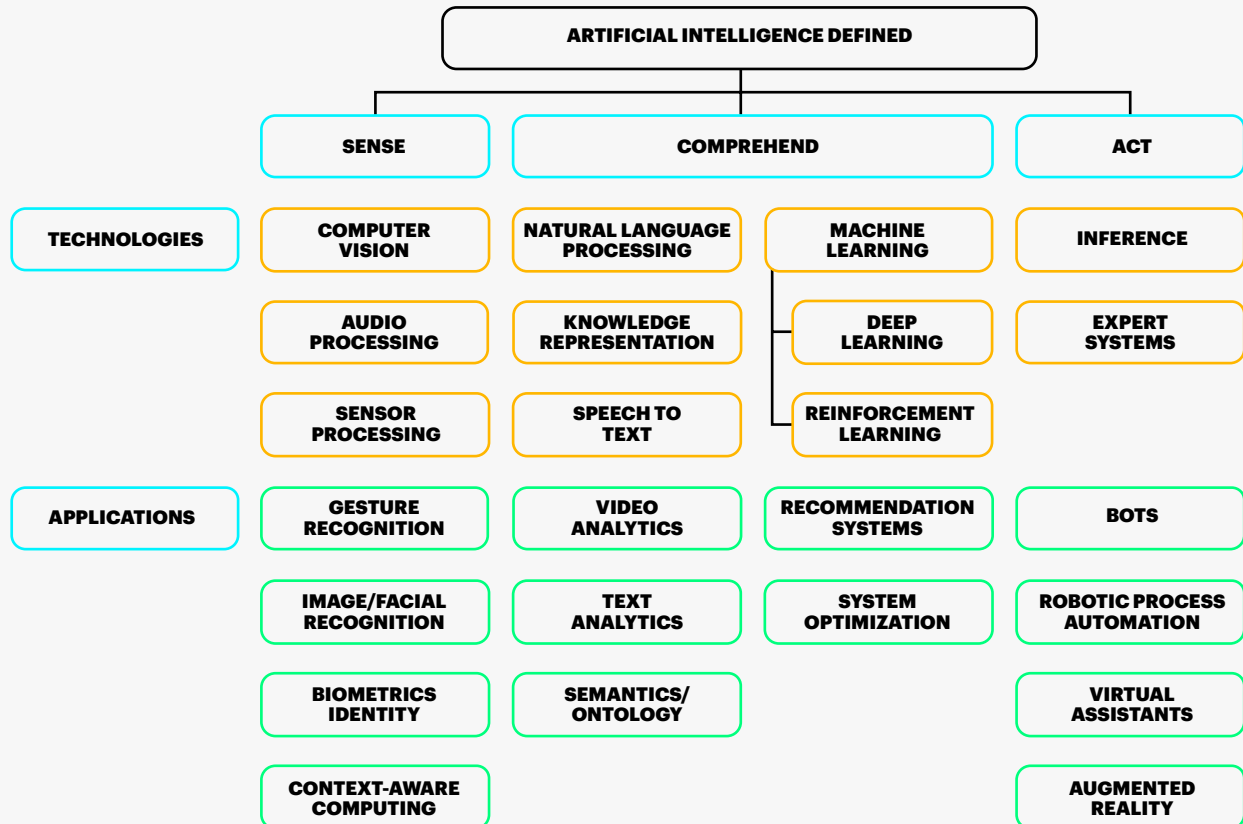
AIQ FOR COLLABORATION (EXTERNAL INITIATIVES)

4 # Announcements on keywords related to usage or adoption of AI vendor solutions, joint ventures and collaborative agreements on AI (source: web crawling of news)

5 # Announcements on keywords related to participation in AI startup accelerators, venture investment in AI startups, university tie-ups and sponsorships, open innovation with third party developers etc. (source: web crawling of news. CBInsights)

The Accenture Artificial Intelligence Quotient (AIQ) was developed using a mix of publicly available data, qualitative analysis and AI-powered web crawling tools. It is composed of five parameters grouped into two indexes, AIQ for Invention and AIQ for Collaboration. For each of the 200 companies (Fortune 100 and the Intelligent 100), Accenture calculated one score per parameter based on the relative positioning of that company vs the leading companies. The averages of each index were used to set up cut off points to define the four categories of companies (Collaborative Inventor, Inventor, Collaborator, Observer).

We adapted Saunder's & Brynjolfsson's (2016) econometric approach to estimate the effect of AIQ on Enterprise Value. In order to be able to estimate this effect with highest precision, the econometric model controls for a number of fixed and time-varying factors potentially confounding with companies' investment on AI technologies.[22]

ABOUT THE RESEARCH

ASSESSMENT OF AI TECHNOLOGIES and applications in search strings:

ARTIFICIAL INTELLIGENCE DEFINED

	SENSE	COMPREHEND		ACT
TECHNOLOGIES	COMPUTER VISION	NATURAL LANGUAGE PROCESSING	MACHINE LEARNING	INFERENCE
	AUDIO PROCESSING	KNOWLEDGE REPRESENTATION	DEEP LEARNING	EXPERT SYSTEMS
	SENSOR PROCESSING	SPEECH TO TEXT	REINFORCEMENT LEARNING	
APPLICATIONS	GESTURE RECOGNITION	VIDEO ANALYTICS	RECOMMENDATION SYSTEMS	BOTS
	IMAGE/FACIAL RECOGNITION	TEXT ANALYTICS	SYSTEM OPTIMIZATION	ROBOTIC PROCESS AUTOMATION
	BIOMETRICS IDENTITY	SEMANTICS/ ONTOLOGY		VIRTUAL ASSISTANTS
	CONTEXT-AWARE COMPUTING			AUGMENTED REALITY

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 vs. Applications or Capabilities is subjective to individual interpretation. The list is not exhaustive.

Note: This study looks at pioneers in the development of AI technologies and applications that are transforming business models. It does not closely analyze the companies that are adopting AI in various innovative ways—further study is required to make a fair assessment of companies' adoption or usage of AI.

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