

Leading the Way with Artificial Intelligence:

The Next Big Opportunity for Europe

About the Report

835 Business Leaders

Tata Consultancy Services’ Global Trends Studies are a series of surveys that seek to understand the opportunities new technologies present – and the barriers they face – in the world of business. Over the years they have served as a benchmark on the adoption of, and sentiments around, Big Data, Cloud, Mobile, the Internet of Things (IoT) and, most recently, Artificial Intelligence (AI) & Robotics. The European edition of this survey is being launched at the European Business Summit 2017 in Brussels. This study is comprised of the opinions of 835 business leaders from across the world. Approximately 30% (253) are from major European countries including France, Germany, the UK, Switzerland and Denmark. The respondents are from 13 distinct industries, and their companies reported average revenues of USD \$23.5 billion (median revenue of \$4.0 billion).

Contents

Foreword by Amit Bajaj, CEO Europe, Tata Consultancy Services	4
European Perspective by Lambert Van Nistelrooij, MEP	6
Executive Summary	8
Key Findings	10
Conclusion	26

The Power of Innovation:

How European Businesses are Embracing Artificial Intelligence

This year Europe celebrates the 60th anniversary of the Treaty of Rome, which helped to establish the European Economic Community. Reflecting on this diamond anniversary, and as the Strategic Partner to the European Business Summit, I'm inspired by the tremendous growth and prosperity of the European region, driven largely by a progressive and innovative business community.

With political uncertainty in Europe, combined with the almost unbelievable pace of digital advancement, there is no question that challenges lie ahead. Also, I see many exciting opportunities. Probably the single largest opportunity is the digital economy, which the European Commission estimates will grow by €415 billion per year, if we can successfully support digital businesses.

European businesses have long been digital leaders. The impact of AI & Robotics, particularly on skills and jobs, as well as ethical and liability issues, have been considered in Brussels for a number of years. Our most recent Global Trend Study on AI highlights just how much of a positive and innovative outlook European businesses have on the ways in which technology can enhance

the quality of work and overall job satisfaction.

“European businesses invested \$80 million on average in AI & Robotics in 2016”

In a major endorsement of digital innovation, European businesses invested \$80 million on average in AI & Robotics in 2016 - more than any other region globally. By comparison, North American firms, which are traditionally the biggest AI investors, spent \$64 million. Asia-Pacific and Latin American companies spent \$57 million and \$56 million, respectively.

By 2020, European companies envision 51% of their AI spend will go towards improving existing business processes, 49% transforming them - heralding new ways of working and creating opportunities to pursue new ventures outside of the existing business model.

European businesses are uniquely poised to drive innovation and affect transformation. This is because these businesses largely trust advice from cognitive systems. European employees are receptive to the advantages of technology

and have far fewer concerns than their counterparts in other regions, thereby helping to power new developments and ways of working.

During the many years I've worked with European businesses, what has struck me most is how leaders genuinely embrace the ways in which AI can improve productivity and the quality of their work. For them, it's not about cutting costs. It's about introducing new tools that help businesses improve on quality and create new opportunities. It's a new way of thinking and a new way of working. The rate of innovation is only going to keep getting faster. This is why it's imperative that all leaders plan for an agile, digital future.

To prepare and upskill employees for the future, Tata Consultancy Services (TCS) is closely following the New Skills Agenda - the European Union and Member States' agenda which looks into redefining skills and qualifications for a future world. We've already shared our Harvard Business Review report on "The Robotic Revolution" at the recent World Economic Forum in Davos and, along with our Strategic Partnership here at the European Business Summit, we'll continue to engage with European policy makers in this area, to ensure

**Amit Bajaj, CEO Europe,
Tata Consultancy Services**

digital skills and training keep up with digital innovation.

“This is one of the most exciting times for leaders in Europe and around the world”

This is one of the most exciting times for leaders in Europe and around the world. Digital technologies and applications, forged by innovations, such as AI, enable more informed and better decisions and impactful solutions than ever before. As business and technology industry leaders, our responsibility is to listen to the needs of governments, businesses and individuals and help guide each other along this journey.



Collaborating to Build a Better Future in the Digital Economy

Today in Europe we are living in an exciting time, with incredible potential to affect positive change for our future. Technology is the fuel of the future, and as a member of the European Internet Forum (EIF) steering committee, I have the privilege of experiencing first-hand how technological developments, from advancing AI to the internet of things, are already making the world a better and more connected place. The EIF's mission is to help ensure that Europe remains at the forefront of this global tech transformation and benefits fully from it through enhanced global competitiveness and social progress.

Europe has a fantastic history of embracing technology, after all, in 1899 it was the Italian Guglielmo Marconi who sent the first international radio signal between England and France. In recent history, the first microprocessor, the Intel 4004, was designed by another Italian, Federico Faggin, while the German Karlheinz Brandenburg invented the MP3 audio file format. Without these innovations, the world would be a very different place.

To follow in these footsteps we must plan now for future developments, ensuring we invest in a proper regulatory framework to support

technology and its continued growth, and pay heed to the importance of cybersecurity and data protection.

“technology can bring us the productivity gains needed to achieve long-term, sustainable growth”

In a world with an ageing labour force and increased competition for limited natural resources, technology can bring us the productivity gains needed to achieve long-term, sustainable growth. Indeed, the European Commission estimates that our digital economy is set to grow €415 billion per year, if we can successfully support digital businesses. Now is the time to collaborate and work seamlessly with tech leaders so we can continue to propel Europe forwards.

This is particularly true for AI and cognitive technologies, which European business leaders are already embracing and actively using. According to TCS' AI and Robotics: The Global Trend Study, 91% of European respondents already use AI and almost 60% said they view AI as important to remaining competitive by 2020.

Most importantly, European businesses are setting themselves up for the future - in 2016 European businesses invested \$80 million on average in AI and robotics, more than any other region globally.

The European Parliament is dedicated to championing and supporting technology innovators and leaders who are transforming our world for the better. One of our biggest hurdles now is ensuring that we upskill and train our citizens for the digital future, creating the conditions for future jobs and growth. One way we are already doing this is through the New Skills Agenda, which aims to improve the quality and relevance of skills formation, make skills more visible and improve intelligence and information for better career choices.

“Cognitive technologies have massive potential to improve the lives of all European citizens”

Cognitive technologies have massive potential to improve the lives of all European citizens and it's the responsibility of the policy community to work together with business leaders to realise the opportunities ahead in a strategic

Lambert van Nistelrooij, MEP

and responsible way. The countries who lead in this transformation will benefit most from it. As this report shows, Europe has a head start - but in a competitive global economy this advantage may not last for long - Let's seize the moment now.



Executive Summary

Europe Leading the Way in the Use of Cognitive Technologies

Like many innovations, AI first burst into public view as science fiction. Mary Shelley's *Frankenstein*, Karel Capek's *Rossum's Universal Robot* (which actually gave us the word robot) and others conceived artificial beings with the ability to think like humans.

Today, the exponential growth of computing power is bringing these and other imaginings to life, from self-driving cars to intelligent assistants, networks that self-learn, and dozens of other less glamorous but nevertheless critical applications. And we are still in the early days.

Artificial Intelligence is the next transformative wave of technology, and no business executive can afford to ignore it. According to American research and advisory firm Gartner, smart agents will facilitate 40% of mobile interactions by 2020. The market for cognitive and AI solutions will experience a compound annual growth rate of 55.1% between 2016 and 2020, according to analyst firm IDC, growing from nearly \$8 billion in revenues to \$47 billion.

But it can be difficult to get a firm grasp of what exactly AI is and how it can best help a business. In addition to being technologically

complex, AI is like many of the products it spawns: evolving and changing rapidly. It is both far more – and much less – than either the utopian promises or dystopian visions that often surround it.

It is vital that businesses are clear-headed and strategic as they navigate this new landscape. Senior executives are being bombarded – from the IT room to the boardroom – with questions and demands about how they are keeping up and how they plan to get ahead. That's why TCS conducted a wide-ranging study to document whether and how companies were using AI and Robotics. This report shines a light on the research we did into the responses from the 253 European respondents.

“European organizations are leading investment in AI and Robotic technologies”

The headline news is that European organizations are leading investment in AI and Robotic technologies. But Europe is not only a leading user of AI and Robotics; it is also a leading producer of the technology. According to the U.S.

Commerce Department, in 2016, Europe and Japan produced and shipped more robots than U.S. companies did, which led to a \$4 billion U.S. trade deficit in advanced flexible manufacturing goods with the European Union, Switzerland and Japan. That was double the trade deficit of 2003 in that category.¹

Our study found that 91% of European companies are using AI and more than half (57%) see it as essential for global competitiveness.

These findings show that in many ways European companies are in the vanguard of using AI and Robotics to improve their operations, and in some cases revolutionise them. We've mapped out some of the key European findings below and pulled out real life examples of companies already implementing AI to make advances for their businesses. We hope they galvanise ideas and inspire you to explore investments in this exciting field.

Key Findings

“European companies spend far more on average in AI than any other region globally”

Key Findings

Airbus has been experimenting with robots that can take on more assembly-line tasks. The goal is to reduce time to market, improve product quality, and pare costs – all critical goals to increase output from 42 planes a month to 50 by next year. “We cannot continue with business as usual,” said Bernard Duprieu, the company’s head of manufacturing technologies research told a reporter last year. “We have a great opportunity with the increase in volumes to bring more efficient design and more automation into the manufacturing process where it’s appropriate and makes sense”²

European Companies Lead on AI & Robotics Investment Worldwide

Together, European companies spend far more on average in AI than any other region globally. However, the median spend by European companies is low. This conservatism in spending (except by a couple of companies, resulting in a high average spend) is not likely to significantly impact European companies and their competitiveness in the short term because the full benefits of AI only reveal themselves after substantial investment.

AI & Robotics Technology Essential for European Competitiveness

The vast majority (91%) of European companies are using AI and more than half (57%) see it as essential for global competitiveness.

AI & Robotics Technology will be Used Increasingly to Transform Industry

Presently, European companies are using AI to maintain a competitive status quo but by 2020 the percentage of AI investments as a transformative factor in their business will start to increase.

Main Driver for use of AI & Robotics Technology is Better Service and Increased Competitiveness

Most of the companies surveyed stated that the main driver to use AI in Europe continues to be the improvement of customer experience, value and quality of service. By doing so, they aim to build on existing strengths and increase their competitive edge.

Despite Europe leading globally in manufacturing of industrial robots, European companies use AI less in manufacturing operations. This may be evidenced by a reluctance to automate jobs in that sector. European companies view the core benefit of AI as one of competitiveness and better value to customers, over job reductions or cost cutting.

Adidas has embraced cognitive technologies. After a successful pilot test, the company opened an automated factory in the Bavarian town of Ansbach last year, and will follow it later this year in a second ‘Speedfactory’ in the U.S.⁴ And additional facilities are expected in Europe.⁵ The factories will use robotic technology to make shoes faster. Speed, not job cuts, is the goal, **Adidas** told Fortune magazine. The factory will “propel a global network of automated production which brings cutting-edge technology to cities around the world,” said **Adidas**’ vice president of technology innovation, Gerd Manz. It will “set the scene” for the company to usher in large-scale production that gives consumers what they want faster.⁶

The Technology is Seen as Producing many New Jobs in Europe but Automating Jobs as Well

In Europe, respondents predicted that their businesses could use AI to reduce headcount by an average of 17% of jobs by 2020. But they also predicted that AI and robotics could lead to a 13% increase in jobs by 2020 in the areas of the business where they were using the technology.

However, companies with the biggest revenue and cost improvements from AI in 2015 predicted AI would produce at least three times as many new jobs by 2020 in the 13 functions that we surveyed vs. the companies that reported the smallest improvements from AI.

AI & Robotics will be Used Most in the IT Function

Until 2020 the IT function is still the area within companies where AI will be most evident, thereafter slowly gaining traction in finance and accounting. These findings give food for thought as to how Europe prepares for this by rethinking what IT and other skills people entering the job market should have.

Secure AI is the Highest-Rated Success Factor in European Companies

All in all, the respondents rated five factors as most important to generating benefits from AI:

- 1. Making AI systems secure against hacking (also rated no. 1 globally)**
- 2. Developing systems that continually learn on their own to make better decisions (again, the same as the no. 2 globally)**
- 3. Helping employees to learn and adopt new processes and systems (no. 5 globally)**
- 4. Developing systems that make good, reliable, safe decisions (no. 3 globally)**
- 5. Enabling employees and managers to trust what AI is advising them to do (no. 4 globally) - appeared lower on their list, reflecting less concern**

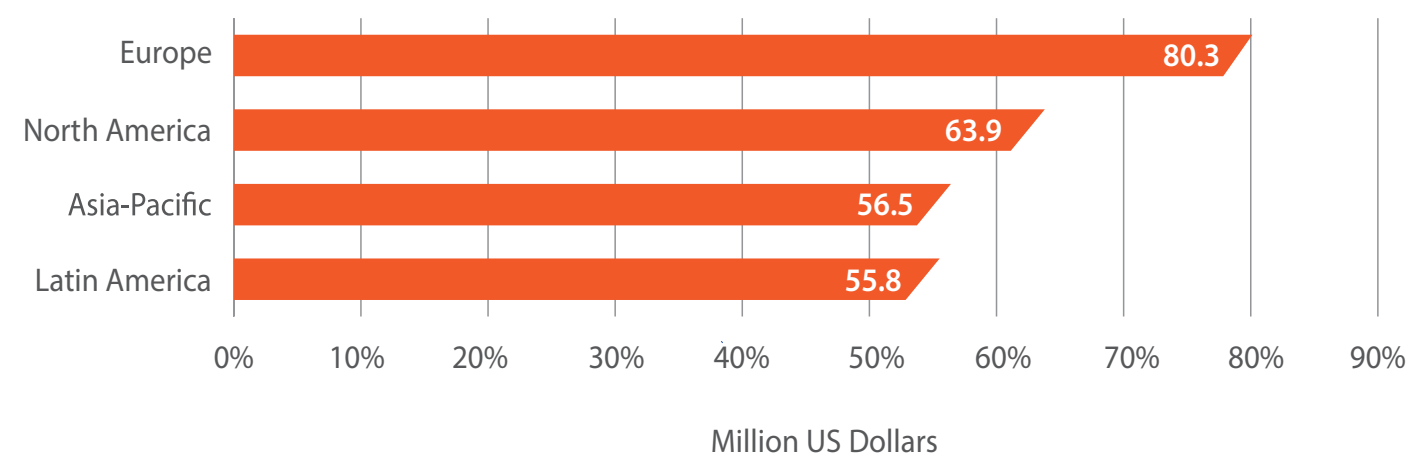
Key Findings

Europe Number One for AI Investment in 2016

European companies are, in many ways, leading the charge in terms of the use of AI and Robotics to improve their operations, according to our study.

Last year, the average European company surveyed spent \$80 million on AI initiatives, while North American companies spent a mean of \$64 million. Asia-Pacific and Latin American companies reported similar mean spends of \$57 million and \$56 million, respectively. Not only are European companies at the cutting edge in developing AI and robotic systems, they are also front and centre of using the technology in their own businesses (exhibit 1)

Exhibit 1: Cognitive Spend by Region of World in 2016



Q10 (Regions): Average 2016 Spend per Company on Cognitive Technology Initiatives

Individual European Companies not Spending Big on AI

In 2016, the average European company spent far more on AI than its counterparts in the three other regions of the world – in fact, 26% more than the average North American company. However, most European companies individually did not invest heavily in AI last year. In fact, 58% spent less than \$10 million each, and 24% spent less than \$1 million. Only 12% spent at least \$100 million each on AI.

So, while the mean spend in Europe was \$80 million, the median spend was only \$2.7 million. This pattern played out similarly in the other three regions of the world.

In TCS' six previous Global Trend Studies (dating back to 2011) on the adoption of digital technologies (eg, IoT, big data and analytics), we found a similar pattern: only a distinct minority of companies had invested heavily. Since the benefits of such technologies are (at the beginning) largely unproven to many industry executives, they remain sceptical about investing in them in a meaningful way – until someone else makes a big splash.

But what has now prompted companies like Daimler, Toyota, General Motors and Ford to step on the pedal with their AI investments? We believe it was largely driven by companies such as Google and Uber – firms from outside their industries – that got a head start in using AI to create self-driving vehicles. Google launched its self-driving car project in 2009 – long before AI hit the headlines¹⁰. Uber has been experimenting with self-driving cars in Pittsburgh since September 2016¹¹. The established motor manufacturers got serious about AI after seeing competition emerge – and a clear path to making money from the technology.

They're also watching investors' interest in AI. This April, the stock market value of Tesla surpassed that of GM and Ford. One reason cited was Tesla's pending use of AI-enabled car safety and self-driving capabilities, according to a Morgan Stanley securities analyst.¹²

Only two years ago giant car manufacturer **Toyota Motor Corporation** announced a \$1 billion investment in AI over five years in a new Silicon Valley research centre.⁷ This year, **Ford Motor Company** said it would invest \$1 billion alone in one AI startup (**Argo AI**, with less than 200 employees) over five years so that it could catch up with competitors in self-driving cars. (The startup firm was launched by two ex-leaders of self-driving initiatives at **Uber** and **Google**.⁸) In addition, German automaker **Daimler AG** announced this January it would bring to market a self-driving taxi service within three years, aiming to beat **Ford** and **BMW** to market by at least a year. **Daimler** now has hundreds of AI specialists, and it is looking to hire more.⁹

Key Findings

The way the automotive industry has been investing in AI is indicative of our broader finding that only a minority of companies surveyed in each of the sectors were making substantial investments in AI. In this way, the moderate spending of most European companies with AI investments may prove out to be far too conservative.

This may have repercussions later as they play catch up with the biggest spenders inside and outside of Europe.

Globally, the sectors with the greatest number of ‘high rollers’ in AI were telecommunications (12% of that sector’s total survey participants), banking and financial services (9%) and consumer packaged goods (8%) (see exhibit 2). The first two industries didn’t surprise us. Telecommunication companies today must use AI to detect and protect their networks from hackers who are continually trying to bring them down. Meanwhile, the banking industry is among the largest spenders on IT year-on-year. In 2016, IT research firm IDC said banking and retail led the world in spending on AI (see exhibit 2).

Exhibit 2: Sectors with Companies that Spend Big on AI

As % of firms in their industry	# of firms that spent at least \$250M on AI	Industry
12%	7	Telecommunications
9%	16	Banking & Financial Services
8%	2	Consumer Packaged Goods
7%	4	Insurance
7%	11	High-Tech
7%	7	Industrial Manufacturing
5%	3	Retail
4%	1	Utilities
4%	1	Energy
4%	1	Media, Entertainment & Information Services
2%	1	Healthcare & Life Sciences
0%	0	Automotive
0%	0	Travel, Transportation & Hospitality

Q10A (Global): Industries with the Biggest AI Spenders (No. of Companies which Spent at Least \$250M in 2016)

What the biggest investors in AI do differently

The companies that we surveyed across all four regions of the world with the biggest spend, not just in Europe, had a notable signature differing in five primary ways from the companies with the smallest improvements:

1. AI leaders outspent companies with the smallest improvements from AI by a factor of five
2. Use AI more broadly across their organizations, especially in areas that appear incidental to generating short-term revenue
3. Focus on areas that directly impact their ability to make (and lose) money
4. Pay more attention to addressing fears of unemployment
5. Ensure that their IT departments don't suffer the 'cobbler's children' syndrome of using AI everywhere else but in IT

Applications of AI & Robotics in European companies

Travel, transportation and hospitality: German airline **Lufthansa** developed a sales chatbot (based on AI technology that can recognize text messages) that helps customers find the lowest fares for flights over nine months. The chatbot (dubbed 'Mildred') is based on the **Facebook Messenger** platform.¹³ (There are an estimated 25 million **Facebook** users in Germany.¹⁴)

Consumer packaged goods. Swiss fragrance manufacturer **Firmenich International SA** has spent \$60 million over the last three years to increase the capacity of its factory near Geneva without having to add staff. The country has the world's highest average wages.

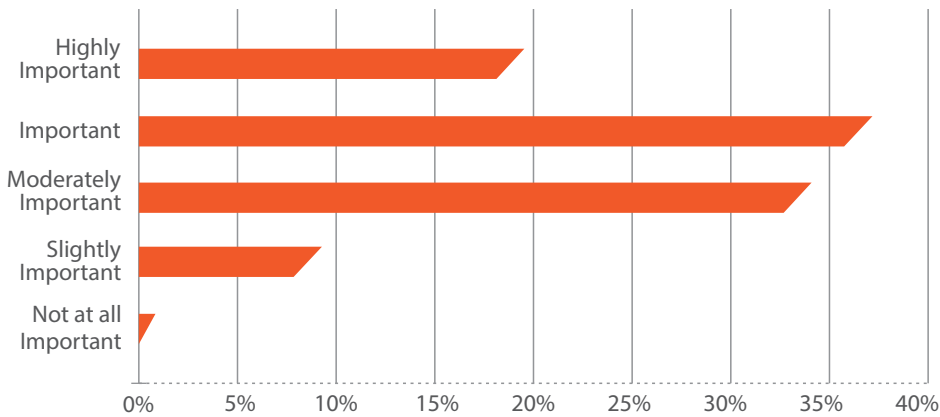
Some 200 workers at the plant oversee self-driving vehicles that transport barrels and robotic arms that fill, sort, label and ship containers with little need for much manual labor. "Automation is imperative if we want to remain competitive," said the company's CEO, Gilbert Ghostine.¹⁵

Industrial manufacturing. In the realm of procurement, **Siemens**, the \$87 billion German engineering giant, has been using sophisticated systems to predict energy supplies and procurement for years. Its neural network can forecast electricity prices for the next 20 days to identify optimal purchase times.¹⁶

AI & Robotics Technology is Essential for European Competitiveness

Europe has a large appetite for investment in AI and is busily applying this 'frontier' technology. Remarkably, the vast majority of European companies (91%) use AI, and 57% view the technology as important or highly important to remaining competitive by 2020 (exhibit 3).

Exhibit 3: Most European Companies View AI as Essential to Competitiveness



Q14: (Europe): AI's Importance to Company Competitiveness by 2020 (% of Respondents)

AI & Robotics Technology will be Used Increasingly to Transform Industry

With the idea that AI could be used either to transform a company or to improve its existing business, we asked our European survey respondents to estimate what percentage of their AI investments would be transformative vs. improving the status quo. The results were striking: In 2016, 54% of European company AI investments went toward improving the existing business, and 46% to transforming it. The percentage was expected to increase through 2020 and 2025.

European companies envisage that spending plans will change: They predict 51% of AI investments will go toward improving the existing business vs. 49% to transforming it. Globally, respondents envision that by 2020, 48% of cognitive technology investments will go toward transformation (See exhibit 4 on next page).

Key Findings

Exhibit 4: Use of Cognitive Technologies to Improve vs. Transform Business

2025 % of Spend for Improving	2025 % of Spend for Transforming	2020 % of Spend for Improving	2020 % of Spend for Transforming	2016 % of Spend for Improving	2016 % of Spend for Transforming	Region
50%	50%	51%	49%	54%	46%	Europe
53%	47%	54%	46%	55%	45%	North America
52%	48%	51%	49%	54%	46%	Asia- Pacific
53%	47%	50%	50%	50%	50%	Latin America

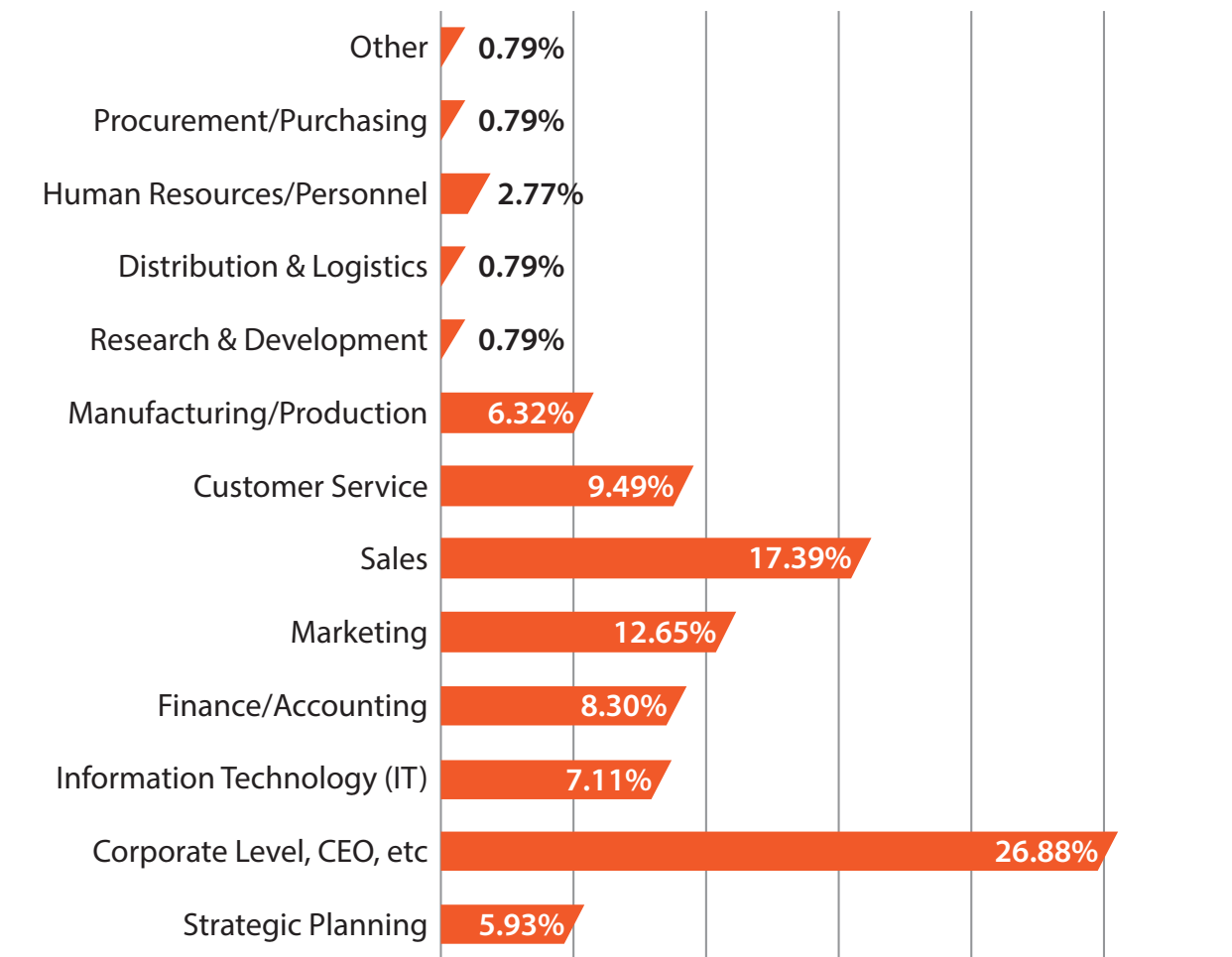
Q11A (Region of World): Estimated Percent of AI Investments for Transforming vs. Improving the Current (2016, 2020 and 2025)

Main Driver For Use of AI & Robotics Technology is Better Service

Across all sectors, companies that each spent more than \$250 million on AI more frequently were using the technology in the IT, corporate centre, finance and accounting, and marketing functions than in other areas of the business (see exhibit 5).

The top two rated goals were: helping customers use and get more value from products and services (3.92) and improving the quality of products and services (3.88). Next came a focus on speed: reducing cycle times for key processes (3.85). Respondents gave slightly less priority to the importance of improving executive decision-making abilities, identifying new revenue opportunities, and reducing costs by automating work currently done by people. That's notable, since the topic of job automation dominates so many marketplace discussions on AI (see exhibit 6)

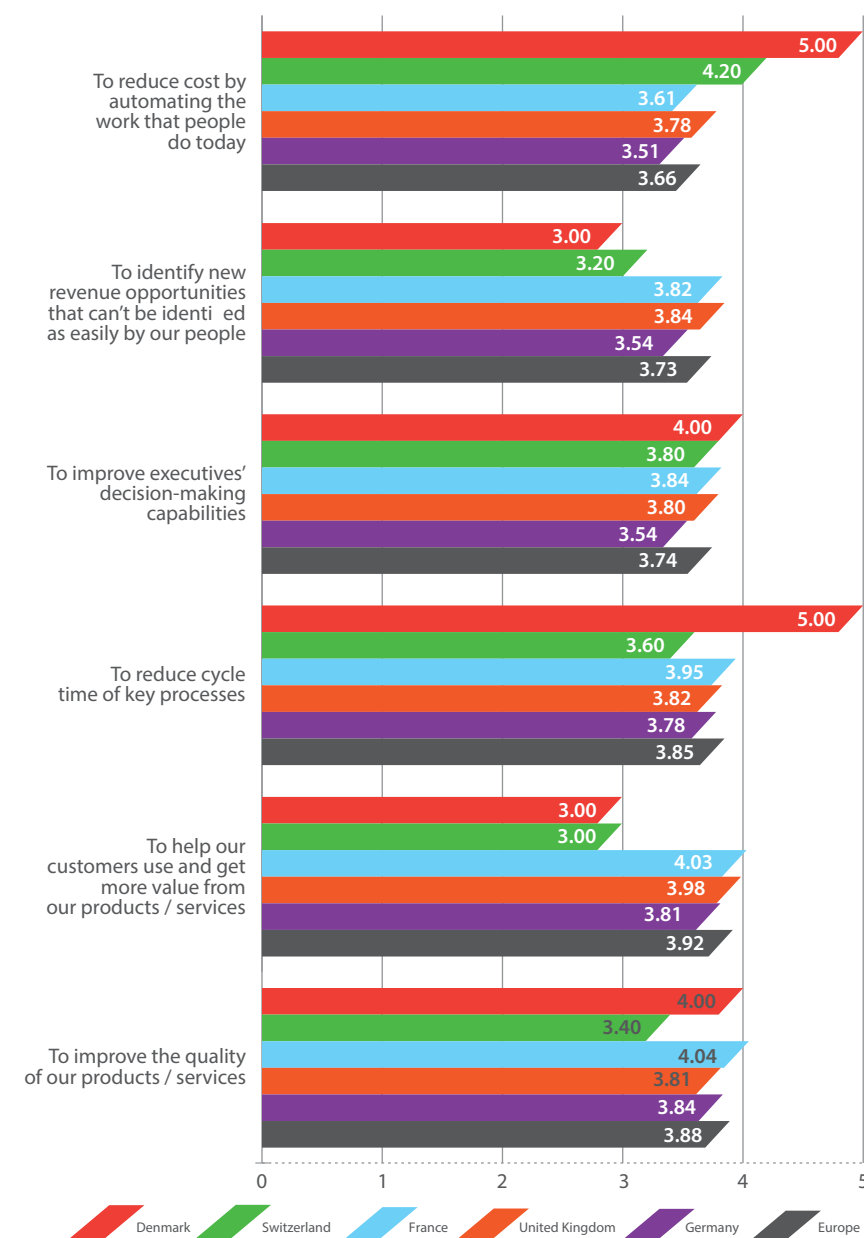
Exhibit 5: Where European Companies Predict AI Will Have its Greatest Impact



Q15 (Europe): Business Functions in Which AI is Predicted to Have the Greatest Overall Competitive Impact by 2020 (% of Respondents' No. 1 Choice)

Key Findings

Exhibit 6: European Companies AI & Robotics Goals



Q9 (Europe): Mean Rating of Company's Goals - Europe Overall and by Country

AI & the Future of Work

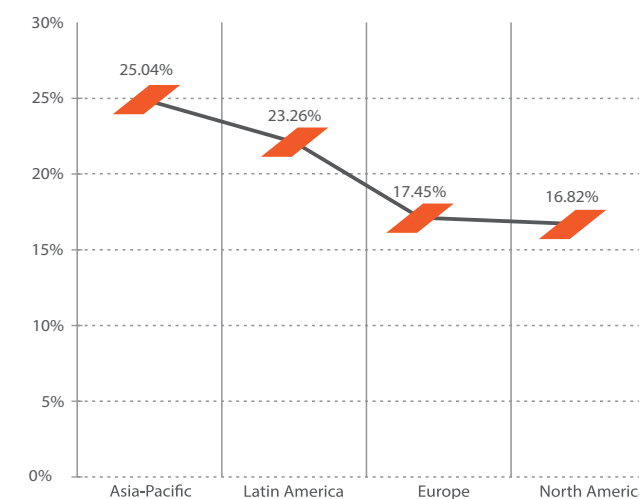
Job quality and satisfaction will improve, but there will be job losses in the short term.

While AI is widely considered a threat to jobs, the present reality is one where the technology assists its human counterparts - this includes a mixture of automating monotonous work (for example, automating routine answers to customer questions or replacing people with robots on assembly lines), to actually helping employees do their work (for example, guiding service reps on how to resolve customer problems), and doing work no one had done before in the organization (for example, anticipating future customer purchases and automatically presenting offers online).

Nevertheless, in Europe, respondents predicted that the area of their business related to the AI project (not the entire company) could use the technology to cut an average of 17% of jobs by 2020. At the same time, however, companies with the biggest revenue and cost improvements from AI in 2015 predicted AI would produce at least three times as many new jobs by 2020 - leading to an average 13% increase in jobs in functions using AI by 2020 (see exhibit 7).

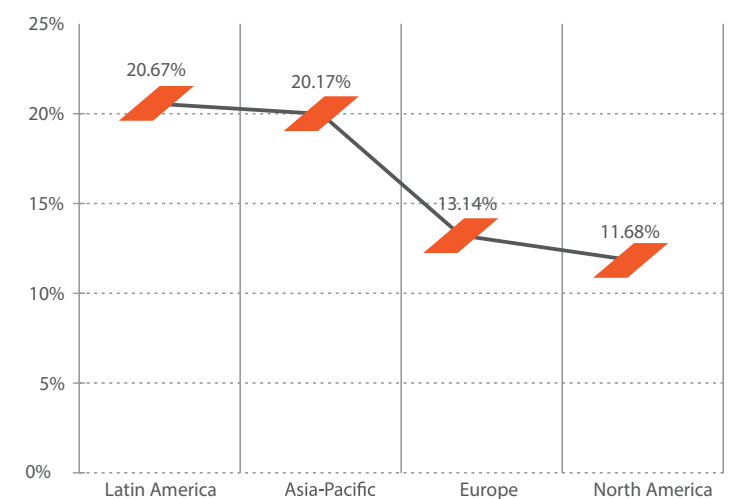
Taken together, those figures indicate that European respondents envision a slight drop in the total number of jobs within their business units using AI by 2020 (see exhibits 7 and 8).

Exhibit 7: Expected Job Cuts Related to AI by 2020



Q18 (Regions): Mean Percentage of Jobs in Functions That Could be Eliminated by 2020 with the Use of Cognitive Systems

Exhibit 8: Expected Job gains Related to AI by 2020



Q19 (Regions): Mean Percentage of New Jobs the Technology Could Create in Functions by 2020

Key Findings

What will Future Work Look Like?

A study by the McKinsey Global Institute predicted that 78% of the time spent on what it called “predictable physical work” (eg, food preparation, putting objects into packages, and some assembly-line tasks) could be automated. McKinsey also said 60% of work in collecting and processing data could be automated.

Other studies this decade have estimated the impact of AI on employment, and some have issued dire warnings. For example, a 2012 study by Oxford University estimated 47% of jobs could be eliminated by AI and other automation by 2033.¹⁷ While the Organization for Economic Co-operation and Development (OECD) said 9% of jobs in its 21 member countries could be eliminated.¹⁸ It is to be noted that, like the McKinsey report, the OECD study analyzed tasks rather than whole jobs in terms of their susceptibility to automation.

In our study, we asked managers in 13 functional areas to estimate AI’s impact on jobs in the functions in which they worked by 2020 – that is, jobs eliminated and new jobs created to handle AI. Based on this data (exhibit 9), here are some observations:

- They don’t see massive job losses due to AI by 2020. In no function was the net job loss (average predicted % of jobs gained minus average predicted % of job lost) more than 7% of jobs in any function
- Manufacturing/operations and IT managers predicted the highest average percentage of job losses from AI (24% in manufacturing and 21% in IT) of all the functions we surveyed. The functions predicting the lowest percentage of job losses by 2020 were the sales and legal departments
- Distribution and logistics managers actually predicted a net gain in jobs in their function by 2020 due to AI. Perhaps to keep their autonomous warehouses and trucks working, they’ll need a higher number of support personnel (technical, maintenance, etc.). No other function predicted a net gain
- Sales jobs appear safe, with an average net loss of just 1% of jobs predicted

Several economists and other labor experts predict that AI and Robotics will result in new jobs, and that the technology won’t eliminate as many existing jobs as some believe. “In general, every wave of automation and computerization has increased productivity without depressing employment, and there is no reason to think the same will not be true this time,” said Michael Kende, chief economist at the Internet Society. For example, he said, while robots take over some manual work, someone must design and build them.

Exhibit 9: 2020 Forecasts of Functional Jobs Gained and Lost because of AI

Projected % of Jobs Gained	Projected % of Jobs Lost	Functional Area
19%	24%	Manufacturing or Operations
15%	21%	IT
13%	19%	Finance & Accounting
16%	19%	Corporate Level (CEO, COO, BU Head)
16%	19%	Marketing
16%	19%	Customer Service
22%	18%	Distribution & Logistics
11%	16%	R&D
10%	15%	HR
8%	15%	Strategic Planning/Corporate Development
9%	15%	Procurement
13%	14%	Sales
3%	2%	Legal

Q18 (Global): Predictions of Gained and Lost Due to AI by 2020 in Respondents’ Functional Areas

Key Findings

Deutsche Telekom's use of AI in finance and accounting work is a harbinger of this future. Since March 2015, the telecom services company has been using software robots to automate the formerly manual work of managing contract changes and chargebacks. The software manages email, CRM and company applications, and by February 2016 was handling 150,000 business transactions per month. The impact, according to the company was "significant" reductions in cost and time to process the transactions.¹⁹

Bosch, the \$78 billion German manufacturer of auto parts, appliances and other products, has been investing for years in robots, AI and predictive analytics in its factories. The company is making additional investments to infuse AI, robotics and other technologies into its products and the assembly lines of its 250 factories around the world. The company has projected savings of \$1 billion by 2020 from such technologies, as well as \$1.1 billion in additional revenue.²⁰

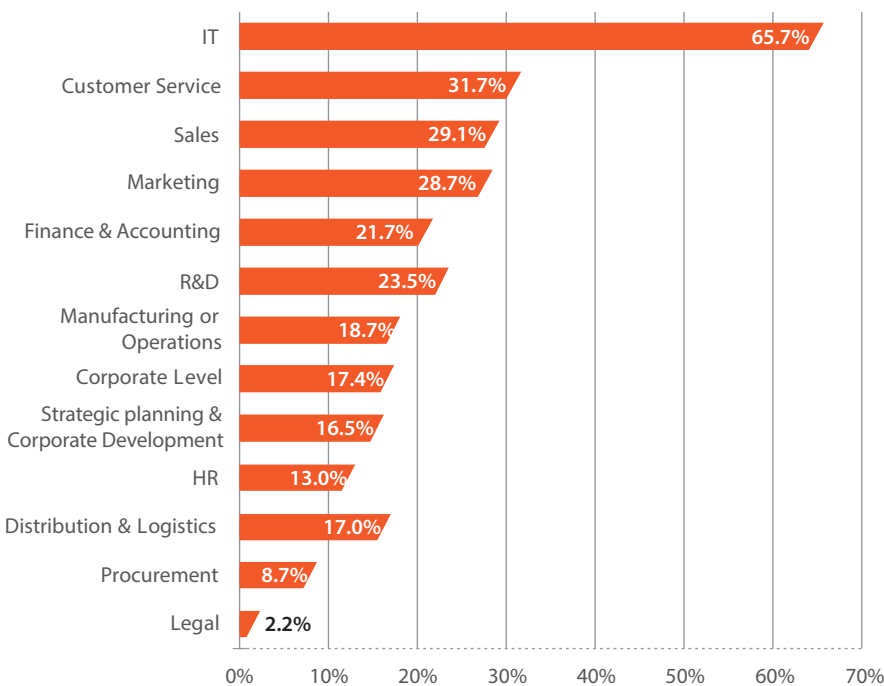
It announced in January a €300 million investment over the next four years in an AI research center, with an initial staff of 100 located in India, the U.S. and Germany. The company said it would focus AI on IoT applications, and it predicted that **Bosch** products using AI would eventually make up 10% of total revenue. "Ten years from now, scarcely any **Bosch** product will be conceivable without AI," said the company's chairman, Dr. Volkmar Denner. "It will either possess that intelligence itself, or AI will have played a key role in its development or manufacture," he added.²¹

AI & Robotics Will Be Used Most in the IT Function

By the end of the decade, AI's impact in European companies will expand far beyond the present heavy use within the IT function. Two-thirds said their IT functions were using AI in 2016, while the next most frequent AI users were customer service (in 32% of the firms), sales (29%) and marketing (29%). By 2020, European companies still see IT as the most frequent internal user of cognitive technologies but also see AI gaining traction in finance and accounting, with 30% saying they expect to use the technology there compared to the 22% using it there today (see exhibit 10).

When asked in which business function AI would have the greatest impact on their company's competitiveness by the year 2020, European companies chose IT most frequently (27% of respondents), followed by customer service (17%), sales (13%) and manufacturing/operations (10%).

Exhibit 10: European Company Use of Cognitive Technologies, by Function: 2016



Q7 (Europe): Percentage of Companies Using Cognitive Technologies Presently in each Function

Making Systems Secure is seen as The Top AI Success Factor in Europe

We asked European respondents to rate the factors that made cognitive technologies in their business units successful, on a scale of one to five (with five being highly important). Just like survey participants from around the world, European companies cited security - making systems secure against hacking - as the most important factor. This is not surprising - it's hard to imagine a project with subpar security being viewed as a business success.

As the second most important success factor, European respondents cited developing systems that continually learn and make better decisions (as did respondents globally). This was followed by getting employees to learn and adopt new processes and systems, and developing systems that make good, reliable, safe decisions (see exhibit 11).

One interesting difference was that North American respondents cited 'getting teams to trust advice from cognitive systems' as their number two key to success. Globally, this factor was rated fourth. But European respondents rated it fifth - indicating slightly less concern with the trust issue (see exhibit 10).

Exhibit 11: Key Success Factors for AI Projects (continued on next page)

Latin America	Asia-Pacific	North America	Europe	Across World	Rank
Getting managers and employees to trust what our cognitive systems are advising them to do (4.46)	Making systems secure against hacking (4.05)	Making systems secure against hacking (4.12)	Making systems secure against hacking (4.00)	Making systems secure against hacking (4.09)	1
Developing systems that continually learn and make better decisions (4.46)	Getting employees to learn and adopt new processes and systems (4.01)	Getting managers and employees to trust what our cognitive systems are advising them to do (4.04)	Developing systems that continually learn and make better decisions (3.90)	Developing systems that continually learn and make better decisions (4.00)	2
Determining where to use the technology in the company (4.44)	Getting managers and employees to trust what our cognitive systems are advising them to do (3.93)	Developing systems that make good, reliable, safe decisions (4.04)	Getting employees to learn and adopt new processes and systems (3.90)	Developing systems that make good, reliable, safe decisions (3.99)	3
Addressing layoff fears (4.44)	Developing systems that make good, reliable, safe decisions (3.93)	Developing systems that continually learn and make better decisions (4.03)	Developing systems that make good, reliable, safe decisions (3.88)	Getting managers and employees to trust what our cognitive systems are advising them to do (3.99)	4
Making systems secure against hacking (4.43)	Developing systems that continually learn and make better decisions (3.92)	Getting employees to learn and adopt new processes and systems (3.93)	Getting managers and employees to trust what our cognitive systems are advising them to do (3.86)	Getting employees to learn and adopt new processes and systems (3.96)	5
Changing our business processes to capitalize on automated decisions, actions, etc. (4.39)	Changing our business processes to capitalize on automated decisions, actions, etc. (3.91)	Changing our business processes to capitalize on automated decisions, actions, etc. (3.93)	Changing our business processes to capitalize on automated decisions, actions, etc. (3.79)	Changing our business processes to capitalize on automated decisions, actions, etc. (3.91)	6

Importance rated on scale of 1-5 (1 = not at all important, 2 = slightly important, 3 = moderately important, 4 = important, 5 = highly important)

Q17 (Overall and by Regions): Most Important Factors in Getting Benefits from AI

Key Findings

Exhibit 11: Key Success Factors for AI Projects (continued)

Latin America	Asia-Pacific	North America	Europe	Across World	Rank
Developing systems that make good, reliable, safe decisions (4.39)	Getting top management approval for funding (3.88)	Determining where to use the technology in the company (3.88)	Determining where to use the technology in the company (3.78)	Determining where to use the technology in the company (3.86)	7
Deciding whether to use the technology to help or replace people (4.37)	Deciding whether to use the technology to help or replace people (3.85)	Getting top management approval for funding (3.87)	Getting top management approval for funding (3.68)	Getting top management approval for funding (3.84)	8
Getting employees to learn and adopt new processes and systems (4.33)	Determining where to use the technology in the company (3.85)	Deciding whether to use the technology to help or replace people (3.56)	Deciding whether to use the technology to help or replace people (3.67)	Deciding whether to use the technology to help or replace people (3.71)	9
Getting top management approval for funding (4.26)	Addressing layoff fears (3.69)	Addressing layoff fears (3.40)	Addressing layoff fears (3.58)	Addressing layoff fears (3.58)	10

Importance rated on scale of 1-5 (1 = not at all important, 2 = slightly important, 3 = moderately important, 4 = important, 5 = highly important)

Q17 (Overall and by Regions): Most Important Factors in Getting Benefits from AI

Conclusion

“Artificial Intelligence presents a profound economic opportunity for Europe and across the world”

Conclusion

There is Strong Consensus on the Benefits of Cognitive Technologies

AI presents a profound economic opportunity for Europe and across the world. IDC predicts that \$47 billion worth of AI services will be required by 2020. The TCS Trends Study indicates that European firms have taken an early lead in terms of investment in this new technology, and a majority of Europe's business leaders (57%) see it as vital to their future competitiveness.

As with the advent of any new technology, a balanced policy needs to be put in place to serve the twin purpose of protecting both workers' rights and the opportunity for Europe's industry. It's important that businesses and policy leaders collectively put measures in place to ensure that the benefits of AI technologies are felt by as many as possible, particularly since this study indicates that one of the main benefits of adopting AI will be seen in terms of better service to European consumers. At the same time, there is a need to boost skills in the labour force to capture the new jobs that will be created by this opportunity.

“If AI's adoption is supported by judicious and fair regulation, enabling companies to feel secure in making their investments, then great leaps forward are possible”

There is strong consensus on the benefits of cognitive technologies to industry. If AI's adoption is supported by judicious and fair regulation, enabling companies to feel secure in making their investments, then great leaps forward are possible. The European Union has already started to tackle several issues around cognitive technologies, including the evolution of legal issues around robots. Through its Committee on Legal Affairs, the European Parliament has also created a working group to establish legal recommendations on robotics and AI.

Further collaboration is essential between businesses, policy makers and academia to ensure Europe harnesses the economic opportunity that AI will present in the coming years. As the foremost platform for public-private dialogue in the region, the European Business Summit has a major role to play in ensuring that these efforts come to fruition.

References

1. U.S. Commerce Department data, as cited in The Wall Street Journal on March 27, 2017. Accessed April 12, 2017. <http://www.wsj.com/articles/powering-americas-manufacturing-renaissance-foreign-robots-1490549611>
2. Austin Weber, "Airbus Ramps Up Automation," Assembly magazine, April 28, 2016. Accessed April 10, 2017. <http://www.assemblymag.com/articles/93377-airbus-ramps-up-automation>
3. Stephanie Overby, "RPA proving its transformational value at Deutsche Bank," CIO magazine, Feb. 24, 2017. Accessed April 10, 2017. <http://www.cio.com/article/3174126/outourcing/rpa-proving-its-transformational-value-at-deutsche-bank.html>
4. "Adidas's high-tech factory brings production back to Germany," The Economist, Jan. 14, 2017. Accessed April 14, 2017. <http://www.economist.com/news/business/21714394-making-trainers-robots-and-3d-printers-adidas-high-tech-factory-brings-production-back>
5. David Meyer, "Why Adidas is Turning to Robots in Germany and the US," Fortune, May 25, 2016, <http://fortune.com/2016/05/25/adidas-robot-speedfactories/>, accessed June 22, 2016.
6. Adidas press release. Accessed Aug. 16, 2016. <http://www.adidas-group.com/en/media/news-archive/press-releases/2015/adidas-first-speedfactory-lands-germany/>
7. Fortune magazine article, Nov. 6, 2015. Accessed April 10, 2017. <http://fortune.com/2015/11/06/toyota-ai-silicon-valley-robotics/>
8. Bloomberg article, Feb. 10, 2017. Accessed April 10, 2017. <https://www.bloomberg.com/news/articles/2017-02-10/ford-investing-1-billion-in-ex-google-uber-engineers-startup>
9. Handelsblatt, Jan. 9, 2017 article, interview with Daimler R&D chief Ola Kallenius. Accessed April 10, 2017. <https://global.handelsblatt.com/companies-markets/daimlers-driverless-future-673931>
10. Business Insider article, Oct. 23, 2016. Accessed April 10, 2017. <http://www.businessinsider.com/google-driverless-car-history-photos-2016-10/#google-launched-its-self-driving-car-project-in-2009-under-the-leadership-of-sebastian-thrun-a-stanford-university-professor-who-is-lauded-as-the-founder-of-the-autonomous-car-while-at-google-thrun-led-several-projects-at-googles-x-research-lab-including-google-glass-and-street-view-thrun-has-since-left-google-and-is-now-the-founder-of-education-startup-udacity-1>
11. Wired magazine article, April 4, 2017. Accessed April 10, 2017. <https://www.wired.com/2017/04/mercedes-promises-self-driving-taxis-just-three-years/>
12. New York Times article, April 6, 2017. Accessed April 11, 2017. <https://www.nytimes.com/2017/04/06/business/tesla-story-stocks.html?action=click&contentCollection=Business%20>
13. Future Travel Experience, November 2016. Accessed April 10, 2017. <http://www.futuretravelexperience.com/2016/11/lufthansa-launches-flight-search-chatbot-for-facebook-messenger/>
14. Statista. Accessed April 10, 2017. <https://www.statista.com/statistics/283629/germany-number-of-facebook-users/>
15. Alice Baghdjian and Albertina Torsoli, "Robots Rule at Swiss Factories as Strong Franc and Wages Bite," Bloomberg Markets, Feb. 16, 2017. Accessed April 10, 2017. <https://www.bloomberg.com/news/articles/2017-02-17/robots-or-exit-is-swiss-factory-choice-as-franc-and-wages-bite>
16. "Autonomous Systems: Getting Machines to Mimic Intuition," Siemens website information. Accessed June 27, 2016. <http://www.siemens.com/innovation/en/home/pictures-of-the-future/digitalization-and-software/autonomous-systems-machine-learning.html>
17. Oxford University study. Accessed April 11, 2017. http://www.oxfordmartin.ox.ac.uk/downloads/academic/The_Future_of_Employment.pdf
18. OECD report. Accessed April 11, 2017. http://www.oecd-ilibrary.org/social-issues-migration-health/the-risk-of-automation-for-jobs-in-oecd-countries_5jlz9h56dvq7-en
19. Almato press release, Feb. 15, 2016. Accessed April 10, 2017. <https://almato.de/en/news/blog/trend-details/new-customer-deutsche-telekom-implements-automation-project-with-almato/>
20. Russ Juskalian, "Bosch's Survival Plan," MIT Technology Review, June 21, 2016. Accessed April 11, 2017. <https://www.technologyreview.com/s/601502/boschs-survival-plan/?set=601733>
21. Darcie Thompson-Fields, Access AI, Jan. 31, 2017. Accessed April 12, 2017. <http://www.access-ai.com/news/564/bosch-to-invest-e300-million-into-ai/>

About Tata Consultancy Services Ltd. (TCS)

Tata Consultancy Services (TCS) is the global IT services, business solutions and consulting company, which helps enterprises across the world harness the power of digital. With operations in 46 countries and 387,000 employees, TCS is one of the fastest growing brands in the technology sector, with an audited brand value of US\$ 9 billion. It is widely recognized as the industry leader in business performance and customer satisfaction. Europe's largest ever survey of 1500 C-suite executives rated TCS with the highest general satisfaction across the industry in 2017. Its 21 country European operations account for 25 per cent of its € 16.1 billion global revenues and are enabling 350 clients across every industry to reimagine their businesses. An investor in skills and STEM education, the company has been accredited as a Top Employer in Europe by the Top Employers Institute, for four years in a row.

For more information, visit www.directions.digital

Follow TCS on Twitter [#DigitalDirections](https://twitter.com/DigitalDirections)

IT Services
Business Solutions
Consulting

All content / information present here is the exclusive property of Tata Consultancy Services Limited (TCS). The content / information contained here is correct at the time of publishing. No material from here may be copied, modified, reproduced, republished, uploaded, transmitted, posted or distributed in any form without prior written permission from TCS. Unauthorized use of the content / information appearing here may violate copyright, trademark and other applicable laws, and could result in criminal or civil penalties.

© Copyright 2017 Tata Consultancy Services.



TATA CONSULTANCY SERVICES