orange™ Business Services

Artificial intelligence: what's next?

› Why is AI part of our daily lives today?

› How will AI evolve?

› Can chatbots revolutionize customer service?

Introduction:

Why is AI the most important driver of innovation in the 21st century?

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Artificial Intelligence (AI) has made spectacular progress in recent years, in particular as a result of 'deep learning' technology. As long as it can be trained with data enabling it to "learn" a specific task, AI can even exceed human performance for a specific task.

AI is set to fundamentally change what we do, just as computers did when they were introduced into businesses. Specialized AI is creating new opportunities to simplify our interactions with digital services through more natural interfaces. This includes the capability to recognize speech, facial expressions and power two-way dialogue with customers.

This is helping us develop smarter, more customized services, improve the performance of global infrastructure (smart connectivity, smart cities, smart agriculture, etc.) and enhance customer experiences in many industries.

Things are looking promising:

- Private and professional personal assistants adapted to our needs.
- Cogbots (collaborative robots) that provide smart, specialized advice.
- Semantic search engines that can chat with us.
- Autonomous or semi-autonomous objects that can adapt to uncontrolled environments (from cars to garage doors and vacuum cleaners to A380 airplanes); and
- Increasingly realistic augmented reality universes.

Nevertheless, AI that can replace human beings is largely out of reach today. There is still a long way to go: conceptual representations of the world will need to be developed, as well as machine reasoning and better decision-making, emotional and ethical capabilities.

Although this generalized and more flexible AI will not emerge overnight, progress is being made and fears and concerns are already being voiced. AI, like any very powerful technology, raises new ethical questions and makes us scrutinize the choices we make.

As for me, I'm convinced that this subject must be handled with curiosity and openness, and that Orange can develop a "Human Inside" approach to AI.

Why is AI part of our daily lives today?

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AI is already part of consumers' daily lives, sometimes without our knowing it. Will Intelligence-as-a-Service bring it within the reach of all businesses?

Why are we talking about AI again?

AI is far from a new topic, having already been hyped and forgotten at different times. Research began after the Second World War with the ambitious aim of simulating human intelligence.

The foundation stones of AI were laid during the series of Macy Conferences, attended by mathematicians, neurologists, psychologists and economists between 1942 and 1953. It was during this period that Alan Turing devised his test to describe a system as "intelligent" if more than 30% of people conversing with the system and a human simultaneously are unable to distinguish which is which.

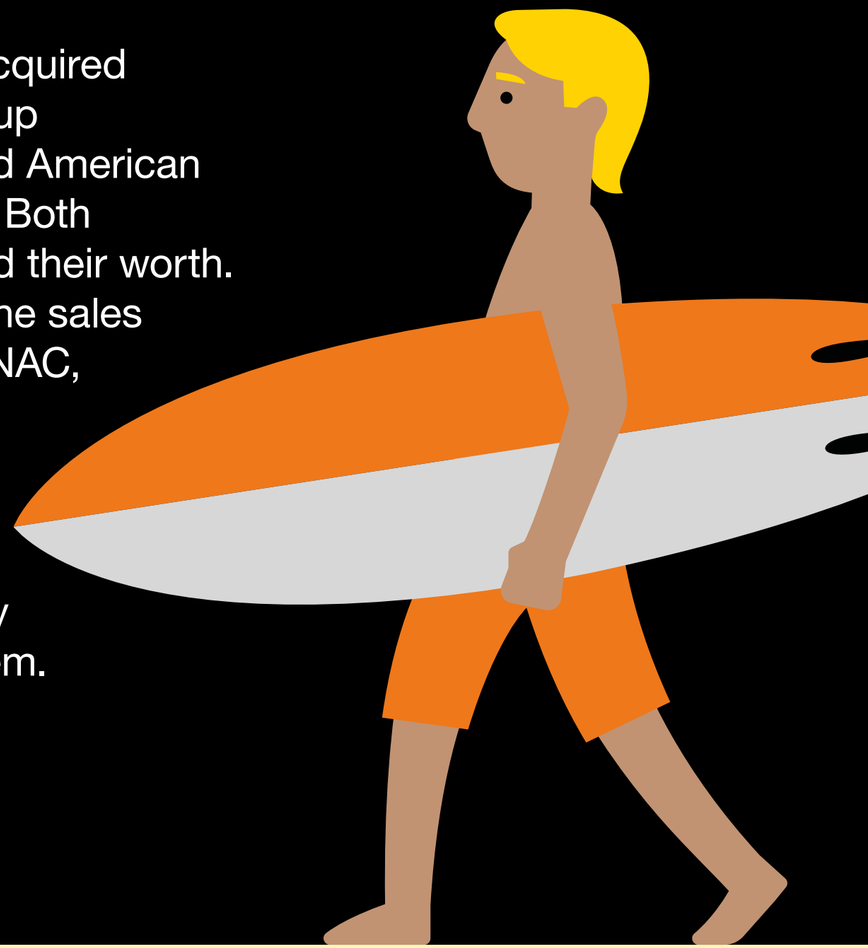
However, research funding, which mainly came from public sector bodies, dried up for lack of results. Interest in AI then re-emerged in the 1980s with projects focusing on decision support systems to answer questions on the basis of known facts and rules. Once again, the cost and complexity of implementations limited market adoption.

The third wave of AI?

The development of new algorithms, described as machine learning, put AI back on the menu in the 1990s. Then, in March 2016, deep learning – a variant of machine learning – became a buzz word in the wake of AlphaGo, AI developed by Google subsidiary DeepMind, beating one of the best players in the world at a strategy game called Go.

AI is now focusing on specific areas, such as medical diagnosis, bank fraud detection, assisted driving and the development of personal assistants. It has become a driving force behind some highly practical, and commercially exploitable, innovations.

For example, Google recently acquired French image recognition start-up Moodstocks and Apple acquired American user behavior analysis firm Turi. Both acquisitions have already proved their worth. Moodstock is being use for online sales recommendations at retailers FNAC, La Redoute and Leroy-Merlin in France, while Turi's technology was used to create Pandora's music recommendation system and the American estate agency Zillow's property valuation system.

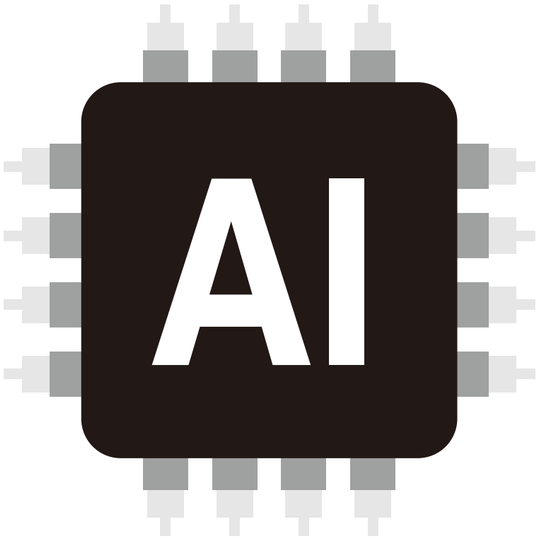


Long-lasting progress

The third wave of AI is different from previous two waves in various ways. The most important point probably relates to financing. It is businesses that are buying into AI today rather than the public sector. Built into the key development tools of Google, Apple, Facebook and Amazon, AI has now entered a phase of widespread commercial take-up in the form of search engines, recommendation engines and advertising optimization systems.

The success of AI today is also driven by technical factors, in particular increased computing power at a lower cost. GPUs (Graphical Processing Units), initially designed for video games, can now perform over a thousand billion operations per second and are highly effective in the neural networks used in machine learning.

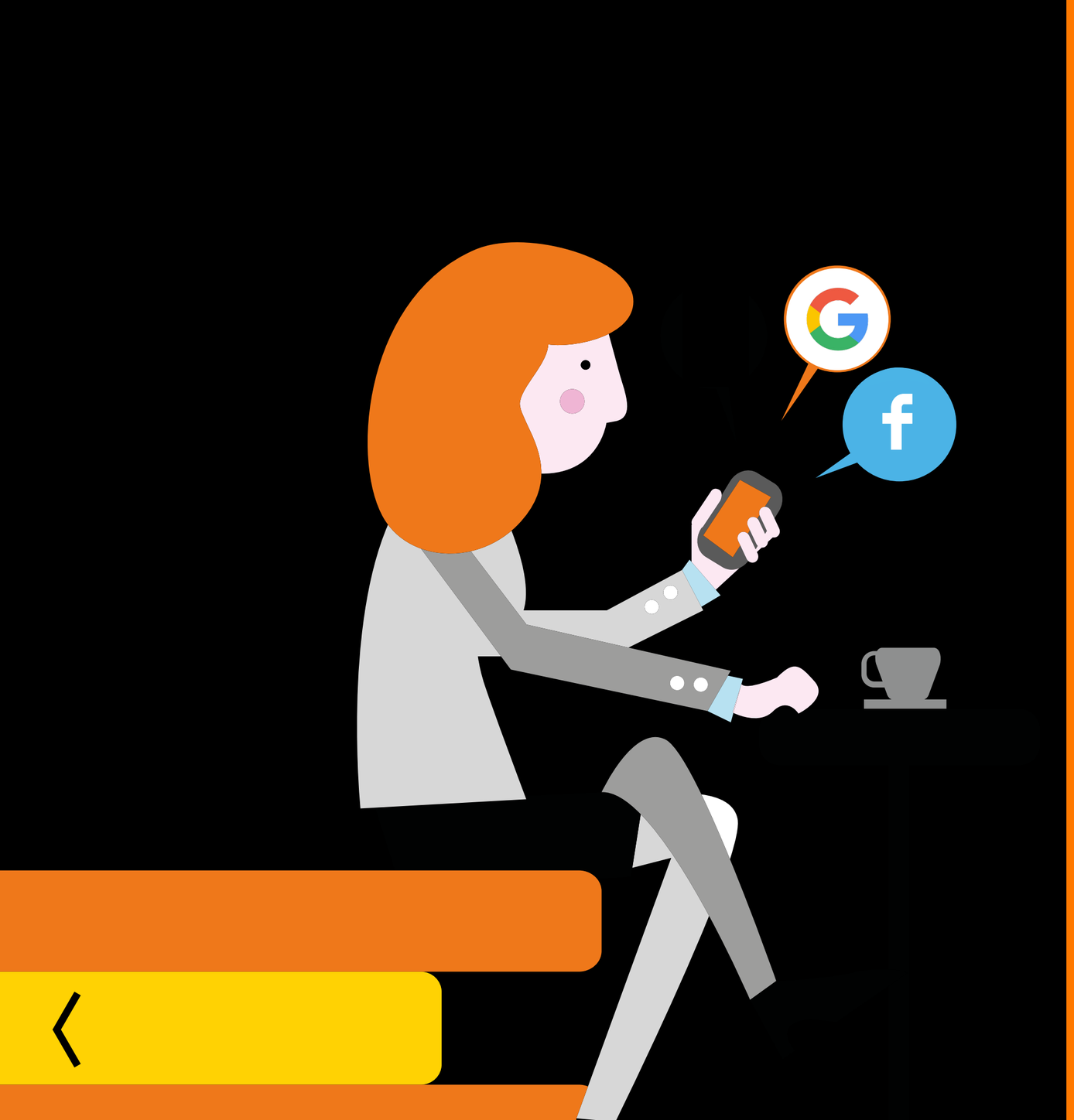
While affordable cost cloud computing enables the storage and processing of vast amounts of training data. Lastly, spectacular progress in deep learning algorithms has halved the error rate in speech recognition systems and enabled near-human accuracy in image recognition.



In 2015, $5 billion was invested in AI research globally.

There has been a sharp increase in the number of AI patents filed since 2010, with a strong presence from the web giants Microsoft (26% of patents), Google (10%) and Apple (3%). Others IT heavyweights involved include IBM (16%), Xerox (5%), Oracle (4%), SAP (4%) and HP (3.5%).

Source: CIBC, July 2016



We now use AI, often unaware, via personal assistants (Cortana, Siri, Google Now, Echo, etc.). Google is using AI in its Google Translate app and World Lens technology (from a start-up acquired in 2014) to translate text in photos.

Top-of-the-range cars use the visual system from Israeli firm Mobileye for assisted driving, while customers chat with intelligent digital assistants without ever realizing they are robots.

Facebook, Google and Microsoft image recognition systems find and filter violent or pornographic images. While telecoms operators increasingly use AI for predictive network management and customer services applications.

Sharing by open source

In addition to developing proprietary AI solutions, the web giants have launched open source projects to accelerate research. Google, Apple and Facebook have opened up their respective platforms – TensorFlow, DSSTNE and Torchnet. Mention should also be made of the OpenAI research project – open to everyone – launched by Elon Musk with support from of big web names such as Peter Thiel, CEO of Palantir, and Reid Hoffman, who created LinkedIn.

Intelligence-as-a-Service

Tom Austin, an analyst at Gartner, believes the migration of AI to the cloud indicates a major breakthrough, with Intelligence-as-a-Service making AI available to everyone. Some 80,000 developers have had access to Watson's various APIs since 2013, through what IBM has called "self-service artificial intelligence".

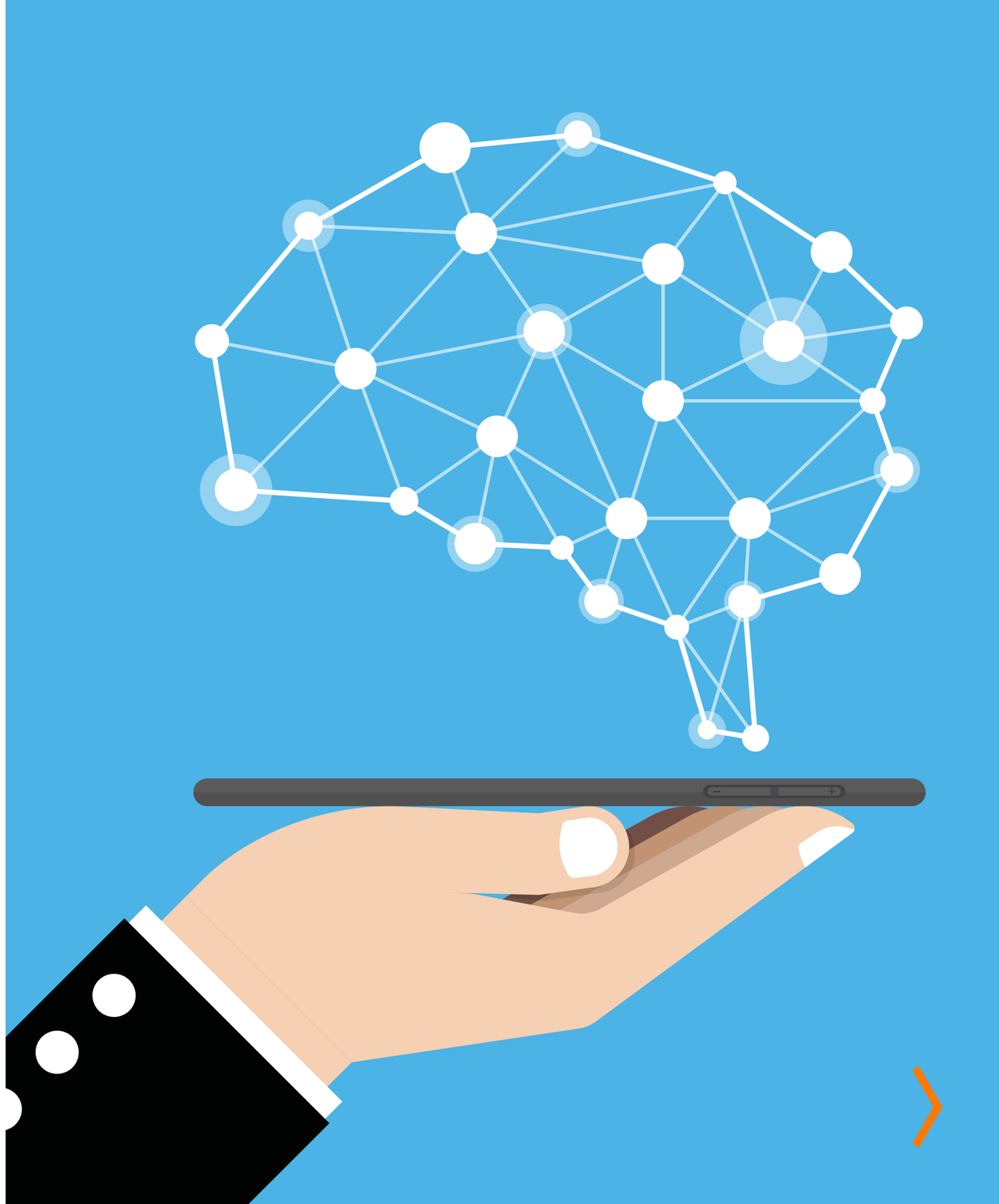
While Microsoft offers over twenty "cognitive services", such as image recognition ("computer vision") and speech recognition. Amazon, meanwhile, is developing the AWS catalogue with a machine learning predictive analytics service.

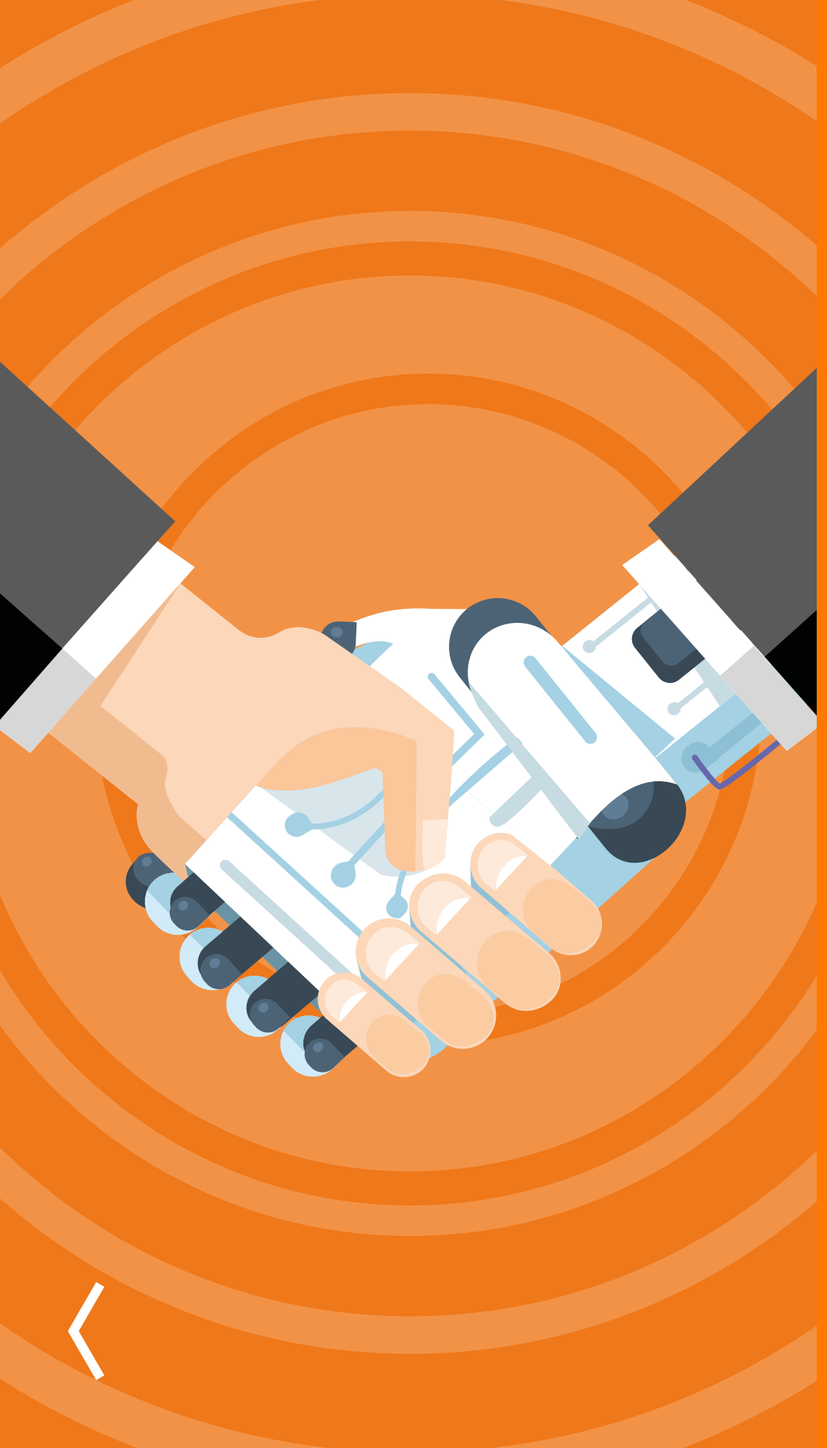
In May 2016, Google announced it was opening up three APIs – translation, natural language processing and speech-to-text in 80 languages. Lastly, in China, Alibaba Cloud, a business unit of e-commerce giant Alibaba, launched image, video and speech recognition services.

Could AI overtake human intelligence?

Some people are anxious about the possibility that, at the current pace of development, AI could overtake human intelligence. Mathematician and science fiction author Vernor Vinge believes this could happen as early as 2030. This led a group of experts – including Yann LeCun, head of AI at Facebook, and the founders of DeepMind – to write an open letter in 2015 warning about the need to study the risks of AI.

According to Cambridge University's Centre for the Study of Existential Risk (CSER), there are two opposing schools of thought. The mainstream belief is that the capabilities of AI will be curbed by energy consumption and computing power. Others think this is a serious error of reasoning as human ways of thinking will not necessarily be the means of reproducing human intelligence.





The threat to jobs

AI brings both risks and opportunities, a duality expressed in the opinion polls: 47% of French people are scared, whereas 52% see it more as an opportunity (Odoxa).

Concerns naturally include the risk of job losses. Those under 35 are thus more worried (50%) than retirees (40%); and workers and employees (40%) are more worried than supervisory staff (22%). However, research by a team from the OECD estimated that just 9% of jobs in the US were at risk from AI, while a significant volume of jobs (21%) are likely to transform considerably.

Already, some businesses in the logistics sector have invested in both robots and employee training without any loss of headcount. American e-commerce start-up Boxed has automated its picking and packing operations and run extensive employee training programs.

Operators previously assigned to picking have been trained to supervise the robots that now do these jobs. Another section of the staff has been trained to service the conveyor and maintain the software, and others are responsible for the link to customer services.

The French e-commerce site La Redoute has taken a similar approach, automating its warehouse and reducing the time to prepare an order from two days to two hours. The operators now work on tasks with higher added value, such as the returns workflow which requires human intervention. Employees were directly involved in designing the new workstations, via test sessions using virtual reality.

In the French banking sector, IBM's Watson solution has been rolled out in Crédit Mutuel to almost 20,000 customer advisers. The aim is again to optimize employee productivity, suggesting answers that advisers can give on questions about savings and insurance products and processing emails more quickly thanks to customizable replies.

Virtual assistants have enabled advisers to reduce the time they take to find answers by 60%. Although still wary of job losses, the advisers have been won over: 94% of the pilot users recommended using the virtual assistant, and 87% the email analyzer.

The arrival of AI will cause professional services firms to remodel their work radically, developing tasks with higher added value, to avoid the drop in fees expected by clients. Qualified accountants might, for instance, offer advice on management and business lawyers on strategy.

To prepare for this new world enterprises should aim to create a culture of continuous learning. Employees will need to be given the right support in updating their skills to enable firms to make best use of a combination of digital and human resources and remain competitive in a fast changing world.

Key points

- Companies need to prepare for the massive wave of change in job roles that AI will bring.
- Intelligence-as-a-Service capabilities are making AI available to any company.
- AI can enhance the work that humans do and improve customer service and satisfaction levels.

How will AI evolve?

What is “machine learning”?

Machine learning is aimed at identifying hidden relationships between variables in data.

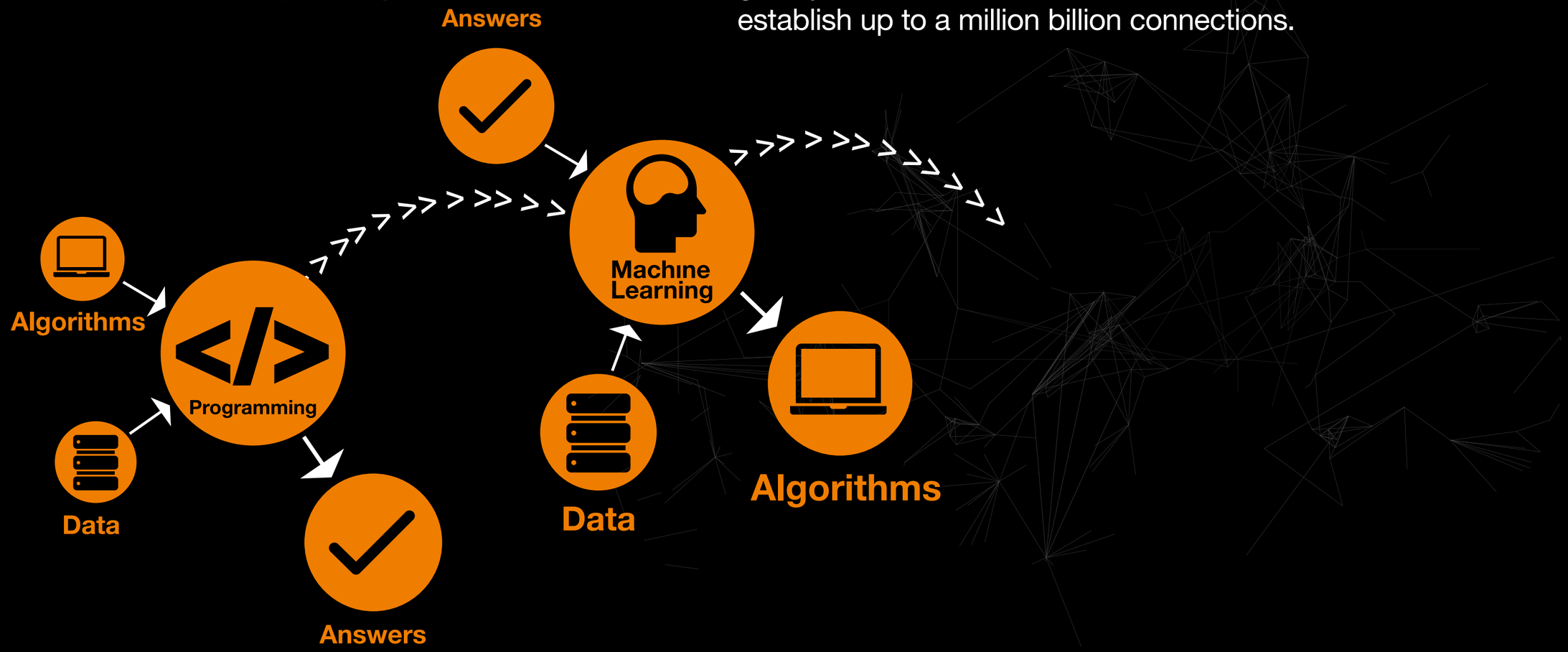
The more data the system receives, the more quickly it converges on an answer and its error rate drops. This is very different from traditional programming which relies on predefined algorithms.

Machine learning uses networks of neurons that simulate the workings of the human brain by using multiple representation layers to reach a higher level of abstraction.

What is “deep learning”?

A specific technique of machine learning, deep learning is based on several layers of artificial neurons hierarchically arranged.

Deep learning uses neural networks comprising billions of connections. Its performance nonetheless remains greatly inferior to that of the human brain, which can establish up to a million billion connections.



What types of learning do AI systems use?

Different types of learning can be used to train AI systems:

Supervised learning

Supervised learning uses data labelled by humans, which is expensive. A data set is presented to the learner system, such as the photo of an object or an animal with its category, and the system is able to use its ability to generalize to correctly categorize a new image. This is the most common method currently.

Unsupervised learning

In unsupervised learning, data is not labelled beforehand. The learning phase has to be supervised by an expert in the field.

Reinforcement learning

In reinforcement learning, the machine receives a signal, a sort of reward, indicating whether the response was correct or not. This form of learning, which requires a high number of trials, was successfully used by DeepMind's Go program, AlphaGo.

Can chatbots revolutionize customer service?

Intelligent virtual assistants are become a core part of customer service delivery. This is helping address consumer expectations for 24/7 support while reducing operational costs.

Emma, 28, works in a customer services department in a phone company in Sweden where she answers 5,000 customer questions per day on average. In addition to her record levels of productivity, Emma is much-appreciated by customers: 66% of those with whom she has dealt say they would make direct contact with her again for any future enquiries.

Emma is actually an intelligent virtual assistant born from a joint project between the company's marketing and customer services departments. To ensure she is accepted not only by customers and colleagues, this chatbot has a CV, an HR file and even a telephone number in the company's internal directory.

A successful new approach

Emma's is not an isolated case. There is Nina, an intelligent virtual assistant that converses with customers in natural language on a Swedish bank's website. Nina is built using AI solution provided by Nuance, and has achieved a first contact resolution rate of 78%.

Meanwhile, an oil company has also created a virtual assistant called Ethan using the Tenao AI platform from Artificial Solutions. He answers questions about the technical features of engine oils and other lubricants; "knows" over 100,000 data items about 3,000 products sold by the company and 10,000 competing products. Conversing with customers in 21 languages in 138 countries, Ethan meets 99% of customer needs and reduced call center activity by 40%.

While the main aim is to reduce the cost of customer service, the quality of CRM delivery must not be neglected. Managers are still very anxious to avoid shortcomings like those revealed by Tay, Microsoft's virtual assistant, which failed to detect online trolls who taught it racist and sexist phrases.

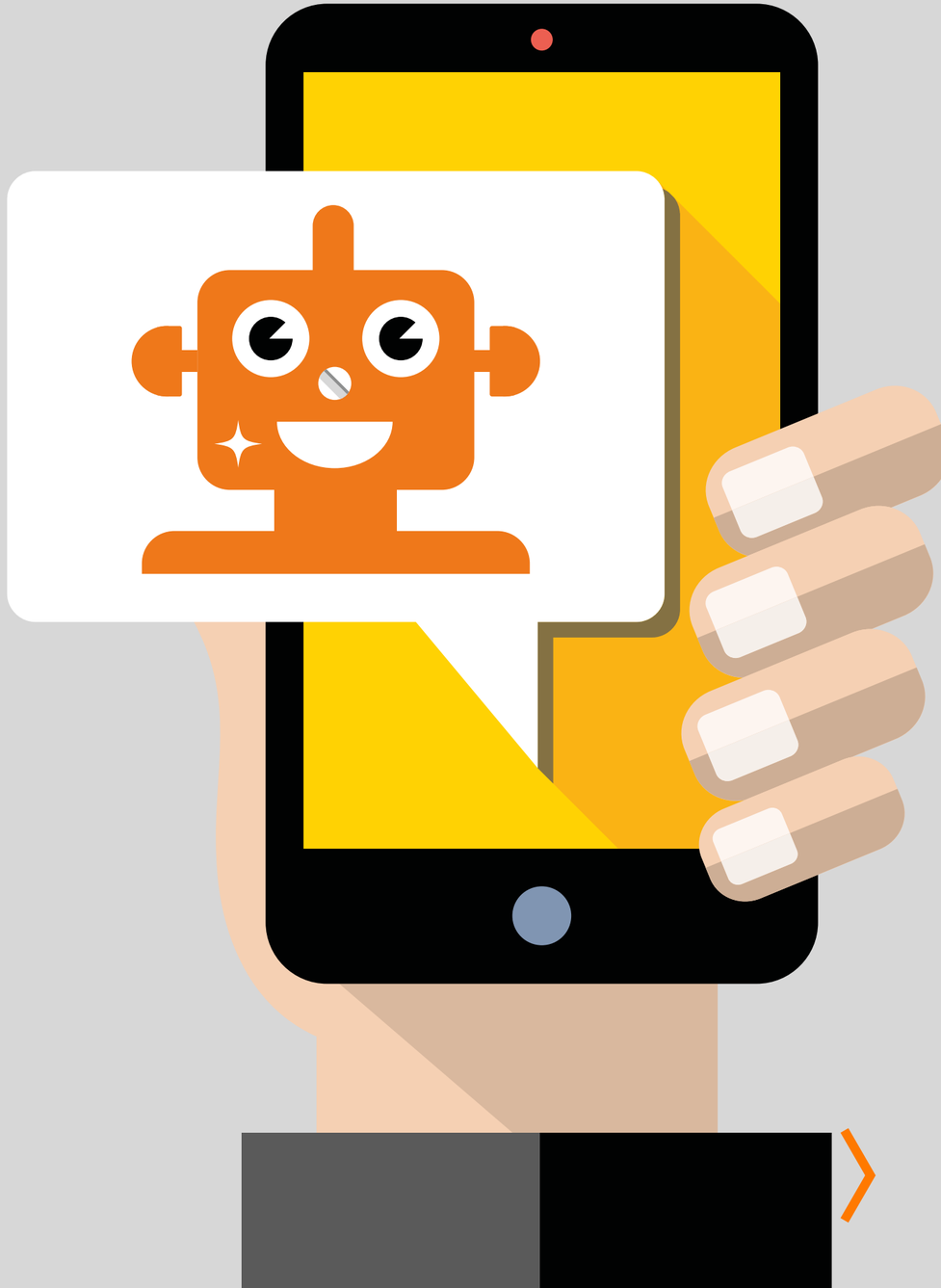
Emma requests help from human colleagues during contract termination requests and when she doesn't know the answer to a question. This happens with less than 4% of contacts.

Her ability to converse with customers in natural language makes a seamless transition possible, with customers unaware that they have been transferred from a virtual assistant to a human being. The next stage in the program is likely to see Emma supporting and guiding customers in their online purchases and getting involved in marketing campaigns.

Paradigm shift with AI-only customer service

Launched in April 2016, the mobile-only British bank AtomBank, backed by Spanish banking group BVVA, intends to be “as disruptive as Uber”. Use of AI is the driving force behind this goal, with predictive analysis to enable customers to anticipate future spending, log in using biometrics and receive support from intelligent virtual assistants.

AtomBank chose machine learning solution from Xerox which, built into its app, to deal exclusively with customers. If the intelligent assistant is unable to provide an answer, the customer is transferred to a human customer support representative who replies within 24 hours.



Answering customers, and so much more

The integration of AI in customer services makes possible other activities beyond answering questions, such as the simplification of identity authentication processes through face or voice recognition. HSBC bank has launched a voice recognition authentication service in the UK using technology provided by Nuance.

AI can also be used to customize automated self-service channels, such as interactive voice response servers. Interaction with human advisors can be enhanced by automating simple repetitive tasks to enable them to concentrate on more complicated work. A more unexpected consequence is that AI relieves pressure on customer advisors, which can help to reduce very high staff turnover in contact centers as well as increasing productivity.

Lastly, through its ability to capture and analyze data across multiple channels, especially social media, AI can be used to identify the causes of customer dissatisfaction, strong and weak signals alike, making it possible to optimize customer request handling processes.

Customers won over

How can such inroads by virtual assistants, unthinkable just a few years ago, be explained? There appear to be two key factors. Firstly, developments in technology have made it much more effective, and secondly, changes in customer expectations towards acceptance of dealing with robots.

For the first time, consumers made more use of self-service FAQ on websites than customer services in the US in 2015. While chat services with advisors were preferred to a call when direct contact was required. Customers are now looking for instant, relevant answers at any time, whether those answers are supplied by a machine (if they even notice) or a real person. Use of AI, combining service continuity and natural language interactions with high quality and quick responses, explains why customers are won over by intelligent virtual assistants.

CHATBOT

Could AI overtake human intelligence?

The other reason for this budding success is naturally the quality of the technology used. Besides giants in the field, such as Watson from IBM, many specialist start-ups are offering their own services. For New York based DigitalGenius, the supplier of the AI used by customer services departments at BMW, Unilever and Panasonic, the high recurrence of questions asked by customers makes customer services ideal for implementing AI, despite the complexity of some situations.

CRM is furthermore a mine of categorized data for machine learning. Text-based conversations obtained from email, online chat, IM and social network channels can be used by deep learning algorithms to learn how to answer questions.

This analysis is shared by Accenture which has joined forces with New York start-up IPsoft, using its AI customer services platform to help customers in banking, insurance, transport and tourism. IPsoft claims its virtual assistants can demonstrate “empathy” and the ability to determine and adapt to customers’ moods.

A booming market

According to American market intelligence firm Tractica, which specializes in human interaction with technology, virtual digital assistants (VDAs) are a booming industry. Tractica estimated that by the end of 2016, a thousand businesses had integrated a virtual digital assistant into their customer service, reaching some 200 million people worldwide. By 2020, platform providers are likely to be in a position to supply solutions suitable for SMEs, enabling more than 800 million people to interact with a virtual assistant.

Growth is most likely to come in the consumer sector, but the business market (enterprise VDA) should nevertheless rise from $1.6 billion in 2015 to some $4 billion in 2021. Automation of simple tasks also enhances the value of those human advisors, as they become specialists in more complex issues, while preventing the risk of overwork or excessive pressure.

The ability of AI to open a permanent conversation between a business and its customers might nonetheless hold some surprises and give consumers new sources of power. For example, one telecoms customer created a bot to automatically send a tweet of complaint whenever his line speed dropped below that advertised for the service he had taken out.

Key points

- Self-service FAQ and chatbots on websites are now accepted by consumers, complementing human advisors for complex queries. It’s the speed of response that is key.
- Data from email, online chat, IM and social network channels is vital to train AI tools in customer service tasks.
- AI can relieve pressure on customer advisors and help to reduce very high staff turnover in contact centers.

The Orange difference

Experts by your side, worldwide

Orange Business Services has the skills, commitment and experience to help you achieve your digital ambition, all around the world. No matter which markets you're in, we understand your local environment, cultural needs, regulatory challenges and business goals. We can help you apply new learnings faster and more effectively.

We're able to meet the huge challenge of delivering more IT resource capacity – within budget, with the highest levels of reliability and performance, and to the largest number of locations.

The best digital tools for your needs

Irrespective of vendor, we seek out the best technology innovations available, so that we can offer you the most appropriate fit for your existing infrastructure. We complete all the interoperability tests needed to ensure everything works seamlessly together in your enterprise, in real-world conditions.

A human understanding of your employees and customers

As a consumer and business mobile operator, we know what real people expect from their digital experiences.

We understand what expectations people bring from their personal lives into the world of work. It's what gives us the edge in delivering great end user experiences.

You can rely on us to boost collaboration, improve communication and streamline workflows to help individuals and teams be more innovative, productive and responsive to customers.

The result?

Higher levels of employee and customer satisfaction, increased loyalty and revenue growth.

Want to know more?

To find out more about how we can help you with your digital transformation strategy, please contact our digital consulting team at **consulting@list2.orange.com**