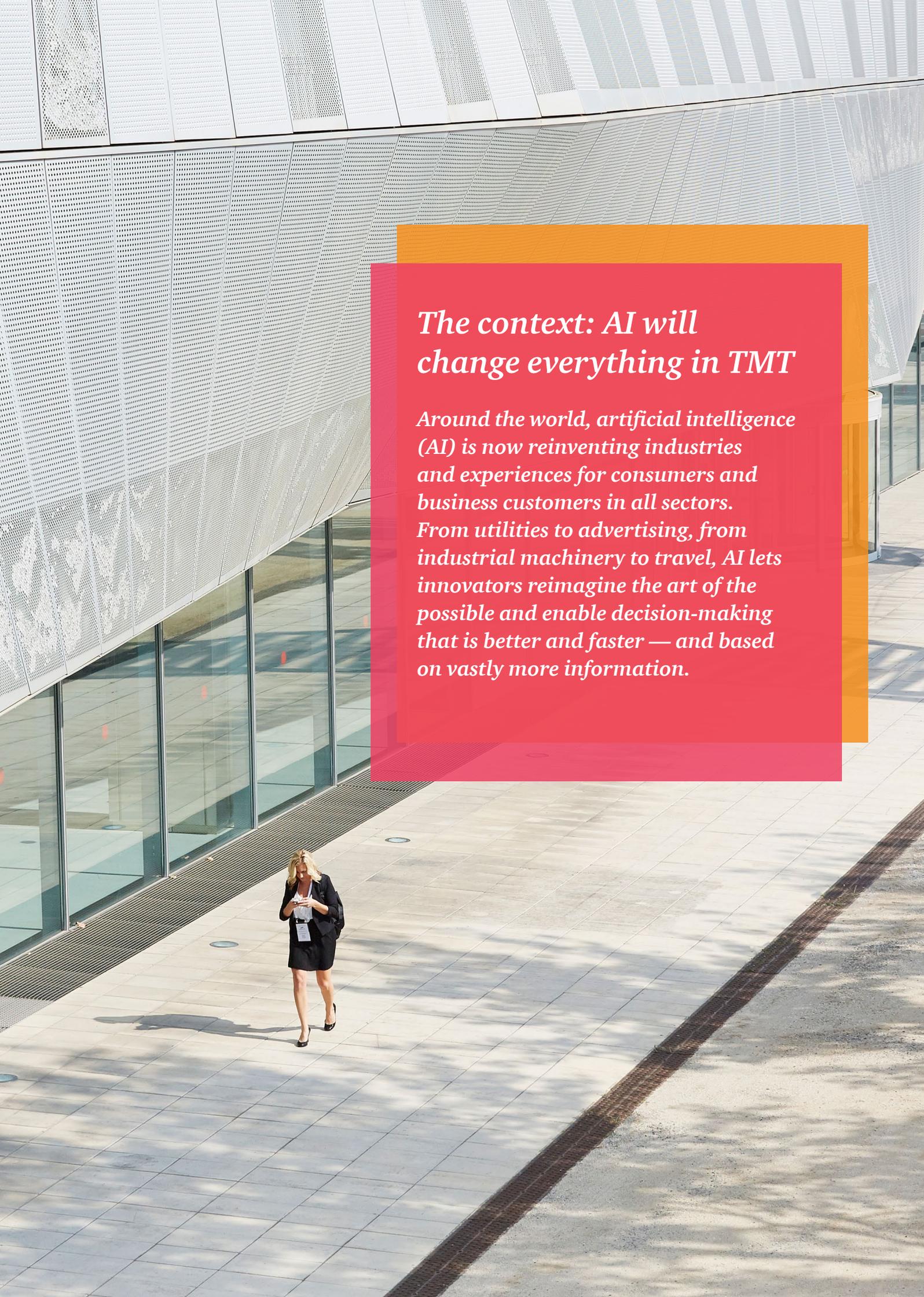




The smarter phone

How AI-enabled devices
will reshape the Technology,
Media and Telecoms industry



The context: AI will change everything in TMT

Around the world, artificial intelligence (AI) is now reinventing industries and experiences for consumers and business customers in all sectors. From utilities to advertising, from industrial machinery to travel, AI lets innovators reimagine the art of the possible and enable decision-making that is better and faster — and based on vastly more information.



‘Smart’ is a relative term...

As the advance of AI gathers pace and scale, the broad Technology, Media and Telecoms (TMT) industry will be one of the first to be transformed. Over the next three to five years, the combination of AI and 5G will power the emergence of a new generation of devices that will redefine the word ‘smart’ by differing from today’s in two key respects.

...that’s set to change

First, the user interfaces of these new devices will be based not only on touch, but also increasingly on voice interfaces that work side-by-side with touch or even without it. Second, they will meet users’ needs by moving away from today’s mode of using discrete apps to trigger specific tasks requested by users, and towards applying AI-driven algorithms to anticipate and infer users’ intent. Having figured out what the user wants, the devices will act autonomously to deliver the desired outcomes, by orchestrating aggregated software capabilities in ways invisible to the user.

This advance to a world of voice-enabled devices and autonomous AI-driven fulfillment of human needs carries major impacts for connectivity, devices, content, distribution and software. It heralds sweeping changes for users, carriers, device manufacturers, content providers and app developers. It may blur the boundaries between these formerly distinct participants in the supply chain. And it raises fundamental issues around the integrity of information and the extent to which AI is responsible.

Three steps to take

In PwC’s view, companies across the TMT industry need to take three steps as matter of urgency to prepare for this new landscape.

- First, they must develop various endgame scenarios to understand the opportunities and challenges that AI disruption will create for their business, and assess their own readiness to leverage those disruptions.
- Second, they must use the resulting insights to develop suitable business models for the different scenarios, including models involving new alliances and partnerships.
- Third, they must build the new capabilities they’ll need to succeed in their target scenario — including retraining the workforce — while monitoring other unfolding scenarios.

The redefinition of smart will have equally profound impacts for consumers. As people become increasingly reliant on their truly smart AI-enabled devices, current notions of intimacy and humanity in digital experiences will be reimagined. And while these technological advances will transform user and customer experience, they'll also raise issues around personal privacy, from both a regulatory and an ethical perspective. How much of their data and day-to-day decision-making will people be prepared to cede to AI devices? And how responsible does AI need to be? Such questions will be a constant theme amid the forthcoming wave of innovation.

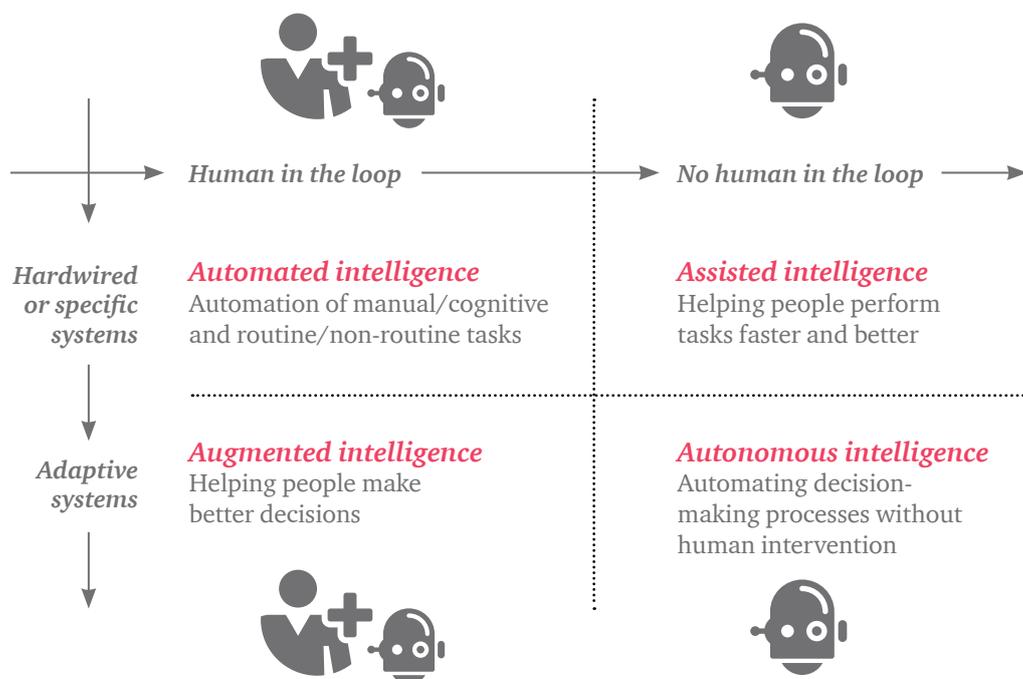
Global commonalities

In this paper, we map out the future opportunities, risks and options for TMT in an AI-enabled world. The impacts will inevitably vary among different regions and geographies, thanks to differences in technology and user behavior. But we're focusing here on the global commonalities that all TMT companies will have to address. The outcome for the industry will be a world that's very different from today — but which is already taking shape around us.

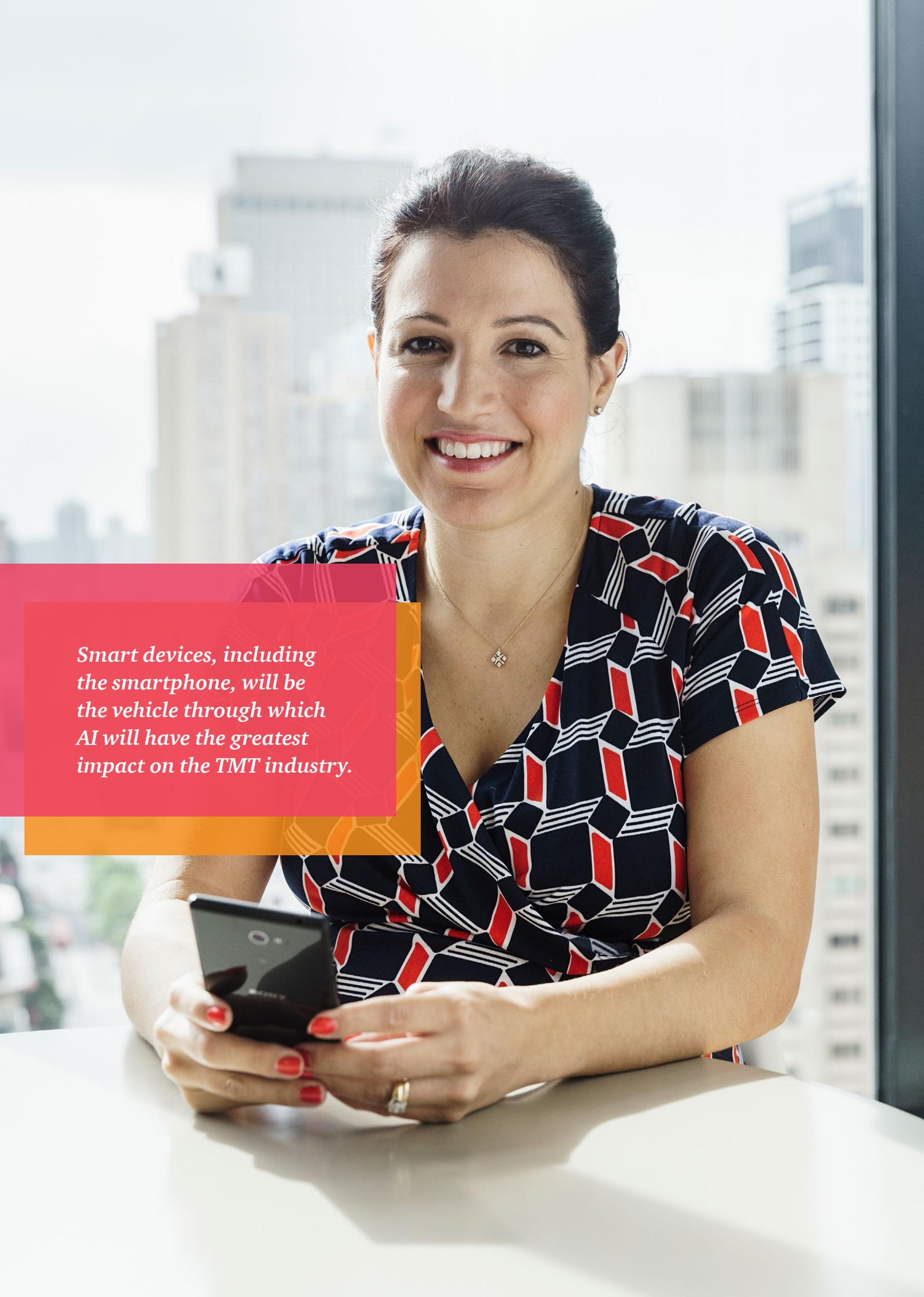
Defining AI

In our broad definition, AI is a collective term for computer systems that can sense their environment, think, learn and act in response to what they're sensing and their objectives.

Forms of AI in use today include digital assistants, chatbots and machine learning.



As humans and machines collaborate more closely, and AI innovations come out of the research lab and into the mainstream, the transformational possibilities are staggering.



Smart devices, including the smartphone, will be the vehicle through which AI will have the greatest impact on the TMT industry.

Can the smartphone be made truly smart?

Smart devices, including the smartphone, will be the vehicle through which AI will have the greatest impact on the TMT industry. When they were introduced almost 15 years ago, the original smartphones were smart because they were both mobile and connected to the internet.

Today, internet connectivity is a given, and mobile devices are ubiquitous. However, since smartphones came on the scene more than a decade ago, the smartphone has — in the eyes of many users and experts — essentially plateaued. In recent years no major step changes in function or experience have emerged.

An increasingly dumb device...

The result: the smartphone now feels increasingly dumb to most users, and is being left lagging by other devices and consumer experiences. To be sure, early adopters and fans still line up to purchase the latest iterations of phones with new features. But new releases of smartphones are generally regarded as so routine, and the advances they offer so marginal (an improved camera, faster processor, fingerprint recognition), that many users aren't bothering to upgrade. They are happy to stick with older versions they're familiar and comfortable with. For example, in September 2017 the UK retailer Dixons Carphone said its customers were buying a new handset every 29 months — up from every 20 months in 2013.¹

Consumers feel a similar sense of rising disengagement towards many of the apps they use. In the last several years major smartphone manufacturers have added voice assistant capabilities and have refined them. But, in general, the technology is still very brittle when it comes to understanding discourses or keeping track of an individual user's transaction history.

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1. <https://www.theguardian.com/money/2017/sep/01/upgrade-downturn-why-are-people-holding-on-to-their-old-phones>

...that remains reactive, not proactive

The problem goes beyond individual devices and releases, and relates to the nature of the device itself. The smartphone remains essentially reactive rather than proactive. It requires users to meet their own needs by actively downloading, selecting and clicking specific apps — rather than working out what users need and meeting those needs automatically and autonomously.

One result is that most apps on people's phones are hardly ever used, if at all. A study published in May 2017 by the researchers at App Annie found that the average smartphone owner uses more than 30 apps per month — which is only one-third to one-half of the apps on her device.² That said, using a favorite app is now a daily habit, with the average consumer launching at least nine apps each day.

Aggregation of apps: a key advance

Most apps go unused because of a combination of three issues with today's app environment — delivery, discoverability and connectivity between apps.

The delivery challenge reflects customers' reluctance to go through the installation process and clutter up their screens with yet another app. The issue with discoverability springs from the use of proprietary, closed platforms where people need to download and register to use an app, and can't search for or view them via a browser.

On the third issue — connectivity *between* apps — today's users want their single-function apps to talk to one another, and join forces to undertake bigger, more multifaceted tasks. However, the current app ecosystem makes it very difficult to combine apps in this way. Users' desire to address the connectivity issue lies behind the growing popularity of the free web-based "If This, Then That" (IFTTT), which was launched in 2010 and allows users to connect apps to work together.³

The answer in the longer term clearly lies in the aggregation of apps. The earlier generations of apps triggered a revolution in software development and usage, by simplifying tasks and making them easier to perform. However, as we progress towards an AI-enabled future, seamless aggregation of apps will be vital to enable devices to act autonomously: for example, consider a fitness app that links to your calendar to schedule a workout, and then uploads the data to your doctor's health app and your company's fitness rewards program.

As this type of aggregation continues and accelerates, it will represent a major step forward from today's app environment — where most people identify the handful of apps that suit them, and then use these for discrete tasks until something better or smarter turns up. At root, the smartphone offers a relatively dumb form of smartness. It provides assisted (not augmented or automated) intelligence, and responds to specific requests rather than anticipating wider needs and meeting them through intelligent automation.

To make the smartphone truly smart, we will have to make more use of AI.

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2. http://files.appannie.com.s3.amazonaws.com/reports/1705_Report_Consumer_App_Usage_EN.pdf

3. <https://www.theverge.com/2013/7/15/4524776/best-new-apps-ifttt>

At root, the smartphone offers a relatively dumb form of smartness.

What's happening in AI?

Today, most people are using AI systems — often without realizing it — by tapping into apps such as Spotify, Google Maps and Uber, or by using Google Home or Amazon Echo and Alexa to play their favorite music or organize their lives. Netflix alone has attributed annual savings of US\$1bn to its use of AI algorithms, which increase its user retention rate.⁴ Multiplied across all companies and sectors, the total financial benefits generated from AI are clearly many magnitudes larger.

But the progress to date is just the start. Going forward, AI will become more efficient through increases in computational power, and will also grow more effective at understanding our needs based on an increasing volume and diversity of data points. This will accelerate the adoption of AI applications every year, while also increasing the amount that organizations use AI to help tackle problems

TMT's next great leap: “conversational” AI...

Currently, the focus of AI in many industries is on unlocking value from real-time big, unstructured data sets — mostly to enable automation and assisted intelligence using techniques such as deep learning, natural language processing and anomaly detection. While these technologies are being applied across most sectors, consumers are arguably most aware of TMT-related uses of AI, such as the recommendation engines of Netflix or Spotify. Going forward, it is likely that TMT will continue to drive innovative applications in AI.

...as the user interface becomes invisible...

One of the biggest implications of AI for telecoms and media will be the rise of conversational AI. We're already seeing user interfaces (UIs) start to progress from graphical (GUI) to voice (VUI). The next step will be to an environment where the best UI is “no UI at all” — where the action required by the user is triggered automatically by an AI interface, or by a conversational or gesture (and, in the future, human-machine) interface that interprets people's everyday behaviors and habits.

...powered by autonomous AI-enabled decision-making

As the move to ‘No UI’ gains momentum, the future will bring autonomous decision-making, with AI anticipating and meeting users' needs without users having to express them or even be aware of them. This shift will create a growing need for advanced computing power — probably from quantum computing — and for further understanding of more advanced cognitive and emotional responses and tasks. Ultimately, we may arrive at generally applicable and aware AI, which goes beyond the ability to undertake specific tasks and decisions within a domain, and becomes capable of learning to handle the same diversity of tasks and choices as a human being.

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4. <https://www.fool.com/investing/2016/06/19/how-netflixs-ai-saves-it-1-billion-every-year.aspx>



Why is AI coming of age today?

Invented in the 1940s, AI is now at a historical moment, having exploded into everyday life. Its headlong rise is being driven by the convergence of:

- **Volume of data:** More than ever before, we have access to vast amounts of data — not just structured data, but also unstructured data, such as free-form text, audio, images, and video. We can use this data to build systems that can learn from data.
- **Processing power:** Accelerating computing technology, including massively parallel GPUs (graphics processing units) and cloud computing have made it cheaper and faster to process the large volumes of data.
- **Open-source software:** Open-source groups focused on developing machine learning programs as well as the availability of large open source data for learning are accelerating the development of machine learning. For example, one can quickly use open-source machine learning packages to process large volumes of image data to recognize specific images.
- **Advances in algorithms:** Including the development of deep neural networks — an interconnected collection of nodes akin to the vast network of neurons in the human brain.
- **Accelerating returns:** Increasingly smart algorithms create a competitive need to invest — which, in turn, accelerates industry-wide investment by forcing capital into the AI-related industries. Companies also reinvest returns into AI, creating a virtuous cycle of accelerating returns.

The next wave of disruption: AI and the smartphone will collide to redefine “smart”

Picture the scene.

Your smartphone knows your wedding anniversary is coming up, and you have a chat with it about how you might celebrate the event. Based on its deep understanding of you and your spouse, the device suggests a romantic weekend in Paris. You agree. It knows from your photos and calendar that you got engaged at a small bistro in the 9th arrondissement, and from your travel history that you favor a small hotel near Parc Monceau and your preferred airline is Air France. So it creates a full transport and accommodation itinerary — and presents it to you for your approval.

After you’ve used your smartphone a few times to book trips, you trust it so much that you authorize it to book everything without even checking with you. That leaves you time to get on with more important things, like deciding what to pack for your trip.

Or imagine that you’re tied up in a meeting one morning at work, and an invitation comes through on your phone for a vital meeting across town that afternoon. From your many interactions with your AI-enabled smartphone, it knows how important that client is to you — and to your company’s profitability. So, as you focus on the task at hand, the device automatically checks your diary to make sure you’re clear, accepts the meeting on your behalf, checks navigational apps for traffic and books a car through a ride-sharing service.

Later that day, the next installment of the *Star Wars* series is released. From your chats and viewing history, your smartphone knows you’ll want to see it — so it connects with the distributor to create a trailer personalized to your tastes. After you watch the trailer and give it a thumbs-up, the device checks the diaries for you and your family, books you in to see the film the following Saturday and makes a reservation at your kids’ favorite restaurant.

A world without apps...

Now, you could plan and execute all the aforementioned transactions today by using several apps. But all these scenarios share a key trait: you don’t need to go near an app, as the device does everything for you. In other words, you’re in a world beyond apps — and beyond UI.

As we’ve seen, today’s comparatively dumb smartphone needs to be made truly smart. AI and deep learning will converge and collide to reinvent the role and functionality of the mobile device.

...will impact the entire TMT value chain

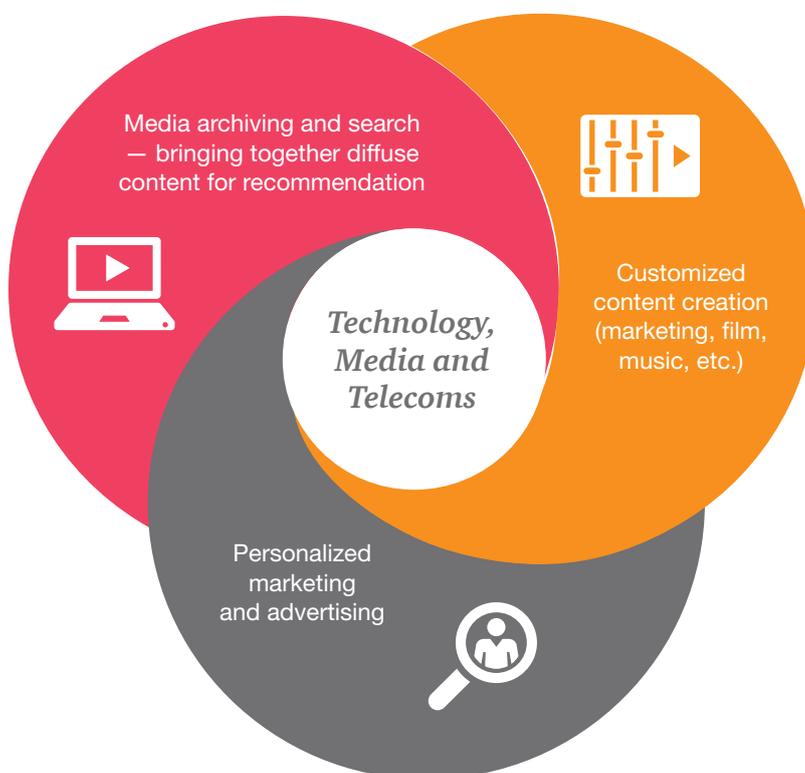
The types of scenarios we've just described are increasingly achievable and coming ever closer to reality. But the effects and impacts on the entire TMT ecosystem and value chain won't end there.

Of course, form factors will change — with growing use of advances such as reality headsets and smartphone implants. Mobility will also become so ubiquitous and intuitive that we will stop using the term 'mobile' altogether. But the key to smartness will be devices' unprecedented levels of intelligence and autonomous functionality, as they relieve us of an increasing proportion of today's tasks.

This shift will create a step change in several dimensions: from proactive to reactive; from assisted intelligence to augmented/automated intelligence; and from responding to explicit requests to predicting and serving the user's needs in an informed and automated way — whether or not those needs are actually articulated. And this is not a distant development: It could happen by 2020, not 2030.

For TMT companies of all types, the message is clear. We'll soon be in a world where smartphones will be truly smart. Companies that don't prepare for the new reality will struggle to catch up in the years to come.

Three of the areas of TMT with the biggest AI potential



What does the AI-enabled smartphone mean for the participants in the TMT ecosystem?

In PwC's view, the truly AI-enabled smartphone — whether termed a 'smartphone' or something else — will become reality within the next three to five years.⁵ As we've described, it'll be increasingly voice-activated, and apply AI to a vast range of information signals to anticipate human activity and support it autonomously. The emergence of this new generation of devices will have profound and pervasive impacts for all players in the TMT value chain. Here are some of the main developments we expect to see.

Users: a focus on personalization, intimacy and productivity

End-users will see three main impacts from the AI smartphone. The first will be greater **personalization**. Increasingly powerful AI will be applied to ever more detailed and standardized data on users' individual preferences and behaviors. The vast amounts of data generated from the Internet of Things (IoT) are already resulting in rising standardization. That, in turn, is fostering the growing automation and personalization of products and services that are fueling the next wave of digital innovation. AI will exploit data gathered from people and things to automate and assist what we do today, and find ways to do things that were previously unimaginable. All of which will add up to a big increase in utility for users.

The second impact for end-users will be greater **intimacy**, or humanity, in their digital experiences. One of the biggest challenges in AI is the need to ensure it develops as human-friendly technology. A key part of this will be advances in augmented intelligence, where AI will help humans to make decisions and take actions — thus augmenting human capabilities and creating unprecedented alliances between humans and machines, with each learning and benefiting from the other. Soon we will be able to select the voice of famous characters from movies or even our friends as the voices of our smartphones. And we will have apps that also understand our emotions by hearing our voices or seeing our faces, and then respond appropriately.

The automation of tasks and greater intimacy and personalization will make it quicker and easier for consumers to search for, find and choose what they want, saving them huge amounts of time previously spent in apps. The result will be the third impact of AI for users: big increases in **productivity** and work/leisure bandwidth, with people freed up to pursue activities they're really interested in, rather than carrying out the mundane and routine tasks of opening apps and trawling through the digital ecosystem for content or help with activities.

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5. <https://www.ibt.org/tech-advances/ctos-predict-big-future-for-ai-and-5g-services-by-2020/2291.article>

Carriers: a focus on the evolution of the smartphone

- **Business model impacts:** Mobile — or some version of mobile — will continue to be hugely important to the communications ecosystem. But rather than collecting revenue primarily from device sales or device usage, the carrier business model will also allow an ‘outcome-based’ model. The user’s ‘digital twin’ — a digital representation of the individual, based on all their demographic, behavioral and preference data — will negotiate with other ‘vendor’ sites (e.g., travel, hotel, etc.) to get the most cost-effective deal. The impact is that the effective price of the device and/or service will fall.

In years to come, you can imagine the developers of the digital twin — potentially the carrier — taking a commission on the total amount spent using the twin. So consumers might have a choice between doing all the research and booking the cheapest flights themselves, or using their digital twin to negotiate the best deal while paying a small commission for the service. Users will focus on the net cost of their digital twin set against the commission charged for using it — although the rate of commission may not be easily visible.

A further shift affecting carriers will be an ongoing migration from customers owning the device, to leasing the device, to then just paying for the service or experience through a single price that includes the cost of using the equipment. This will echo the trend we’ve already seen in the satellite/cable industry, where nobody pays upfront and owns the set-top boxes or rooftop satellite dishes. Also, there is currently a trend of diminishing differences in quality of data/voice experience from carrier to carrier. As carriers compete to acquire content creators, they will have an opportunity to differentiate themselves based on the user experience. Crucially, the quality of the experience will not depend solely on the quality of the connection or the ease of contacting customer service, as is generally the case today.

As users’ dependency on their devices grows in tandem with devices’ functionality, the need for uninterrupted service, bigger bandwidth and wider coverage will also grow. Devices will last longer and become more expensive, and the importance of peripheral devices such as 3D printers will only increase. Carriers will also need to seek out ways to become smarter in managing those devices, such as applying real-time data allocation adjustment. The question of whether carriers will be allowed to bill customers in innovative ways, such as surge pricing for data, is likely to be a controversial topic, on which stakeholders ranging from carriers to their customers to regulators may take contrasting views.

Taken together, these developments bring significant implications for revenue models and tax around the world. These impacts are examined in the informational panel on the next page.

- **Risks and challenges:** Given the importance of personal data for realizing the benefits of AI for both carriers and users, concerns over security, privacy and regulatory compliance could become barriers to AI innovation. Privacy issues will boost solutions that combine AI and blockchain. Other risks could include challenges around device compatibility, and around consumers’ willingness-to-pay (WTP) for more powerful devices, and for connectivity over shorter cycles based on data or resource consumption.



New business models: implications for revenues and tax across TMT

The AI-driven changes in carriers' business models raise the question of what happens to the advertising revenues of app developers — especially given the likely shift in the user's attention away from the mobile screen as voice becomes the mainstream UI. In this new normal, large data gatherers are likely to enter into new collaboration arrangements with carriers to share data and to share data and revenue, thus diminishing role of advertising as a primary source of revenue.

This would compound the challenges already faced by nations trying to tax digital companies that transcend territorial barriers with relative ease while creating limited local presences in jurisdictions around the world. One particular challenge would be the differing views that developed and developing nations are likely to have on how to value data, intellectual property rights and automated tools, most of which will be shared with the carriers for a fee. Further issues arise around where the data would be generated and stored, adding more complexity to determining the rights of nations to tax the services that require the usage of such data. Given the possible lack of consensus, more territories may be likely to come up with their own taxation frameworks or laws to deal with these collaborations and the sharing of data as a service — a step that Italy, the UK and India have already taken, albeit in the context of taxing the current revenue streams of these digital companies.

Also, if these new taxation frameworks introduced unilaterally by nations are not synchronized with one another — or do not emerge as part of the current bilateral global treaty framework — the cost of doing business could rise for the companies involved, particularly if they are unable to pass on these costs to the service recipients or users. The key issue here could be around non-eligibility to claim of credit of taxes or levies paid in the source country against the other tax liabilities that would become payable in the residence country.

There could also be associated challenges around intellectual property (IP) structuring and planning. Questions may arise as to where IP and data should reside in order to achieve a global lower effective tax rate with minimal disruption to the current setup, while also mitigating tax risks, given the aggressive approach of several (especially developing) nations to tax the players in the digital economy. Tackling these issues will be imperative in light of the restrictions and challenges around the evolving data privacy and protection regulations in some territories.

Italy: <https://www.reuters.com/article/us-italy-tax-digital/italian-budget-commission-approves-web-tax-on-digital-services-idUSKBN1ED14F>

UK: <https://www.ft.com/content/52010ee4-a93d-30b3-a79b-00adb327b288>

India: <https://economictimes.indiatimes.com/news/economy/policy/budget-2018-foreign-digital-companies-with-india-user-base-may-have-to-pay-tax/articleshow/62761393.cms>

- **So what?** Carriers will move to supplement their current focus on ARPU (average revenue per user) with ATPU (average time per user) — the average time that the user spends interacting with the device and using the carrier’s services. While time-based pricing models are attractive to carriers, they will inevitably face some resistance from their customers, who have become used to paying fixed prices for unlimited data. The more time consumers spend interacting with the AI-enabled device, the more the device learns about them, and the more personalized and enriching the experience they will have with it.

The potential to generate commissions from providing ‘digital twin’ services to users — as noted above — will also present major opportunities.

Device manufacturers: a focus on cognitive computing

- **Business models impacts:** The redefinition of ‘smart’ means mobile and connected devices will be able to address more of consumers’ needs than ever before. Depending on the application, these capabilities will not only be hard-coded, but may also be adaptive. We’ll also potentially see the move away from desktop computing accelerate, as more capabilities and experiences are incorporated in mobile platforms and applications.

As usage of AI grows, IoT and data capture capabilities will be critical for delivering on AI’s promise, and will be attractive to companies seeking to connect more effectively with consumers. And because data fuels insights, and insights inform positive outcomes for companies and users, ownership of data will be ever more important. This raises the possibility of big players building walls around their data, and entering revenue-sharing alliances based on sharing their rich repositories of information.

There will also be a trend toward intelligence moving to the edge, with a smartphone or any kind of wearable device or sensor becoming ‘intelligent’ — in the sense that it knows what information to keep and what to transmit, and how to use the information it has. All these factors will see device manufacturers focus on embedding cognitive computing — or ‘intelligent automation’ — into their products, and on gathering more data on users to meet their needs better and attract third-party revenues, including advertising.

Device manufacturers will also face an acceleration of a trend seen in the past few years, as devices become more ubiquitous with minimum differentiation. Just as today’s users rarely focus on who made their cable/satellite boxes, future consumers will pay less attention to device brands. The resulting commoditization of handsets will lead to the exit of some players while others will consolidate.

The differing speeds at which established device manufacturers manage to incorporate AI into their products may also play a role in reshaping the handset industry. The sector has a history of apparently unassailable incumbents falling prey to disruption from new entrants, as BlackBerry and Nokia did. There’s a clear risk that this type of disruption of the established order could happen again.

- **Risks and challenges:** The quality and integrity of data are vital to AI models, creating a risk that poor data could result in poor AI decisions and in turn limit adoption. For carriers, the need to collect and use large amounts of personal data may give rise to concerns over security, privacy and regulatory and tax compliance. A related challenge is the notion of ‘cyber risk’: the danger of someone hacking into a device and taking control of a user’s home equipment, financial accounts or even their car.

Further issues springing from these changes could arise around managing and keeping down the overall costs — including tax costs — as companies start dealing with several players around the world and apps start interacting autonomously with one another. This could result in the creation of new IP and analytical data that would generate new revenue streams — and which could potentially be taxed at different points in time and in different territories.

- **So what?** For device manufacturers, success in an AI world will not be merely about how “slim” they can make the device, how much functionality they pack into it or how attractive they make it. Instead, it will be about how effectively the device acts as the ‘portal’ into a user’s experience of all elements of the digital ecosystem around them. And it will be about controlling all users’ IoT-connected services and devices in a proactive and augmented fashion, including through voice recognition, while still looking sleek and fashionable. We are already seeing some signs of this new ecosystem emerging in the latest generations of devices, but there is much further to go.

Success for device manufacturers will be about how effectively the device acts as the ‘portal’ into a user’s experience of all elements of the digital ecosystem.





Content producers/distributors: leveraging creative intelligence in media

- **Business models impacts:** In **content creation**, producers and distributors will continue to converge and the traditional dividing-line between them will blur — witness how Disney and Netflix are moving to the same hybrid model from drastically different starting points.⁶ As a result, new forms of content will emerge, including handmade content based on user input. AI will augment the production and discovery of various types of content, with innovations such as personally tailored trailers and mixes of video content from many sources, like today’s AI-driven music mixes or playlists. This trend could go further, with any number of special interest groups drafting a storyline or key themes, and having other companies or AI produce short videos to promote their cause or even produce full-length ‘indie’ movies.

In the **content access** space, 5G networks will enable ever higher web-based consumption on mobile devices, with a face-off between subscription and pay-per-unit charging. And with the industry convergence between content creation and distribution potentially including devices as well, competitive frictions could arise. For example, if a conglomerate with activities including media content distribution and production produced a smartphone-type device, would its access to competing studio content potentially be limited? Given the need for payment at some point in the content access cycle, there’s also the potential for content providers to become involved in payments services, even to the point of becoming — or working in close collaboration with — banks.

Looking at **demand generation**, emphasis on influencers and micro-targeting of advertising messages will increase. At the same time, enhanced personalization and utility will boost demand for products and services, and require advertising to follow suit and become more personalized. This, in turn, will significantly improve the productivity and return on investment (ROI) of advertising. As mass ads cease to be effective, advertising revenue will become more localized in the source country, and thus potentially result in a more local tax compliant structure. This shift is already under way: for example, Facebook has recently announced plans to localize its ad revenues,⁷ and to book local ad revenues in local jurisdictions. If others adopt this model, the way it is structured and presented to tax authorities will be critical in determining how much tax risk these companies would carry in the new business model.

6. <https://www.ft.com/content/2a2eac78-7c95-11e7-ab01-a13271d1ee9c>

7. <https://www.theguardian.com/technology/2017/dec/12/facebook-ad-revenue-countries-earned-ireland>

- **Risks and challenges:** There are questions surrounding consumers' readiness to adopt AI-enabled services and provide the required level of detailed personal data, especially given the potentially narrow dividing-line between services being personalized and feeling creepy. There's also the risk of pushback from unions, creatives and studios, who may all be slow or even reluctant to move to new AI-enabled forms of production and content genres.

In the era of concerns over fake news, the ease of generating AI-produced video content could contribute to a continuing proliferation of fake videos, through which special interest groups might seek to propagate their views or influence the wider population. This risk is compounded by the fact that AI-produced videos will serve to make the content even more compelling and closely targeted, potentially exacerbating the polarization of views across society into different echo chambers. AI will also dramatically accelerate the production of content, and traditional methods of monitoring or regulating it will be left struggling to keep pace.

Given the rising recognition of the need for AI to be 'responsible,' all these issues could become highly contentious. In response, content distributors will need to be forward-thinking, and develop AI-enabled solutions to help maintain the integrity of content available on their sites and tackle the challenge of fake news.

- **So what?** Content producers and distributors need to work out how to both understand and shape consumer needs and preferences, while also taking account of the need to use AI responsibly. A further key question is whether content companies can find ways to create and deliver content to ever smaller groups of people on their preferred devices, and at a lower cost.

App developers: seeking to become ubiquitous in the user interaction

- **Business models impacts:** As the intelligent device handles ever more of the decision-making about which apps to choose for which task, app developers will become less visible to users and more B2B-orientated. The key shift will be moving away from performing functions and toward understanding behaviors and producing outcomes. Consumers don't care how many travel comparison apps they have — they just want to get the best airfare for their trip.

To maximize their efficiency and effectiveness in a more B2B-based environment, app developers will also look to locate more of their intelligence in the cloud, and generate value from speed and processing power rather than from branding. This refocusing will position them to play more of a role as back-end utilities supporting other companies' consumer-facing front ends.

- **Risks and challenges:** In moving away from consumer branding and towards a B2B model, apps will risk losing their differentiation with users. This shift will also play to the strengths of the larger players by making scale a more important success factor.
- **So what?** From 'install my app' to 'click my app,' and from 'click my app' to serving the user in the background, apps will need to become ubiquitous in the user interaction with the external world of people and IoT-connected things.

To maximize their efficiency and effectiveness in a more B2B-based environment, app developers will also look to locate more of their intelligence in the cloud, and generate value from speed and processing power rather than from branding.

Conclusion: no time to lose

The rapid advance of AI means the redefinition of ‘smart’ is already under way, and that devices capable of inferring users’ needs and meeting them autonomously will soon be with us. So, whatever your role in the TMT ecosystem, your window of opportunity to prepare for an AI world is short, and shrinking. A look at disruptive entrants who have connected buyers and sellers in new ways in other industries, such as Uber and Spotify, as well as TMT pioneers such as Netflix, Amazon and Google, provides a clear indication of how fast things will move in TMT.

Against this background, we believe there are three steps that all TMT companies should focus on as a matter of urgency. Here they are — together with one key question to ask for each step:

- 1. Developing various ‘endgame’ scenarios for the industry with AI:** “What opportunities and challenges will the upcoming AI disruption create for your business — and how well prepared is your company to leverage those disruptions?”
- 2. Developing business models that would be most attractive for each of the endgame scenarios:** “Are you ready and willing to enter into new alliances and partnerships that will be needed to leverage the disruptions — and have you factored in the impact taxes are likely to have in the new model, allowing you to plan and bring down your global effective tax rate?”
- 3. Building the capability and moving towards the endgame scenario, while monitoring the unfolding of the other scenarios:** “Are you ready for massive retraining of the workforce which will be needed to realize the opportunities of AI?”

PwC is already assisting companies across the TMT industry in planning for — and harnessing — the potential of AI. If you would be interested in a consultation about the opportunities for your business, please feel free to get in touch. There’s no time to lose: tomorrow’s TMT leaders will be those companies that embrace AI today.

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