

Disruptive forces in the industrial sectors

Global executive survey

Automotive & Assembly, Advanced Electronics and Aerospace & Defense
March 2018






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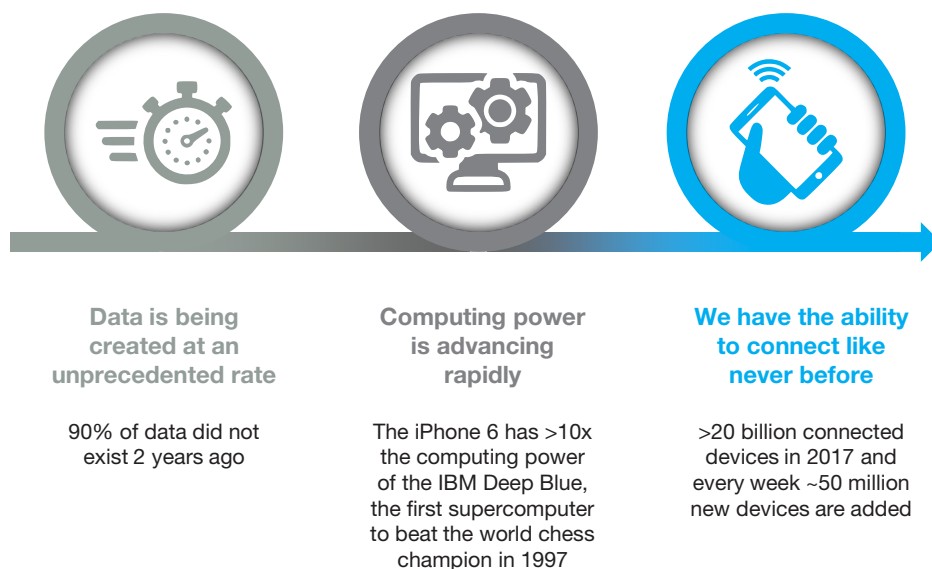
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The disruption challenge: Overview of survey and results

The industrial sectors will see more disruption within the next five years than in the past 20 years combined. This was the context for an extensive McKinsey survey on the impact of multiple forces industrial players face. The conclusion: revenues will grow overall, but incumbents are ill equipped regarding critical topics to capture their fair share.

These disruptions are unprecedented in their scale and speed, driven, among others, by massive advances in data generation, computing power, and connectivity (see Exhibit 1). They already affect all aspects of business and life more broadly. As one senior business leader told us: “Technological advancements will have a massive impact on societies and revolutionize the way we work, and hence our lives.” Preconceptions concerning the roles and responsibilities of companies are being challenged like never before. As the head of a semiconductor company said: “We’ve had technology disruptions before, but the market was stable. Now the market is being disrupted as well as the technology.” Crucially, disruption is linked to execution, not just the underlying technology. In many cases, the technologies themselves are not cutting edge, it is simply that no one has been able to implement them at scale before. Companies that fail to adapt and get up to speed risk being sidelined very quickly.

Exhibit 1: Massive advances in data generation, computing power, and connectedness drive scale and speed of disruptions



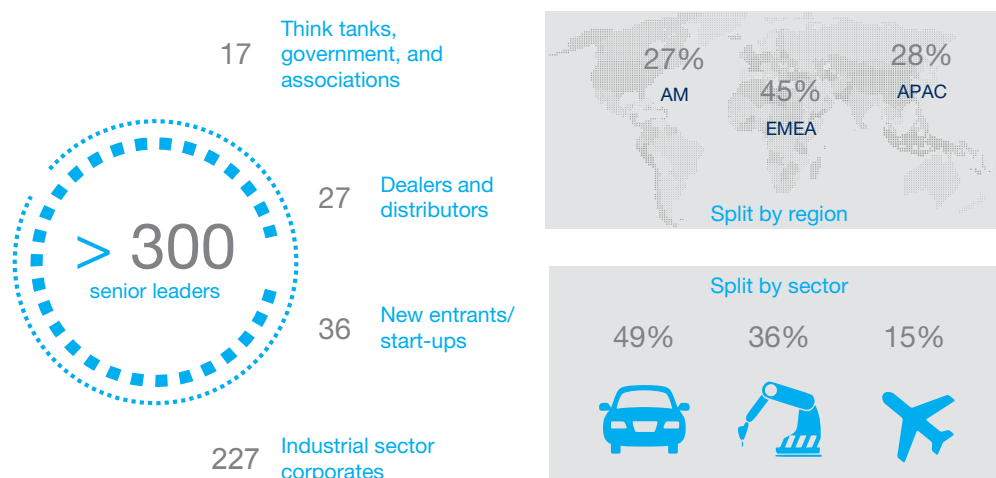
SOURCE: Press research; McKinsey

The markets already look completely different than they did a decade ago. For example, 95 percent of funding for tech start-ups since 2010 comes from nonautomotive players. When a 3D-printed excavator was unveiled in 2017, life suddenly changed for a lot of manufacturing companies. The number of connected devices continues to grow explosively – from 18 billion in 2016 to 75 billion in 2025 – at latest estimates. And the market size for artificial intelligence (AI) is expected to grow at 50 to 60 percent a year from USD 2 billion in 2016 to approximately USD 130 billion by 2025.

Disruption is not automatically bad news – there are incredible opportunities for those players who can turn it to their advantage, and revenues in all these sectors will grow. But given the pace of change, most industrial sectors are going to find it hard to adapt fast enough and not all of today’s leading players will retain their position. As one business leader said: “We will see a complete reshuffling of the industry and a shakeout will happen: the end game is not clear.”

McKinsey set out to understand the implications of the disruption in three industrial sectors: automotive, aerospace and defense, and diversified industrials (i.e., building and industrial technologies, machinery, and power equipment). Between April 2017 and January 2018, we spoke to more than 300 senior leaders – the majority were senior executives at industrial

Exhibit 2: Global executive survey conducted to create 360° perspective



SOURCE: McKinsey

corporations, but we also talked to new entrants and start-ups, think tanks, governments, industry associations, distributors, and resellers (see Exhibit 2). Just under half were from Europe, the Middle East, and Africa, with the rest split equally between the Americas and Asia-Pacific. Slightly less than half were automotive players, just over a third were diversified industrials, and the rest were aerospace and defense.

We have distilled their responses into a set of insights that we hope are both provocative and helpful as companies think how best to respond (see Exhibit 3). The first insights relate to the disruptive forces themselves and how prepared companies are to tackle them. The second set of insights relates to the implications for incumbents of the new disruptive world, and the final insights reflect on what moves companies can make to deliver a sustained successful response.



“Predicting the future has become much more difficult. Disruptions are no longer defined by historical industry leaders but by new entrants and game-changing technologies.”

CEO of a large industrial supplier

Exhibit 3: Three types of insights have been derived from the participants’ responses

Insights on the disruptive forces and companies’ readiness	<ul style="list-style-type: none">▪ Disruptive forces are overwhelming and simultaneous▪ Incumbents are woefully unprepared – and lag attackers
Implications of the disruptions for incumbents	<ul style="list-style-type: none">▪ Change is so fast and at such a scale that it is already too late for some▪ Revenues are growing, but who will capture them?▪ Look over both shoulders: everyone is a competitor▪ The workforce will be shaken up
Moves to ensure a sustained successful response to the disruptions	<ul style="list-style-type: none">▪ Get serious about new business models▪ Partner up in the right ecosystems▪ Focus on the future – push large-scale resource reallocation▪ Hiring smart people will not be enough – pursue multiple options to get the right skills▪ Everyone talks about agile – but no one really does it▪ Triumphant over disruption requires transforming the core of your business

Insights on the disruptive forces and companies' readiness

Disruptive forces are overwhelming and simultaneous

The discussions revealed five major technology-related topics that are disrupting the industrial landscape. It is not possible to pick and choose which disruptive forces to address. They are all interlinked and unlike the endless ninjas in a martial arts film, they all come at once. Three out of every five executives we spoke to who expect a major change are convinced that technology disruptions need to be addressed simultaneously if incumbents have any hope of benefitting from the increase in overall industry revenues that they will generate.

Connectivity-driven business models. For years, companies shared business models and tried to outperform each other. Today, connectivity is enabling new business models. For example, more than half of the respondents expect to see pay-per-use models within their own industries, with data monetization by far the next most common business model. Software is becoming much more important than hardware, and customer interactions are increasingly digitized, in many cases managing without intermediaries. Consequently, connectivity-driven fields such as shared mobility are expected to grow significantly in the coming years.

AI and autonomous systems. Learning from data and developing smart algorithms has become a competitive advantage. Executives from all sectors believe that AI and autonomous systems will affect the entire industry. Investment in AI is at unprecedented levels from both tech firms and traditional manufacturers. Driverless vehicles are AI's poster child, but industrial companies are also investing in machine learning and robotics to develop specific technologies related to their core businesses.

Internet of Things (IoT). This much hyped term refers to the sensor-enabled devices that can communicate with one another via the Internet. The possible uses are still being unearthed, but the McKinsey Global Institute predicts that the annual economic impact of IoT applications could be as much as USD 11.1 trillion by 2025. MGI suggests that factories are likely to see the greatest potential impact from IoT use – as much as USD 3.7 trillion per year – with substantial productivity improvements, including 10 to 20 percent energy savings and a 10 to 25 percent improvement in labor efficiency.






Electrification. Replacing traditional energy sources with electric energy – most notably in vehicles – is being driven by regulatory and technological changes and by growing consumer demand. The growth in electric vehicles sales is expected to be 25 to 30 percent a year to 2025 (see Exhibit 4). A senior executive at a European OEM believes it will affect at least half of the sector's revenues, both in vehicles and infrastructure. Stricter emission regulations and lower battery costs are all contributing to the flurry of activity in this area.

Cybersecurity. The increase in connectivity between companies and consumers as well as within organizations, production facilities, transportation systems, defense systems, etc. means that cybersecurity is critically important. Once closed systems are now open, increasing vulnerability and placing ever higher-value assets and processes at risk, leading to an annual growth in the market for cybersecurity of 5 to 10 percent until 2025 (see Exhibit 4). Our survey revealed widespread and growing concern on this topic, and many companies are starting to bring in the skills they need for tackling cybersecurity concerns. Some even see cybersecurity as a battleground for competitive advantage and differentiation.

Incumbents are woefully unprepared – and lag attackers

We asked respondents to rate the impact of each disruptive force their business faces from 1 to 5 (1 = no effect; 5 = affecting at least half the business), and then to rate their readiness from 1 (no measures in place) to 5 (holistic transformation started). Next to the five technological forces, we also asked respondents to assess the impact and readiness of two organizational changes currently ongoing as well as two macrorends their business is exposed to (see Exhibit 5).

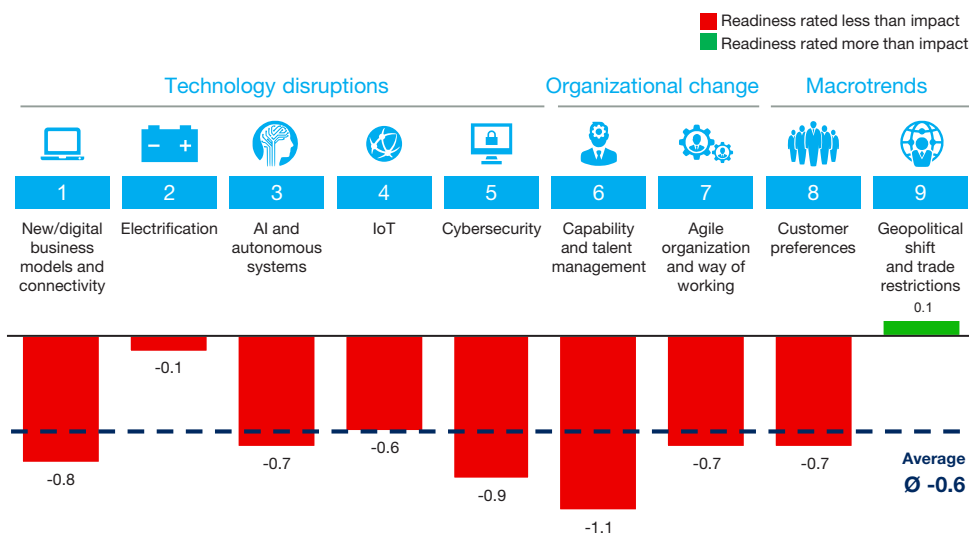
Exhibit 4: Game-changing innovations will have enormous impact

	2016	2025	Growth p.a. Percent
Recurring revenues from shared mobility USD billions	30	~ 385	~ 30 - 35 
Market size for AI USD billions	2	~ 130	~ 50 - 60 
Connected devices Billion units	18	~ 75	~ 15 - 20 
Global battery electric plug-in vehicle sales Million units	0.7	~ 6.7	~ 25 - 30 
Market size for cybersecurity USD billions	96	~ 210	~ 5 - 10 

SOURCE: Press research; McKinsey

Exhibit 5: Major readiness gaps exist across most assessed disruptive forces

Gap analysis of respondents' expected impact¹ and readiness²



1 Impact on business (e.g., sales, EBIT, strategic priority, competitive position); from 1 (not affecting business) to 5 (affecting at least half of the business)

2 Answer options: 1 = no measures so far, 2 = assessment available, 3 = strategy in place, 4 = strategy in place, pilot initiatives started, 5 = holistic program/transformation started

SOURCE: McKinsey

The gap between readiness and impact is substantial in most areas with capability and talent management as well as cybersecurity displaying the largest gap of all.

A startling revelation from this survey was the difference between traditional companies and new entrants. Broadly, the two groups agreed on the impact of each topic – though start-ups saw new business models as having a greater impact. But the new entrants perceive themselves to be much better prepared, with very small gaps between their readiness and the potential impact. Although the start-ups still have to prove that they can scale up, this is a wake-up call for incumbents who are under threat from these new entrants. As the CEO of an automotive start-up put it: “Historically, the focus of OEMs has been to improve the car; this is now moving to the background while processes and mobility come into focus.”

”

“Classic players are weak and completely unprepared. My experience is that start-ups do not have to fear incumbents because they are able to act much faster.”

CEO of an automotive start-up

Change is so fast and at such a scale that it is already too late for some

As depicted in Exhibit 6, a staggering 85 percent of executives see a significant change in the trajectory, speed, and scale of change in their businesses during this period of disruption compared to the gradual evolution of the past few decades – even including the introduction and widespread use of the Internet. The speed of change is the biggest and most critical change, but it is not simply a case of making faster decisions to keep up; the scale of change and the potential impact mean that those decisions also have to be more radical.

As the CTO of a top-tier aerospace and defense supplier put it: “The change is accelerating and the urgency to act is increasing. Rapid advances in commercial technologies are the enabler and driver. It’s a paradigm shift.”

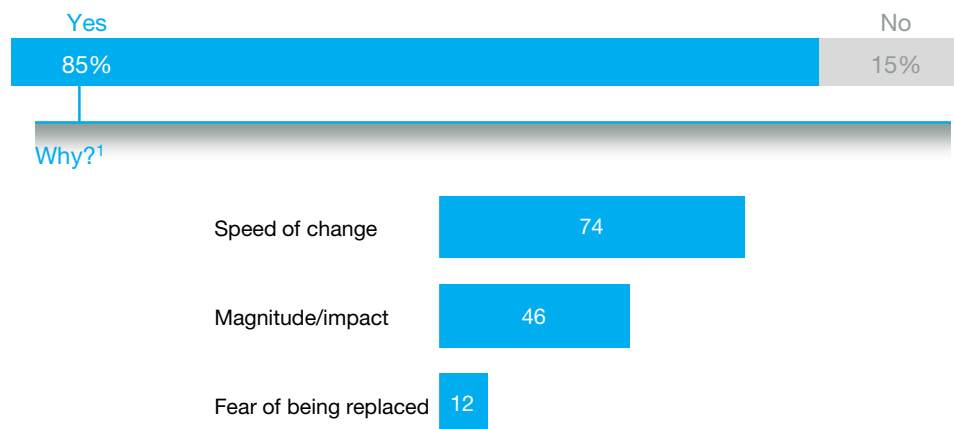
Looking at the development in two different industries helps us understand the pace of innovation: mobile phones and industrial robots. More than a hundred years passed between the first phone call in 1876 and the first mass-produced mobile phone in 1992. Yet, it would be only another 15 years before the iPhone and the mass adoption of smartphones. Now, less than ten years later, wearables such as smart watches have become everyday objects that connect users around the world.

Exhibit 6: Unprecedented change in depth and breadth

Question

Do major disruptions pose a significant shift?

Percent of respondents



1 Multiple answers possible

SOURCE: McKinsey "Disruption ahead" survey 2017/18

In 1961, the Unimate 1900 was the first mass-produced robotic arm. It set the stage for a revolution in factory production processes. Roughly 20 years later, the first direct-drive robot arm was designed, enabling robotic arms to move more freely and smoothly. Another 19 years passed before ASIMO, the first humanoid bipedal service robot, was revealed, but then the pace picked up. By 2012, *Amazon's* warehouses were operated by mobile robots and just five years later, *Boston Dynamics* completed a humanoid robot that can do backflips. How quickly will the next change come?

”

“10 to 15 years ago, nobody could have predicted what is happening now. The disruptions are coming faster than the industry can handle. We had not seen much disruption since 1945, but now the very basis of the underlying business is changing – and the rate of change is enormous.”

CEO of an automotive OEM

Implications of the disruptions for incumbents

Revenues are growing, but who will capture them?

Around half the executives we interviewed are convinced that the new products and services that emerge from the disruptive forces will increase the total revenue pool (see Exhibit 7).

The good news is that disruption is enabling revenue growth in these industries. The drone market, for example, is expected to leap from USD 6.4 billion today to USD 23 billion by 2024, USD 11 billion of which is nonmilitary. However, the additional revenue is coming largely from software and services rather than from traditional manufactured products, which means incumbents are losing revenue to attackers who are devouring attractive parts of the value chain with new ideas and new models.

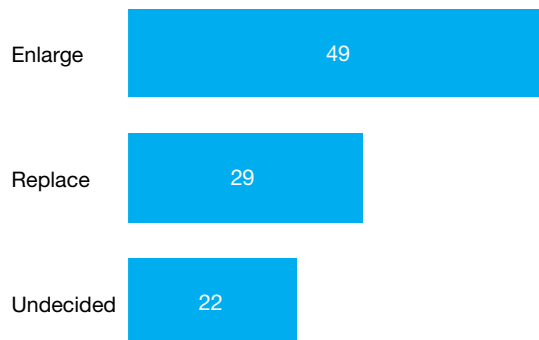
Touching on the impact of software, a senior executive from an industrial OEM does caution that software alone will not be the answer to everything and that at some point, software may even become a commodity. His view is: "A combination of hardware and software is the end game. If power distribution as a service becomes a viable model, there is an open question regarding who owns the assets."

Exhibit 7: Size of the total pie is growing, but you have to fight for your piece of it

Question

Will new products/services replace existing revenue or enlarge the base?

Percent of respondents



SOURCE: McKinsey "Disruption ahead" survey 2017/18

Case example



Substantially higher revenues are expected in the global automotive industry. In 2016, revenues totalled about USD 3.5 trillion, that is expected to almost double to USD 6.6 trillion by 2030. Shared-mobility services will drive about half of this increase. Such services will both grow the revenue pool and replace existing revenues, especially in the taxi and public transport segments. In urban areas, there is some evidence that they may also reduce private car ownership and therefore replace some traditional car sales revenues. The interesting question is who will capture most of this expected growth. Some OEMs have already positioned themselves either by operating their own services (e.g., *Daimler* and *car2go*) or by partnering with other operators (e.g., *Toyota* and *Getaround*).

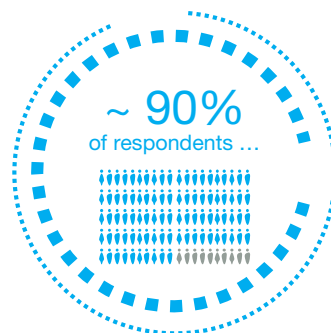
Look over both shoulders: Everyone is a competitor

Incumbents may feel under attack from wave after wave of start-ups on the one side, and the tech giants grabbing oversize slices of the value chain on the other, but the executives we surveyed believe that other incumbents themselves are still strong competitors as well (see Exhibit 8). One in five still sees incumbents as a threat and a third are concerned about start-ups. However, almost half identify the technology and software giants as gaining importance

Exhibit 8: The competitive landscape is rapidly changing – the right approach towards competition and ecosystems is crucial

Question

Will you face new competitors over the next 2 - 5 years?

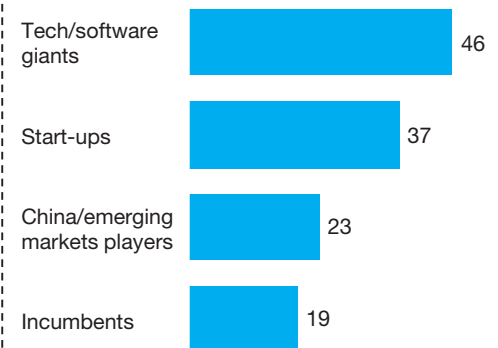


... expect new competitors at different stages of the value chain, leading to a new competitive landscape and ecosystem

Question

Who will be gaining importance as a competitor in the future?

Percent of respondents¹



¹ Multiple answers possible

SOURCE: McKinsey

as competitors. Nowhere is this more apparent than in the world of autonomous driving. At a recent automotive trade show, several journalists reported that the bosses of major German car manufacturers were more anxious that *Facebook* CEO Mark Zuckerberg be present than they were regarding Tesla or competition from China.

In most cases, new competitors are not competing against an incumbent's entire value chain. Instead, they target the most profitable slices of the pie, or the slice they believe is easiest to capture – perhaps a niche that is no existing player's core business, or one that has been neglected over the years. A leader of an industrials company put it bluntly: "Digital players could enter the market at any time – this increases the pressure on existing players and some are likely to be replaced."

Most parts of the value chain used to have clear natural owners, who experienced little competition. Nowadays, it has become less clear who owns which step of the value chain or who owns the customer. For instance, players in the material handling industry have been integrating in all directions to try and extend their share of the pie. Hardware manufacturers have expanded their software expertise through acquisitions (e.g., *Kion* bought *Dematic*, a leading supplier of advanced integrated supply chain automation technology, services and software), automation players are buying system integrators (*Rockwell Automation* and *Maverick*), and some former customers, notably *Amazon*, are developing their own material handling solutions. It is getting harder to know who is a competitor, who is a partner, and who is a customer.

New competition can also arise from existing players expanding on their competences from within the value chain. For instance, *T-Systems* has advanced from providing individual cybersecurity solutions for third parties into the manufacturing IoT space. Its "smart factory" concept offers a full system integration service and ensures high cybersecurity standards for the entire manufacturing process, which is increasingly vulnerable as ever more devices become connected.

The workforce will be shaken up

A majority of executives believe that up to a third of the workforce will be affected by disruption, while a large minority think it will be more than a third (see Exhibit 9). (Surprisingly, some people believed that less than 10 percent of their workforce would be affected). Automation is by far the most important disruptor in terms of the workforce. McKinsey Global Institute research has shown that even with technologies already in use, 45 percent of activities people are paid to perform today could be automated, and that about 60 percent of all occupations could see 30 percent or more of their constituent activities automated.¹

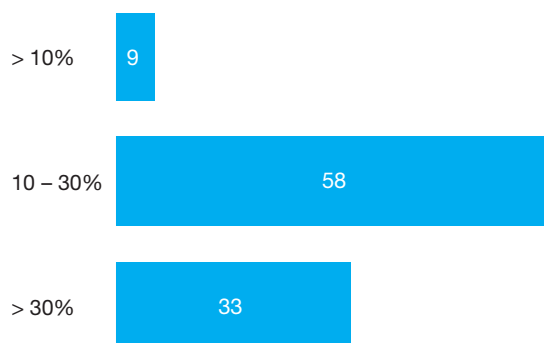
¹ <https://www.mckinsey.com/business-functions/digital-mckinsey/our-insights/where-machines-could-replace-humans-and-where-they-cant-yet>.

Exhibit 9: Massive impact on the workforce

Question

What share of your workforce will be affected in the next 3 - 5 years?

Percent of respondents



SOURCE: McKinsey "Disruption ahead" survey 2017/18

Whatever share of employees is affected, the absolute numbers are fluctuating. The total workforce of the ten largest companies in each sector is roughly 6 million. If 30 percent of those people were disrupted, 1.8 million employees at those companies alone would be affected within the next three to five years. Experts and executives in our survey expect talent scarcity in specific areas, especially data scientists, AI experts, and programmers. In the US, 100,000 software engineers are needed just to cope with increased complexity of in-vehicle software until 2030.

As technology evolves, it is moving beyond robotics and repetitive tasks to more sophisticated activities such as business support functions including finance and HR as well as into sales, and at some level almost every nook and cranny of the business. This will present another set of challenges for all companies.

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“We have to change from a mechanical gear-cutting company to a technical and analytical company. The challenge is scarcity of talent!”

Automotive supplier

Moves to ensure a sustained successful response to the disruptions

Get serious about new business models

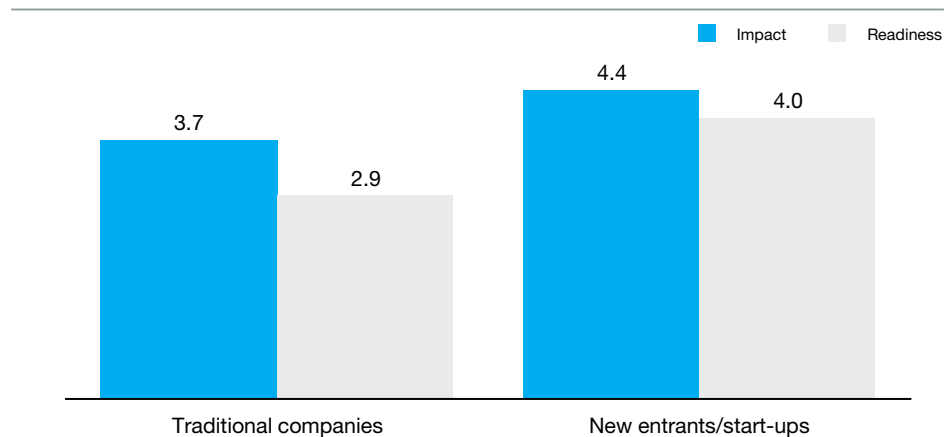
New competitors and new sources of revenue means value needs to be captured in entirely new ways using different business models. In our survey, we noted that incumbents and start-ups feel they have different levels of preparation for this change (see Exhibit 10). Start-ups and some of the tech titans have used these models from the beginning. However, incumbents find they have to think differently about customers. They also require customers to change their view on manufacturers, who they may associate with a very specific set of skills that does not encompass, for example, software or analytics.

Companies need to shift from “product development first, business model second” – a system that prioritizes clever technology over making money – and instead think about the business model from the beginning onwards. Pay per use and data monetization are two of the most prominent business models that competitors are trying to embrace today (see Exhibit 11). They require fundamental changes to the ways companies think about customers, how they calculate pricing, and how they sell.

Pay per use is becoming extremely popular in industries that would never have considered it before. Even air is being sold on a pay-per-use basis. Compressor provider *Kaeser* offers

Exhibit 10: Start-ups and new entrants place significantly more focus on new business models

New/digital business models: Business impact¹ and readiness²
Average assessment of respondents



1 Impact on business (e.g., sales, EBIT, strategic priority, competitive position); from 1 (not affecting business) to 5 (affecting at least half of the business)

2 Answer options: 1 = no measures so far, 2 = assessment available, 3 = strategy in place, 4 = strategy in place, pilot initiatives started, 5 = holistic program/transformation started

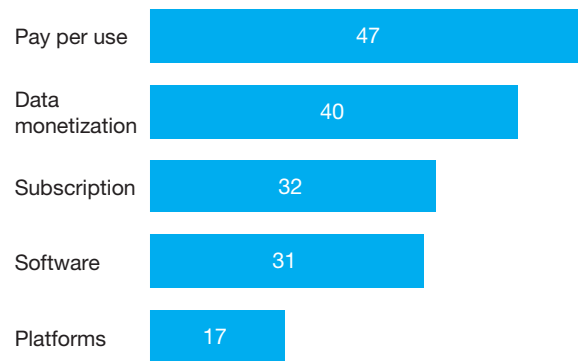
SOURCE: : McKinsey "Disruption ahead" survey 2017/18

Exhibit 11: New business models will gain importance

Question

Which new business models do you expect in the future?

Percent of respondents¹



¹ Multiple answers possible

SOURCE: : McKinsey "Disruption ahead" survey 2017/18

usage-based contracts for equipment whereby customers pay only for the amount of compressed air that is used. *Kaeser* installs and operates the compressor system, guarantees equipment performance based on data analytics, and splits the savings that come from its more efficient performance with the customer.

Pay per use is also taking hold in automotive. *Volvo* has started to test a pay-per-use business model by offering a large beverage producer a fleet of trucks specifically adapted to the needs of brewery distribution, and the truck service and maintenance contracts are on a flexible pay-per-km basis. These are still nascent ideas, though. Less than 1 percent of automotive revenues comes from pay-per-use services, the rest is still generated by traditional sales and financing.

Data monetization – i.e., collecting data from the products you already sell and using it to offer new services – is a major line of business for many manufacturers today and requires a completely different business model. This could include external partnerships, new incentive models, or a new organizational setup. Currently, many machinery players, for example, have sensors installed on their machines, but no way to read the data, let alone monetize it. Meanwhile, third-party providers such as the start-up *Voyomotive*, are entering this space and offering customers valuable new insights from the data they generate.

Honeywell is using the data from parts it supplies to establish predictive maintenance practices and assess whether prices for its components should be higher or lower (focusing on maintenance contracts/guarantees). This is an entirely different way of thinking about where the value lies for the customer.

Case example



Aircraft OEMs are already competing with incumbent component suppliers, such as engine manufacturers, as they seek to monetize data by selling it from all aircraft systems to their customers. Boeing's AnalytX platform, for example, uses advanced analytics to gather data from onboard sensors throughout the aircraft to expand the company's revenue from both the maintenance and operation of aircraft. More than 800 analytics experts work on the platform, delivering valuable insights to more than 200 Boeing customers, who can now use this data to reduce fuel costs by an average of 4 percent, perform predictive maintenance, build smarter flight plans and crew schedules, and minimize disruptions.



"Data has produced new business models. We are a living, breathing example of that as we provide a platform that delivers insights to increase sales. There are so many touchpoints for businesses – by organizing and structuring the data, we deliver insights businesses did not know they could get."

Industrial start-up

Partner up in the right ecosystems

The total investment needed to address disruption is prohibitively high (even for the most liquid players). One look at the balance sheets of the tech titans shows how much cash they have at their disposal compared to even the largest industrial firms. The required competencies also go beyond what most companies have in their existing workforce. All these factors are imperatives to partner up (see illustrative example in Exhibit 12).

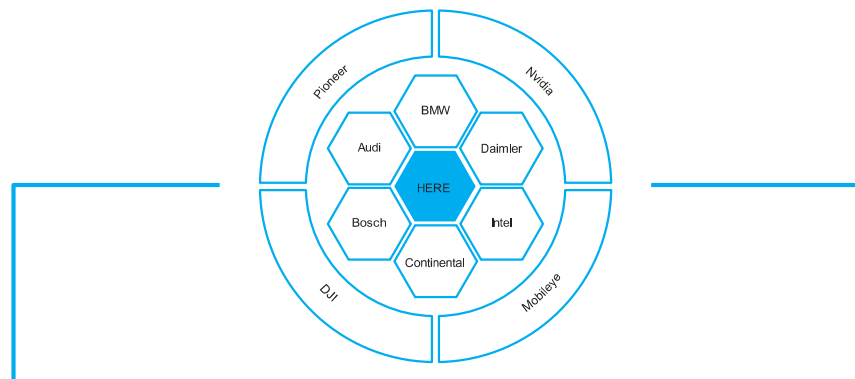
In addition, in an increasingly connected world, companies run the risk that by tackling these disruptive forces alone they will end up with platforms or technologies that are not linked to the rest of their industry. Value could wither quickly in such circumstances.

Smart players need to think about their industries in a more unified fashion if they want to succeed. Manufacturers, suppliers, and service providers must form alliances or join ecosystems – even with companies they might not have considered as natural partners. Choosing the right partner means examining candidates based on their competence profile, resources, market/channel presence, and complimentary fit.

Exhibit 12: Mapping and navigation provider HERE serves as nucleus for new ecosystem

Strategic alliance and partnerships within HERE ecosystem

Illustrative example



Audi, BMW, and Daimler: acquired HERE in 2015 to leverage the leading mapping and navigation technologies to advance their efforts in the autonomous driving space and built an ecosystem also for other industries



Bosch and Continental: most recent alliances (each acquiring 5% stake) to expand existing partnership and leverage live HD mapping beyond autonomous driving technology (e.g., for IoT technology and applications)



Intel: reduce complexity, lower costs, and improve accuracy of localization technology for autonomous driving



Mobileye:¹ improve camera-based ADAS systems with contextual awareness for more reliable, safer autonomous driving



DJI: combine expertise in mapping and unmanned aerial technology to ensure precise navigation, even during critical segments of flights



Pioneer: integration of SD and HD mapping solutions at scale to serve car customers and other industries with location intelligence services



Nvidia: create cloud-to-car mapping systems to ensure safe navigation of autonomous vehicles

¹ Mobileye acquired by Intel in 2017

SOURCE: HERE Web site; press research

Case example



Airbus is addressing disruption by partnering on multiple fronts, e.g., with *Uber* to allow people to book helicopters for a taxi service (the idea was tested at the Sundance Film Festival). The company has also partnered with hardware start-up investor *HAX* to develop, test, and commercialize urban, vertical people transport solutions for cities. It has even partnered with transportation software company *SITA* to develop advanced cybersecurity solutions for the air transport industry. The company clearly recognizes that it cannot succeed alone with disruptions on so many fronts.

Focus on the future – push large-scale resource reallocation

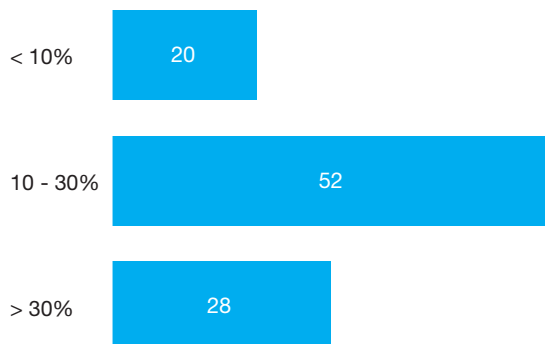
Allocating resources based on last year's budget will be of no help given the speed of disruption. Nor will moving a small share to a glamorous new digital idea help much either. In fact, a third of our survey respondents expect to reallocate more than 30 percent of their resources because of technology disruptions (see Exhibit 13). This will result in a substantial shift of capital expenditures across industries in the coming years. Even a 30-percent reallocation of capex for the top 15 suppliers in each of the automotive and aerospace and defense industries would mean shifting more than USD 12 billion to new areas.

Exhibit 13: Need for substantial at-scale resource reallocation

Question

What share of resources (e.g., R&D, capex) will you need to reallocate to technology disruptions?

Percent of respondents



SOURCE: McKinsey "Disruption ahead" survey 2017/18

Typically, companies that actively reallocate resources also perform significantly better than their peers. Extensive McKinsey research shows that companies with high levels of reallocation – those who have moved more than half their capex over a 20-year period – generate substantially higher total returns to shareholders than those who moved less than 30 percent (see Exhibit 14).

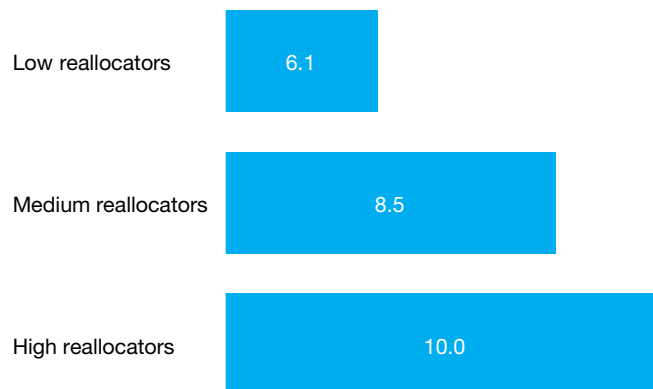
Incumbents recognize the need to rethink the budgeting process entirely and embrace active portfolio management. Some are adopting a zero-based approach that challenges the entire base spend, which can help shift mindsets and money to where they are most needed. A European machinery player built up its entire business budget including footprint from zero while undergoing a fundamental shift from new-installation- to service-based business, which was accompanied by a drop in entire market size. Instead of looking at the status quo and deriving smaller adjustments, the company built a hypothetical “model company” and simulated how its business in different markets is likely to develop. This helped it understand the bigger picture of massive market changes and determine where it will face overcapacities, which products to abandon, and how to secure its profitability.

Exhibit 14: Reallocation drives higher TRS and is even more important in disruptive times

Question

Median TRS¹ CAGR² of companies by degree of reallocation³

Percent, n = 1,508



1 Total return to shareholders.

2 Compound annual growth rate

3 Measures the share of capex that shifted between business units over the 20 years (1990 - 2010): low (0 - 30%); medium (30 - 49%); high (> 49%)

SOURCE: McKinsey

Active portfolio management is an essential element of matching the right resources with the growth opportunities. Amid spin-off and divestiture activity, respondents highlight the importance of running strategic reviews of business activities, particularly given the different impact of disruptions on individual businesses. Automotive supplier *Delphi* spun off its powertrain business into a separate company to allow the remaining company, renamed *Aptiv*, to focus on advanced driver assistance programs, connectivity, and autonomous driving solutions.

Players must be prepared to “bet big” on several opportunities and then drop some of them relatively quickly. Many major players have established investment units such as *ABB*’s Technology Ventures. Others have incubators, such as *BMW*’s iVentures. These units identify, invest in, and nurture promising technologies and start-ups in relevant areas with the hope of getting ahead of the game. *Boeing*, for example, has invested in autonomous capabilities by buying *Liquid Robotics* and *Aurora*. *Liquid Robotics* gives *Boeing* “seabed-to-space” capabilities, while *Aurora* is an innovator in autonomous flight systems. Although such investments naturally carry some degree of risk, failing to move resources to these areas now could be very costly in the long run as nontraditional competitors can emerge from seemingly unrelated fields.



“If you are not moving more than 30 percent, you are doing it wrong.”

Aerospace and defense supplier

Hiring smart people will not be enough – pursue multiple options to get the right skills

Automation will displace employees, but respondents recognize that the disruptive forces also require fresh skills. As depicted in Exhibit 15, 7 out of 10 said they specifically needed digital, analytics, and software skills. 3 out of 10 were looking for cross-functional roles – those people who can act as the integrators between the technical and data people and the business, and only slightly fewer felt they needed fresh sales and account management skills as they move towards selling services and solutions rather than products.

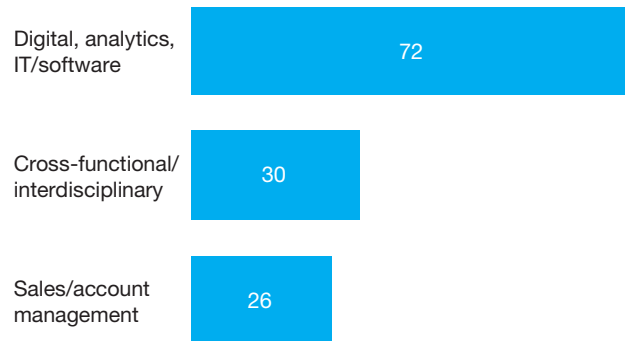
In many cases, companies will not be equipped to build these capabilities in-house, and the scarcity of talent in some areas is of concern. Already half the companies we spoke to expect to acquire skills through M&A or partnerships, such as top-tier automotive suppliers acquiring software companies to build capabilities in autonomous driving (see Exhibit 16).

Exhibit 15: Massive impact on the workforce and required skill sets

Question

What type of capabilities are specifically needed?

Percent of respondents¹



¹ Multiple answers possible

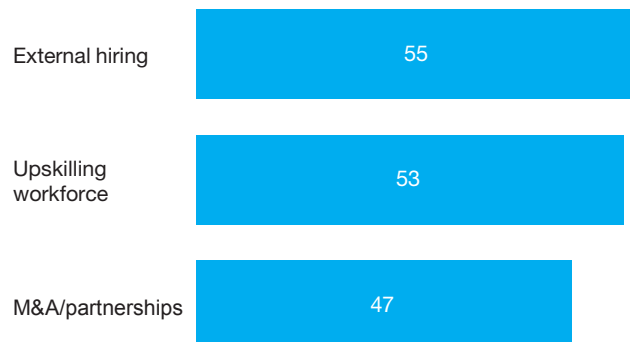
SOURCE: McKinsey "Disruption ahead" survey 2017/18

Exhibit 16: There is no silver bullet to close the workforce skill gap

Question

How will you build critical new capabilities?

Percent of respondents¹



¹ Multiple answers possible

SOURCE: McKinsey "Disruption ahead" survey 2017/18

Automotive supplier *Continental*, for example, bought Israeli data security firm *Argus* in preparation for the growth in interconnected cars. OEMs are understandably concerned about hackers being able to take control of vehicles, but few have the depth and breadth of cyber-security skills required to prevent this.

Fascinatingly, it is not just incumbents that try to acquire talent. *Amazon* regularly buys businesses to benefit from their specific capabilities, and has been doing so for many years. For example, in 2009 it bought *Snaptell*, which had specialized in visual product search, and in 2012 it acquired *Kiva Systems*, which had robotics warehousing capabilities.

Other companies are even turning to crowdsourcing to bring in the skills they need. *GE* reduced the weight of a jet engine bracket by 80 percent through an online design competition, awarding the winning design USD 7,000, effectively receiving thousands of person hours of work at a fraction of normal costs.

”

“All forms of talent acquisition will be necessary. First, partnerships will dominate, then recruiting, then acquisitions, and reskilling will come last.”

Senior executive at an aerospace and defense supplier

Everyone talks about agile – but no one really does it

Respondents agreed most of all on the need for agility. More than 9 out of 10 people said they saw the need for more agility in their organizations as the pace of change accelerated (see Exhibit 17). Yet, there is a huge mismatch between understanding the need for speed and taking measures. Only a quarter had initiated pilots or undertaken any sort of program to become more agile.

The hype regarding agility may not be helping. Many companies simply do not know what it means in practical terms. There are four easily understood dimensions: moving the focus from talking to doing, giving individuals the freedom to act within clear boundaries, ensuring extreme clarity with regard to who is doing what, and encouraging a mindset shift towards accountability.

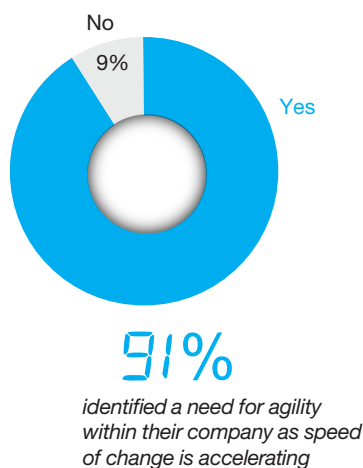
An agile organization that can achieve these targets can rapidly and effectively implement new business models. And our research shows a clear link between agility and economic and operational performance in terms of EBITDA margins, time to market, and frontline productivity (see Exhibit 18). The challenge is that there is not one formula for becoming agile; the starting point and context for each organization are different.

Exhibit 17: Broad consensus that agility is important – readiness perceived to be low

Question

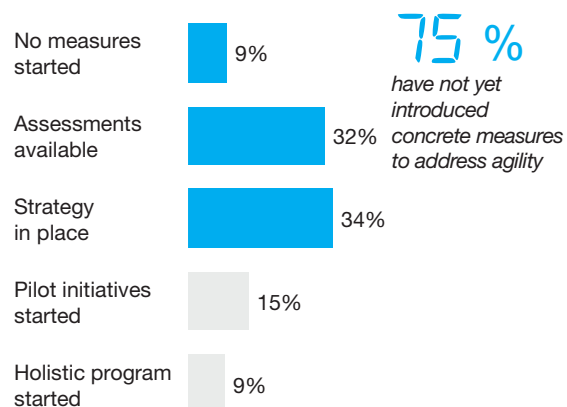
Do you see a need for agility within your organization?

Percent of respondents



How would you rate the readiness of your organization¹?

Percent of respondents



¹ Answer options: 1 = no measures so far, 2 = assessment available, 3 = strategy in place, 4 = strategy in place, pilot initiatives started, 5 = holistic program/transformation started

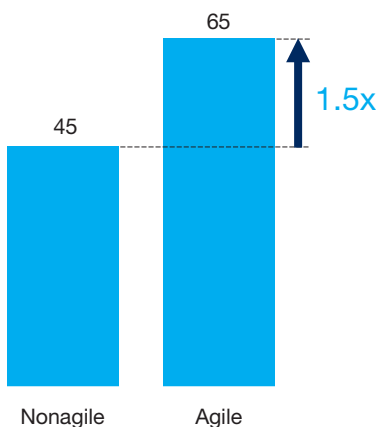
SOURCE: McKinsey

Exhibit 18: Agile pays off

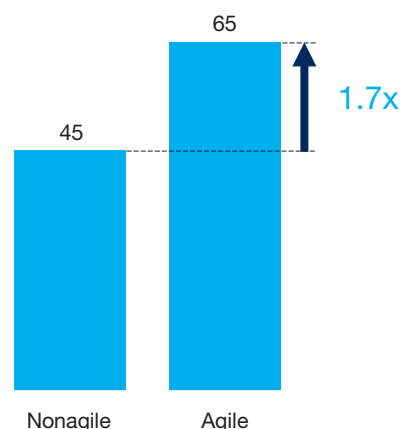
Agile units are over 1.5 times more likely to report higher performance compared to their competitors

Percent of respondents reporting their unit performs better or much better than competitors²; n = 2,546

Financial performance¹



Nonfinancial performance²



¹ Includes revenue, growth, market share, cost efficiency, and profitability

² Includes deployment and innovation (e.g., of products, services, processes, and/or solutions), responsiveness to customer needs, time to market, employee engagement, and productivity

SOURCE: McKinsey

Nor must every part of the organization be agile. Some of the “stable backbone” can stay untouched, but where agility would be of great benefit, the whole operating model needs to change. However, almost three-quarters of companies mistakenly adopt a couple of quick fixes that solve their immediate problems despite evidence that success is three times more likely when a much more comprehensive agile program is adopted.

The need for agility is complicated further by the requirement in some areas to work at different speeds. Combining research and development for both hardware and software is one such field. What is known as “two-speed R&D” refers to the fact that two parallel but tightly linked development models are required to ensure a harmonized offering of new products, yet they operate at different speeds. Given the fundamentally different natures of hardware and software development (e.g., linear versus iterative processes; fully featured versus minimum-viable-product approaches) and the fact that most companies are typically only well versed in one or the other, this too will pose a substantial challenge for many incumbents.

Case example



John Deere launched a large-scale agile program that enabled the company to offer entirely new and sophisticated online services for farmers that helped them manage their fleet based on historical and real-time data. By embracing agile working methods, such as working in small, cross-functional teams, focusing work on smaller increments to increase speed, and increasing the interaction with its customer base, *John Deere* has been able to bring together machines and technology and to use the data generated to derive relevant insights for its customers. Farmers now use *Deere’s* platform to decide which crops to plant where and when, when and where to plough, where the best return will be made with the crops, and even which path to follow when ploughing. *John Deere* also halved warranty expenses and boosted time to market by 20 percent.



“Large industry players are typically bad at agility. They do not recognize innovation opportunities internally and do not know how to attract and manage digital talent.”

Automotive start-up

Triumphing over disruption requires transforming the core of your business

We have touched on partnerships, new business models, agility, and talent. Ultimately, though, for incumbents to build and grow through this unprecedented disruption, most, if not all, will need to undergo a complete change.

The majority of survey respondents are already reacting to the challenges with a company-wide program (see Exhibit 19). Many are also simultaneously establishing business incubators, which is undoubtedly helpful but will not be sufficient for most.

Some transformations are well underway. For example, a leading European industrial company decided to build an IoT/digital business, which required a thorough transformation. Within less than a year, it was able to successfully tie connected services into its core product offering. The company was able to achieve this by following a clearly defined four-stage process: (1) define the product offer, (2) develop the use case, (3) create the first minimum viable product, and (4) build these minimum viable products into digital businesses. In each stage, it focused on customers' needs and initial customer reactions to guide its transformation.

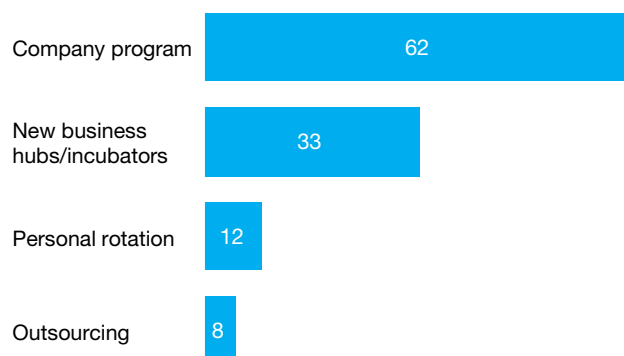
A substantial part of such transformation programs will be the inclusion of Industry 4.0 elements into manufacturing processes. This will be necessary to realize the productivity gains needed to remain competitive. In automotive, for example, it is clear that while the content of vehicles increases, prices are mostly stable. This puts significant pressure on OEMs to increase production efficiency. Artificial intelligence technology is one piece of the jigsaw. McKinsey Global Institute expects collaborative robots using AI to increase productivity of tasks that cannot be fully automated by 20 percent.

Exhibit 19: Majority of survey participants see need for companywide transformational approach

Question

What is your approach to mastering the disruptions?

Percent of respondents¹



¹ Multiple answers possible

SOURCE: McKinsey "Disruption ahead" survey 2017/18

A leading European automotive OEM has launched an end-to-end digital transformation across core business units that has already had a significant impact in terms of automating critical processes, creating digitally-enabled offers, and changing the culture and way of working. As another example, *Leonardo* launched an end-to-end transformation that sharpened its focus on its core aerospace and defense activities and led it to shed noncore assets such as its civilian railroad and industrial plant engineering activities. It created a unified company structure that has resulted in increased efficiency and synergies throughout the organization.

Looking across industries also helps to highlight the potential impact that a company may achieve when it fully commits to a digital transformation. A large European bank for instance completed a wide-ranging program and has achieved to fundamentally reshape and digitize its core business. Daring to divest several businesses, completely digitizing key customer journeys and streamlining the organization, it managed to reduce its operating costs by 20 percent and cut the number of customer complaints in half.

Transformations are daunting and can hit many obstacles. Companies are asking employees to be faster, more entrepreneurial, and less risk averse while the way they work is changing all around them with the rise of digital technologies, automation, and cybersecurity concerns.

Three particular challenges stand out. First, companies will have to become more courageous. Daring to be ambitious and to make mistakes and then to learn quickly from them will let companies redefine themselves and create a new and improved offer for their customers. Second, they must ensure the transformation is inclusive. Strong commitment from the top that is cascaded down through the organization, empowering all levels to deliver improvements is essential. Finally, they must ensure the transformation goes far beyond technology. In our extensive experience – and backed up by our survey results – the biggest stumbling block to any transformation is usually the company’s culture. As an automotive OEM executive said: “The issue is not the organizational model, the issue is people and mindsets.”

”

“We have to transform ourselves in a meaningful way to address the threats and become nimble.”

Semiconductor player

Conclusion

Our survey revealed widespread agreement among industry participants that they will be facing unprecedented disruptions in the near future. The five major forces driving this change – connectivity-driven business models, AI and autonomous systems, IoT, electrification, and cybersecurity – are interlinked and will affect all industries. Most players do not yet feel fully prepared for these disruptions, especially incumbents, and therefore expect to see profound shifts to the competitive landscape.

In order to prevail amid such turbulent circumstances, organizations will be forced to react on multiple fronts. These challenges may seem overwhelming and some players will undoubtedly struggle; however, they also present a great opportunity. The timing has never been better for companies that are eager to set new ambitions. In this sense, we want to leave you with the words of management pioneer Peter Drucker who said “The best way to predict the future is to create it” and encourage you to be ambitious and become the creators of your own future.

What will be your ambition for the future?

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