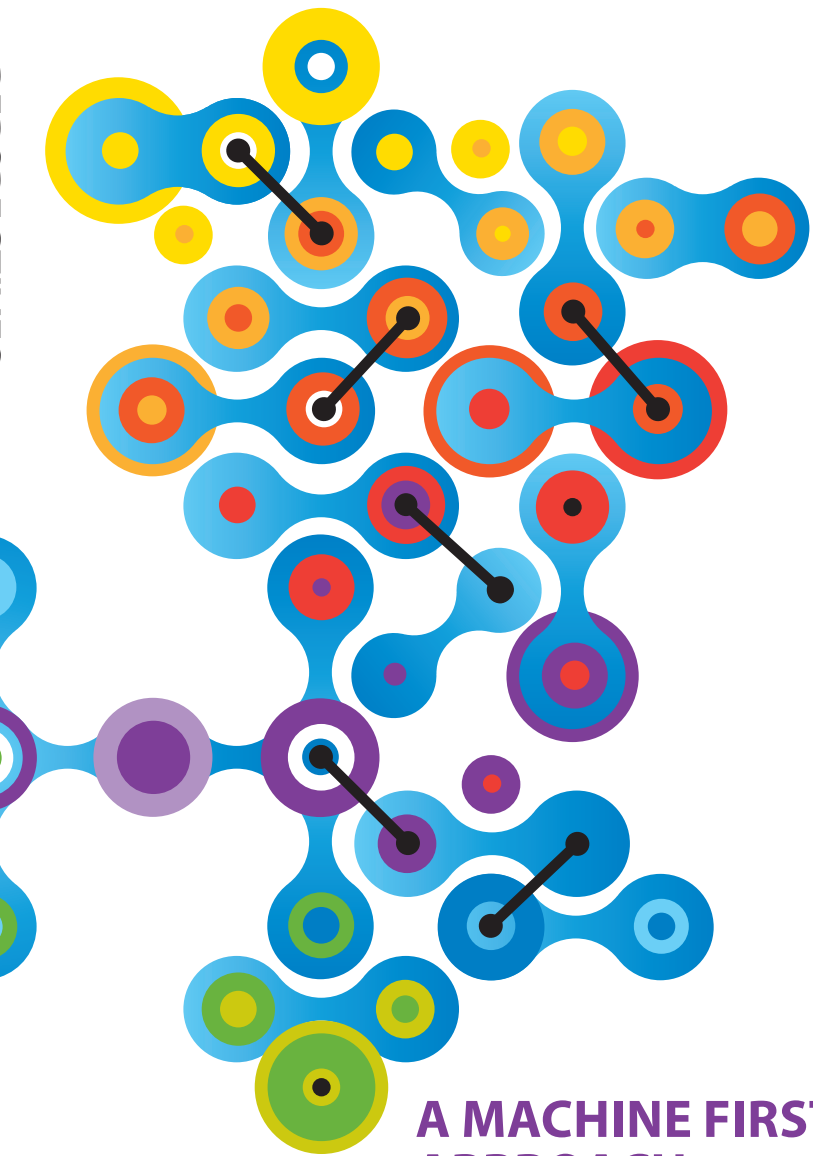
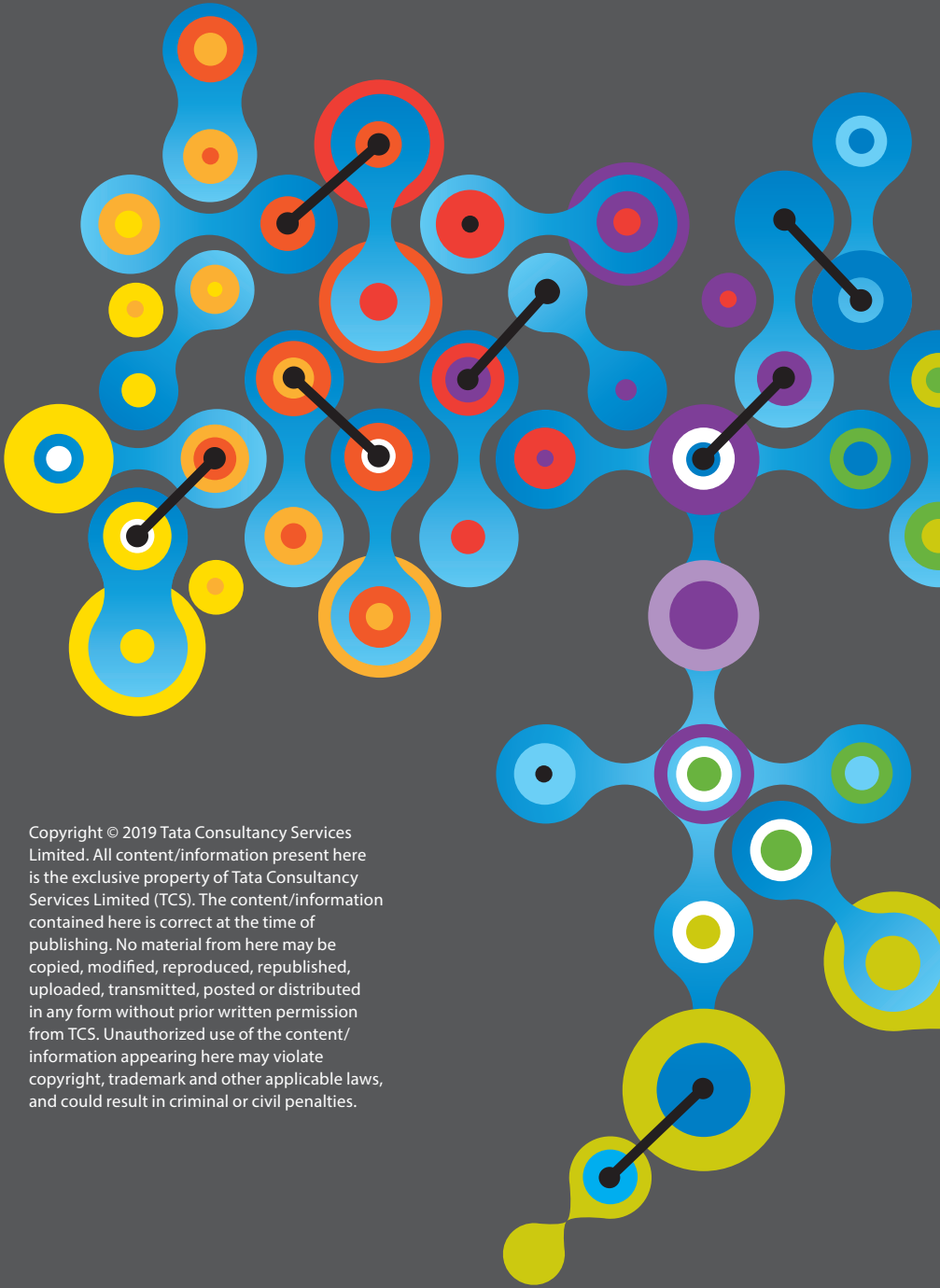


PERSPECTIVES

VOL.12



**A MACHINE FIRST
APPROACH** TO
DIGITAL TRANSFORMATION



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A WORD FROM KRISHNAN

Competing in a World of Abundant Resources and Opportunities

Just as there are multiple varieties of strategic planning approaches, there are multiple ways to digitally transform a business. The differences may seem trivial. However they do, in fact, exist. The best way to understand them is knowing the fundamental beliefs about 21st century business that shaped them.

At the core of TCS' thought leading approach to digital transformation is a move from the paradigm of optimizing scarce resources to one of harnessing abundance. In other words, casting a problem in the lens of abundance to find a solution as opposed to trying to optimize scarce resources to solve the problem. Those now-ubiquitous and abundant resources may be talent (easily tapped wherever there is an Internet connection), data (continually tracking the performance of our products, people, processes, and customer relationships), computing power (to process, analyze, and act on that data, with or without human intervention), capital (from both private and public markets), and business partners (now much easier to do business with in a plug-and-play world of digital ecosystems).

Today's age of abundance means CEOs and their C-suite colleagues can not only dream of doing things they couldn't have imagined in the last century—they can also act on them. Our flavor of digital transformation, what we call the Machine First™ approach, will show you how.

We hope this edition of *TCS Perspectives* (our 12th since 2009) widens your horizons about what is now possible in the paradigm of harnessing abundance.

Krishnan Ramanujam

President, Business and Technology Services
Tata Consultancy Services

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Why Digital Transformation Needs a Reboot in a Business 4.0™ World

Author

By Krishnan Ramanujam

President, Business & Technology Services, Tata Consultancy Services

Large companies around the world are using digital technologies to reinvent their business models, create superior customer experiences, and build far stronger customer relationships. To do so, many of them are aggressively adopting artificial intelligence, analytics software, and cloud computing. Physical and knowledge work that couldn't be automated in prior decades is now, or soon will be, done by machines. Concurrently, the savviest companies are carving out new roles for people—roles that the machines can improve even if they can't supplant them.

Each article in this edition of TCS *Perspectives* lays out the critical issues facing leaders who must digitally transform their companies. TCS experts have written these articles for leaders who want to tap the power of machines for work that should be automated, and the power of people for work that can't be automated, now or possibly ever.

As I believe you will see in this edition's articles, TCS brings a very different method to digital transformation. We call it the 'Machine First™' approach. Our articles will explain what this

means and how to do it, piece by piece. Our experts will give you proven and actionable advice on how to digitally transform your company to win in an increasingly digital world.

Here is a short preview on each article:



As Frank Diana and Simon Torrance explain in “**Defining Your Digital Ecosystem:**

The First Step in a Machine First™ Transformation,” many leaders are no longer looking at strategy and industry structure in the ways of a non-digital world. Instead, they’re analyzing how emerging ecosystems—networks of stakeholders, including business partners, suppliers, customers, and competitors that interact digitally to create value—are supplanting traditional industries as the organizing construct. For example, in a mobility ecosystem, automakers no longer just make cars; they must redefine the very notion of automobile ownership and how people get around.



After they determine in which digital ecosystems their company must play, leaders have a far better answer to how they must digitally transform their businesses. That’s where the

next article comes in: “**Reshaping a Business Around AI: The Machine First™ Approach to Digital Transformation,**” by PR Krishnan. He lays out a structured approach to digital transformation. It’s about automating all crucial business process activities that can be automated, and then turning them into *intelligent* processes. Equally as important is identifying the new higher-level jobs that the organization will need and reskilling the workforce to fill those roles.



Indeed, automation is a central tenet of the Machine First approach to digital transformation. For most companies, the place to begin with is customer-facing activities. In “**Using Advanced Technologies to Deliver an Uncommon Customer Experience Every Day,**” James Wheless and Navin Mithel show how companies are using intelligent technologies to enhance the customer experience. That includes engaging with customers in new ways. For example, some major cruise ship operators today give customers wearable digital devices that unlock cabin doors and provide access to amenities. That frees up employees

from spending their time on manual tasks, which can be automated, to provide more personalized services.



But the customer experience is not the only place that companies can digitally transform through a Machine First approach. In **“Giving Power to the Machine: Offering Technology the First Right of Refusal,”** Santha Subramoni and Akhilesh Tiwari discuss how accounting, human resources, IT help desks, and other internally facing activities can be made far more effective and efficient. The key is taking a new look at onerous manual activities—both physical and knowledge work—that can now be automated with surprisingly high levels of quality, and surprisingly low levels of operating costs.



As companies automate more and more work, they must also identify and fill the important new jobs in the company that can take it to the next level. In **“The Crucial Role of People in a World of Extreme Automation,”** Ram Subramanian and Ashok Nandakumar note that even as machines take over a number of tasks, many new tasks will emerge

that only people can perform. That will enable their company to truly put their people’s creative, analytical, and managerial talents to work.



But automated systems won’t perform well without high-quality algorithms to guide them, and high-quality digital data to feed and continually improve those algorithms. In **“Building the Unbiased and Continually Self-Improving Machine,”** Dinanath Kholkar explores how unintentionally biased algorithms and outdated data can lead a company’s machines astray. No company wants that, of course. The author explains how to validate and continually improve the all-important algorithms that are driving their machines.



AI and unbiased algorithms are becoming critical to company success. But another foundational piece of digital transformation is the ‘cloud’—i.e., the ability to tap enormous amounts of computing power that reside in the data centers of Amazon, Google, Microsoft, and other firms. In **“Cloud Computing: The Essential Platform**

for a Machine First™ Digital Transformation,” Satishchandra Doreswamy, Indu Malhotra, and Chethan Prabhudeva argue that most companies today must turn to the cloud to provide customers with superior and heavily digital experiences. Public and hybrid clouds are also becoming important digital laboratories—i.e., places to conduct experiments requiring colossal amounts of computing power. Furthermore, the cloud has also become a key piece of ecosystems where many companies must digitally connect to one another.



Ironically, the same attributes that make automation so effective—efficiency, accuracy, labor-saving—also open organizations to new risks. This is because computer hackers and other parties with bad intentions are using AI to wreak more sophisticated havoc. In **“Protecting Your Robots: How to Design Security into Your Machines,”** Satish Thiagarajan and Sundeep Oberoi explain what companies must do to protect their automated processes.



In *Perspectives*, we like to bring the views of experts outside of TCS. In the last few years, we interviewed quite a few

experts on strategic business and digital issues (Ram Charan, Tom Davenport, Steve Blank, and others). In this issue on Machine First, we spoke with Professor Vijay Gurbaxani, founding director of the Center for Digital Transformation at the University of California Irvine’s business school. For years, Vijay has conducted research on digital transformation, the findings of which have appeared in prestigious business and academic publications. In our Q&A, Dr. Gurbaxani discusses key leadership challenges for companies operating in highly digital sectors (i.e., Adobe and General Motors), and even such sectors as the restaurant industry that many wouldn’t regard as highly digital.



In our last article, **“The CEO as Chief Exhilaration Officer,”** I explain how

enterprise leaders can overcome one of the biggest challenges of automation: engaging, motivating, and retaining talented people in a world of escalating fears that robots are taking their jobs away. I argue that the most successful companies will have leaders—especially CEOs—who extinguish such fears by exuding optimism and creating new work opportunities.



Defining Your Digital Ecosystem: The First Step in a Machine First™ Transformation

Authors

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It is a boardroom scene we see far too often: An executive team and board directors huddle for a day or more to plot out the digital transformation of their company. Early on, the conversation centers on what the firm's long-time competitors are doing on the digital front. It goes something like this:

"Competitor A has shifted most of its marketing from non-digital to digital channels," the chief marketing officer exclaims. "We need to do that too."

The chief strategy officer chimes in: "Competitor B has launched a whole new digital business that will start cannibalizing its core business."

And then it's the supply chain head's turn: "Competitor C is taking orders online directly from end consumers for certain items now and bypassing distributors to deliver them."

No doubt, they are all important issues to discuss. However, they actually aren't the best place to begin the increasingly important conversation about how a company should digitally transform itself. Whether the approach one takes is of the Machine First or another variety, a digital transformation should begin elsewhere. That place is the **digital ecosystems** in which a company operates.

What do we mean by this?

A digital ecosystem is a complex network of stakeholders that connect online and interact digitally in ways that create value for all.

Every digital ecosystem extends across multiple industries. Companies that view their customers, competitors, and business partners through the lens of a single industry are far less able to recognize the new types of customers, competitors, and business partners they will need to interact with as their sector increasingly goes digital. Or when they do recognize them, it is often too late.

The specter of digital ecosystems supplanting traditional industries as the organizing construct has played out in industry after industry—especially those whose products or services can be fully digitized. The road-map business provides an excellent example.

The Digital Ecosystem That Rerouted the 20th Century Road-Map Makers



In the U.S., the 20th century industry of companies that produced paper road maps was a lucrative one for companies like Rand McNally and Thomas Brothers. But in the 21st century, they have been overtaken by online mapping companies that have viewed the industry quite differently: not only to help drivers get from point A to point B, but to find, evaluate, and secure services they need along the way: restaurants, gas stations, hotels, and parking.

In short, digital companies like Google, Garmin, MapQuest, and others saw road maps not as a paper product but rather a digital ecosystem of needs that people have for information and booking services when they're on the go.

Over the last two decades, this new breed of mapping company has turned the business into a much larger ecosystem than the one William Rand and Andrew McNally could have imagined when they incorporated their company in 1873.¹

With the launches of Google Maps (in 2005) and the iPhone (2007), Google turned the map industry on its head. Instead of getting money from consumers looking to buy maps, Google collected revenue from businesses that wanted to shout out their locations to those consumers. By 2015, the U.S. market for location-targeted mobile ads was \$9.8 billion,

and was predicted to grow to nearly \$30 billion by 2020.² Morgan Stanley estimated that Google Maps alone generated \$1.5 billion from local advertisers in 2017, and predicted it would haul in \$5 billion by 2020.³ And that doesn't include revenue that online map makers can tap from car manufacturers' vehicle guidance system, railroads, and farmers—part of what is projected to be a \$40 billion market by 2024.⁴

In this way, the entry of online map-makers over the last 20 years has exploded the world of the old paper map-makers. Despite filing for bankruptcy protection in 2003,⁵ Rand McNally still exists today, owned by a private equity firm but operating at a smaller scale than in its glory days.⁶ It focuses on telematics for truck fleets, connected cars, and consumers who still love its paper Road Atlas.⁷

¹ Rand McNally history page, <https://www.randmcnally.com/about/history>

² BIA Advisory Services, "Location-Targeted Mobile Ad Spend to Reach \$29.5 Billion in the U.S. in 2020," press release, June 16, 2016, accessed February 26, 2019: <http://www.biakelsey.com/location-targeted-mobile-ad-spend-reach-29-5b-u-s-2020/>.

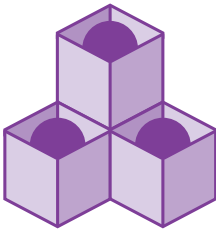
³ Robert Elder, "Google Maps finds a way to monetize," Business Insider, March 21, 2017, accessed February 26, 2019: <https://www.businessinsider.com/google-maps-finds-a-way-monetize-2017-3>.

⁴ Global Market Insights, "Mobile Mapping Market size worth over \$40 billion by 2024," press release, September 12, 2018, accessed February 26, 2019: <https://www.gminsights.com/pressrelease/mobile-mapping-market>.

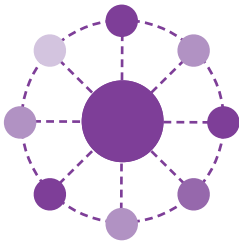
⁵ Bloomberg News, Feb. 12, 2003. <https://www.nytimes.com/2003/02/12/business/company-news-rand-mcnally-files-for-bankruptcy-with-recovery-plan.html>

⁶ Aaron Elstein, "Map publisher Rand McNally charts a course back to glory," Crain's New York Business, Aug. 27, 2015. Accessed March 6, 2019. <https://www.crainnewyork.com/article/20150827/TECHNOLOGY/150829890/map-publisher-rand-mcnally-is-profitable-and-ready-for-a-big-comeback>

⁷ Rand McNally website. https://www.randmcnally.com/about/patriarch_partners



**Traditional
Strategy Thinking**



Ecosystem Mindset

The Mindset That Ecosystems Require

Traditional strategy thinking relies on command and control, with established metrics and layers of decision-making that can make change as slow as steering a tanker ship. In contrast, in a world of ecosystems, a company surrenders some control so that it can play with other stakeholders in a decentralized network. It's an environment that rewards resiliency, sensing changes in rapidly shifting markets, and responding nimbly.

Instead of concentrating on linear supplier, customer, and distributor relationships, companies that adopt an ecosystem mindset focus on adding value in new ways to many more stakeholders. They look at how each party in the ecosystem can bring value to the other parties.

At the heart of every digital ecosystem is a platform business model. The one that Amazon has been building since 2000 explains what this is all about.

Amazon built a strong technology infrastructure to support its online retail business. It then rented out its computing centers to other companies. That business is called Amazon Web Services (AWS). AWS is one of the hubs through which Amazon orchestrates its own digital ecosystem. Businesses like Netflix, Capital One, and 3M use AWS to support their digital operations. Third-party software developers build offerings through it, creating new reasons for businesses to rent its capabilities.

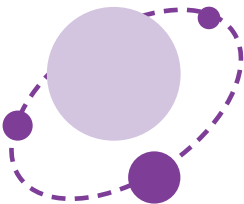
Digital
platforms like
Amazon's
will drive the
ecosystems of
the future.

But Amazon not only lets other companies use AWS to provide their digital services. Amazon itself uses AWS as a launchpad for new digital ventures like Amazon Studios, a streaming video service. And Amazon has integrated acquisitions like grocery chain Whole Foods to establish a new customer channel for its Prime members for home delivery and other services. This is all to say that Amazon's industry is no longer just retailing. The digital ecosystem in which it operates includes retailing but goes far beyond that—to IT services, media, and more.

Digital platforms like Amazon's will drive the ecosystems of the future. Establishing a new platform and plugging into ecosystems requires executives to rethink traditional modes of business.

Getting used to these kinds of arrangements requires executives to have a very different attitude about business. In addition to seeking profits, participants in ecosystems must also be oriented around a collective purpose. The resulting efforts accelerate innovation and the delivery of value.

Some of the platform benefits of collaborative action are visible now. GitHub, an online community for 28 million software developers to collaborate on projects and share code, is an example of a platform that serves as a catalyst for accelerated innovation and learning. ***By working together, software developers around the world can find solutions much faster than they could by working in isolated groups.*** Developers, their organizations, and customers gain value from better software. GitHub collects fees for the use of its platform.

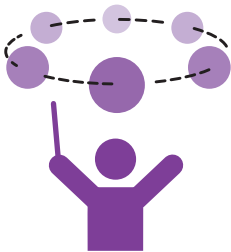


Microsoft, which has long had third-party partners developing software for its operating systems and Azure cloud platform, saw GitHub as a valuable addition to its ecosystem and purchased it for \$7.5 billion in 2018.⁸

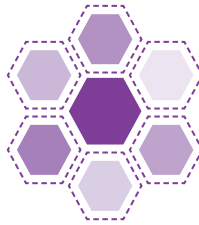
Beyond adopting a platform view of business, another prerequisite to work effectively in a world of digital ecosystems is building a resilient organization. This requires a kind of ambidexterity: optimizing the current organization for digital business while building new digital business models. Some firms set up a separate business unit to do this—with devoted leaders, ample staffing and resources, and reporting to the CEO.

Winning in the World of Ecosystems

So what must a company's leaders do to be successful in a world of digital ecosystems? First, consider what role your company can play. (Note: It's likely you will play multiple roles in overlapping ecosystems.) There are three primary roles: *ecosystem orchestrator*, *modular producer*, and *consumer*.



Ecosystem Orchestrator



Modular Producer



Consumer



Ecosystem orchestrator. These companies connect various stakeholders and create shared value for the community. They take on the risk, complexity, and challenges of supporting stakeholders. They enable others to make and sell goods and services through the ecosystem.

⁸ Microsoft press release, "Microsoft to acquire GitHub for \$7.5 billion," June 4, 2018, accessed February 27, 2019 at: <https://news.microsoft.com/2018/06/04/microsoft-to-acquire-github-for-7-5-billion/>.

Consider Ping An, the Hong Kong-based company that started as an insurance firm. It has since moved into banking, auto sales, health care and other businesses by building a technology foundation on which it can launch new services. Ping An's strategy has been paying off: Revenue has rocketed almost five-fold between 2010 and 2017, from \$29 billion to \$145 billion.⁹

Jonathan Larsen, chief innovation officer at Ping An, says its platform—which includes a cloud-based infrastructure that relies on artificial intelligence, automated services, and deep learning through big data and analytics—enables the company to scale its businesses and seize new opportunities. For example, its Lufax financial service has 37 million customers who use the platform to borrow and lend money. Ping An's Good Doctor service connects doctors for online consultations with 230 million Chinese patients. And in 2017, the company acquired Autohome, a \$1 billion online car marketplace.

Ping An has also launched services such as facial recognition scans to eliminate identity fraud. Its technology platform has automated lending. And it sells its credit platform to 300 Chinese banks.¹⁰

Ping An invests in new firms. And employs 23,000 R&D engineers and 1,000 data science experts in seven research institutes and 25 research labs including those in Palo Alto and Boston. This is even more remarkable given that Ping An does not sell services in the U.S.¹¹



The **modular producer** monetizes value in multiple ecosystems. One example is PayPal. The online payments system provides financial services used in multiple digital ecosystems as a lingua franca of ecommerce. Its core service can meet the needs of buyers, sellers, consumers, and businesses.

⁹ Ping An annual reports from 2017 (http://www.pingan.com/app_upload/images/info/upload/fefe8a8e-fd10-4814-b7b2-aaecf814ff6d.pdf) and 2013 (http://www.pingan.com/app_upload/images/info/upload/5e41531f-63f0-4428-a00a-0625327ee293.pdf) accessed March 6, 2019.

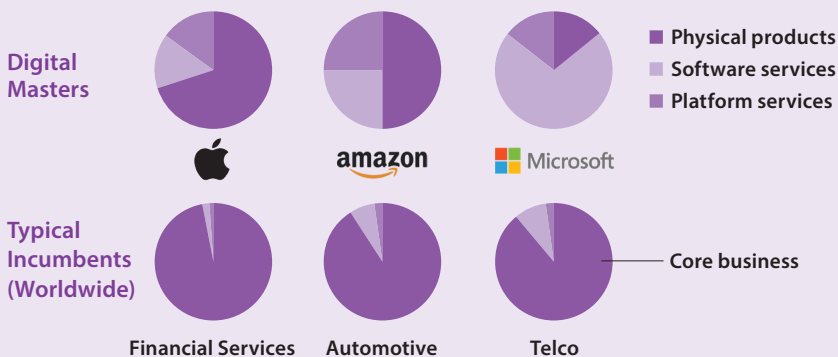
¹⁰ Jonathan Larsen, Ping An chief innovation officer presentation at Platform Economy Summit, November 20, 2018, available via YouTube accessed February 28, 2019 at: <https://youtu.be/IGcMen4qD-M>.

¹¹ Jonathan Larsen, Ping An chief innovation officer presentation at Platform Economy Summit, November 20, 2018, available via YouTube accessed February 28, 2019 at: <https://youtu.be/IGcMen4qD-M>

Figure 1: The Makeup of a Platform Business Model

Digital companies invest heavily in platform business models compared to typical incumbent businesses.

Business Model Portfolios (Relative Allocation of Capital)



Source: Simon Torrance, www.newgrowthplaybook.com 2018, © Simon Torrance



A consumer extracts value from an ecosystem. A consumer can be a person or an enterprise. When you pay for an Uber ride, you are a consumer in the transport ecosystem that Uber has orchestrated. Consumers can also be producers. The company that bought goods at Amazon can sell them on the online marketplace next week. Both are ecosystem stakeholders.

The boundaries are fluid. Firms can play in multiple ecosystems, creating a business model portfolio. Apple makes things like phones and computers while also hosting a third-party applications' marketplace. Microsoft of course sells software, hosts a cloud computing platform, and makes video game consoles (See Figure 1).

Platforms can become huge businesses. Amazon turned its IT infrastructure into Amazon Web Services, which generated \$25 billion revenue in 2018. Uber has made its ride-hailing service a digital mobility platform. Machine First capabilities that automate once highly manual business processes are key enablers of digital transformation.

Creating an Ecosystem Strategy

With those three roles in mind, executives should then take three steps to develop an ecosystem strategy:



1 Identify the ecosystems in which your company must play a part.

Analyze your current business—where you play, who your partners and customers are, and where the emerging threats and opportunities lie. Develop visual models to show how your operations fit into existing and emerging ecosystems. These models should identify the stakeholders you engage with, the value propositions each party delivers, and the value exchanges of goods, services, money, credits, information, and intangibles.



2 Determine which roles you should play in relevant ecosystems.

Draw models of ecosystems, including existing ecosystems and where you play in them, and ecosystems in which you can play a major role. Delineate the value propositions, core interactions, ecosystem stakeholders, conditions that could accelerate change, and the obstacles.

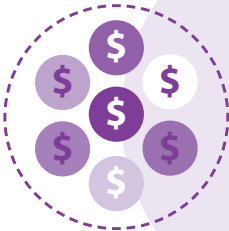
To be an ecosystem orchestrator, a company must have, or build, a platform that creates large network effects. This requires an initial focus on a core interaction that attracts stakeholders to your platform. For example, for Uber the interaction was between passengers looking for drivers. From there, your company can provide additional interactions.

2 continued

As a modular producer, a company can grow and monetize its offerings without the additional challenges of orchestrating others parties' interactions. Such monetization could include creating data services based on expertise of its market or customers. It can turn those insights into consumable products.

What's more, companies must develop a sound application programming interface strategy so that ecosystem stakeholders can automatically connect online to its data.

Notably, a company can play multiple roles, such as an orchestrator in one ecosystem and a producer in another.



3 Determine how to monetize your role in ecosystem.

Examine your core capabilities and determine whether you have assets you haven't monetized in the past but could now in an ecosystem. Determine how you could create value from those assets. An ecosystem modeling exercise allows an organization to articulate exactly how it captures value from their participation. Value does not necessarily have to be revenue; information flows and intangible value can be just as important.

Examples like Uber and Naspers demonstrate different approaches to developing an ecosystem strategy.

Uber Orchestrates Mobility



San Francisco-based Uber leverages its platform business model to drive a mobility ecosystem. It supports a network of on-demand transportation and delivery by connecting driver-partners, riders, and other stakeholders. Uber is a rideshare service for passengers. It is a shipper for last-mile-package deliveries. And it is a courier, supplying groceries to homes and businesses.

Uber leverages a number of technologies: smartphones, social media channels, third-party app developers, mobile app stores, personal digital assistants like Amazon's Alexa, payment service providers, analytics, location services such as mapping providers, geospatial services, and route optimization algorithms. Financial services enable transactions.

By putting these technologies together in its mobility ecosystem, Uber completes 15 million trips daily in more than 600 cities in 65 countries.¹²

Naspers Transforms from Publisher to Platform Host



Naspers, a South African company established 105 years ago as a magazine publisher, has become a completely different enterprise over the last 20 years. It used to be all about physical assets such as magazines, newspapers, and TV stations. In 1995, Naspers measured its market capitalization in several millions of dollars.

Two decades later, Naspers is a platform-driven company. It runs an online classified advertising business to connect buyers and sellers. It runs ShowMax, a veritable Netflix of South Africa, as a successful online video service that delivers cash for further investments in technology and platforms. Naspers also benefits from an early-2000s investment in Tencent, the Chinese technology platform.

In 2018, Naspers generated \$20 billion in revenue, up 38% from 2017, driven by ecommerce and returns on its Tencent investment. Profits rose 47% to \$3.4 billion.¹³ Its market value tops \$100 billion.

¹² Uber website, accessed February 28, 2019 at: <https://www.uber.com/newsroom/company-info/>.

¹³ Naspers 2018 annual report, accessed February 28, 2019 at: https://www.naspersreports.com/ui/pdfs/Annual_financial_statements.pdf

No Time to Waste

Once executives adopt an ecosystem mindset to evaluate their existing business models and envision future platform opportunities, the biggest challenge is execution—just as in other paths to digital transformation. It takes an ambidextrous approach to optimize the present business model while inventing new businesses that harness data, AI, automation, the cloud, new skills, and new relationships with customers.

Digital ecosystems may seem futuristic. But as companies with multibillion market valuations such as Amazon, Uber, Ping An, and Naspers show, these ecosystems are in play today. Thus, executives in every company need to create their digital ecosystem strategy now.

Those that do could find the new digital markets in which they need to play to be far bigger than the industries in which they've operated for years.



Reshaping a Business Around AI: The Machine First™ Approach to Digital Transformation

Author

PR Krishnan

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We have witnessed in the past decade changes in the digital world that have had far-reaching consequences for both businesses and individuals. Companies that have thrived during these revolutionary times have been able to ride the technology wave. They've adopted cloud, mobile, automation, and artificial intelligence (AI), creating a competitive edge for themselves by using them to develop new, interactive, and immersive customer experiences and radically new business models. Amazon, Netflix, Apple, and companies that have followed their lead have, and are demonstrating, what it means to re-think the way business is conducted, applying new technologies as a starting point and a foundation, not as a bolt-on or an afterthought.

As this universal digital transformation proceeds and picks up steam, we believe there needs to be both a change in the way we think about embedding technology in our businesses and a structured way of doing so. To provide best-in-class services to customers and to guide companies toward growth

and perpetual transformation, we believe a Machine First philosophy is essential. MFD™ (Machine First Delivery Model) is the vehicle we choose for our customers to drive their transformation and growth strategy.

In this article, I will explain this concept at a high level and discuss its far-reaching impacts. Finally, I will examine why a Machine First approach requires a different mindset to develop digital processes that can continually get smarter.

Machine First: The Basics

All digital transformations should begin by examining the digital ecosystems in which a company operates, as the [previous article](#) pointed out. Then, it requires a structured approach to generate real value from these technologies.

See “Defining Your Digital Ecosystem: The First Step in a Machine First™ Transformation” on page 8.

As we introduced the Machine First philosophy, the first mindset change we implemented was giving the first right of refusal to technology. Few companies exemplify this concept of adopting a Machine First approach to digital transformation better than Netflix. Netflix’s first digital business model was taking customer orders for movies

There needs to be both a change in the way we think about embedding technology in our businesses and a structured way of doing so.

on the Netflix website. By booking orders online and distributing them on DVDs through the mail, Netflix changed the way people rented videos. When Netflix shifted its business model in 2007 to begin streaming videos over the internet, its AI-driven recommendation engine became its key tool. That engine would be behind its third business model transformation about five years later as Netflix effectively automated all its manual work. Its Machine First approach transformed the

entertainment industry as powerhouses such as Disney, Comcast, and Amazon have all launched (or have announced) highly-competitive streaming offerings.

But the entertainment industry is hardly the only sector disrupted and permanently altered by digital transformation. The Machine First approach adopted by these entertainment giants has been deployed in many other sectors, with huge effects.

Four Big Impacts of a Machine First Approach

From TCS research and client work worldwide, we have found that digital transformations that follow a Machine First approach lead to four major improvements across industries and sectors:

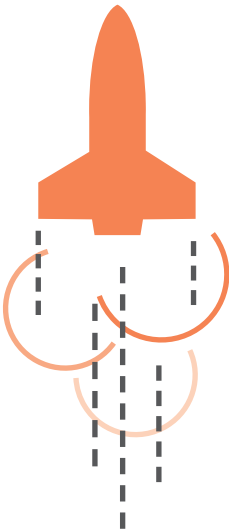


1 Create a Superior Customer Experience

Customers expect every point of engagement with a company to be simple, engrossing, and personalized. The AI-driven recommendation engines of Netflix, Amazon, Spotify, and other online companies track what customers purchased in the past. Based on similar customers' tastes, they can provide guidance on what to purchase next. In the 1990s, that kind of institutional memory far surpassed what even the most intuitive and informed Blockbuster Entertainment store employee could offer, or, for that matter, any store employee at any retailer anywhere. AI enabled Netflix to

gain a clear competitive advantage over the video stores, ultimately displacing them and leading to their extinction.

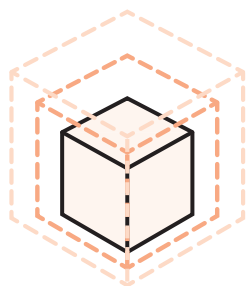
Other companies have digitally transformed their customer experience to help employees focus on their biggest customers. That's what happened at one of the world's largest investment companies. It developed robo-advisers to free up its financial advisers to work with the firm's most profitable customers (i.e., those with the highest net worth). The robo-advisers are based on software using AI and machine learning technology to offer automated and personalized investment advice to customers.



2 Enable Business Model Innovation and Entry into New Businesses

The Machine First approach can enable enterprises to launch new business models to generate new revenue streams.

When a company collects digital data (especially customer data) that might be valuable to other entities, the data can provide an entry into new businesses. For example, online real estate information providers like Zillow and Opendoor Labs (which enable homebuyers to see properties for sale on mobile apps) have been capitalizing on the information they possess, and smart algorithms, to expand their businesses into financing and other aspects of home buying, addressing the many pain points people experience when buying and selling homes.



3 Enhance Business Outcomes

The approach and the mindset of Machine First help to establish limitless boundaries to enterprises to scale and grow exponentially.

Consider what Dubai-based retail giant Landmark Group did recently. The company took a Machine First approach to reinvent its supply and procurement activities. Its key goals were to meet compliance deadlines and curb excessive procurement spending. The company automated key tasks across its sourcing-to-onboarding process. The initiative has increased supplier visibility and enabled smarter vendor negotiations.



4 Empower the Workforce

Automating everything that can be automated does not mean eliminating every job that can be eliminated. It involves turning over manual tasks to software and then identifying the new jobs that software cannot presently do. Those new jobs will rely on technologies such as AI to empower employees with recommendations to make better decisions.

Similarly, Cargotec's mobile service technicians, who perform preventive maintenance and repairs on their cargo-moving equipment, had their response times affected since they were using paper-based systems to service and track their field work at customers' locations in Sweden and remote parts of Finland. They were dependent on back office staff, whom they contacted by cell phone to receive work order requests,

update customer records, and order parts. Cargotec implemented a system that gave technicians access to data anytime, anywhere and the ability to order parts, manage inventory, report time and costs, generate reports, and update customer records, using their laptops.

Some companies may see a net increase in jobs by taking this Machine First approach to digital transformation. For instance, between 2006 (the year before Netflix launched its streaming service, when its annual revenue was \$1.2 billion) and 2017 (when revenue was \$11.7 billion), the company's workforce increased more than four times.¹⁴ In other words, automating to the max, driving exponential revenue growth, can help a company increase employment over time. We discuss this in another article in this edition [here](#).¹⁵

See “The Crucial Role of People in a World of Extreme Automation” on page 47.

Critical to making all this happen is digital data. No matter how much data companies are collecting today, they will need to acquire more tomorrow, assimilating it quickly and incisively. As every big company turns more and more data into actionable intelligence, it will gain new business and customer insights.

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¹⁴ Netflix annual reports for 2006 and 2017, accessed April 15, 2019. The company had 5,400 full-time employees in 2017, and 1,300 in 2006. <https://www.netflixinvestor.com/financials/sec-filings/default.aspx>

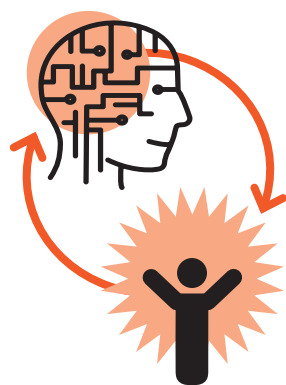
¹⁵ Netflix annual reports for 2006 and 2017, accessed April 15, 2019. The company had 5,400 full-time employees in 2017, and 1,300 in 2006. <https://www.netflixinvestor.com/financials/sec-filings/default.aspx>

As more manual activities are automated and driven by AI decision making, software will get smarter and become more capable of driving marketing, sales, distribution, production, finance, and other key business functions.

This creates a virtuous circle: As the machines get smarter, they allow employees to deliver higher-order work, adding ever more value to the enterprise.

These are four of the largest impacts we've seen among companies that have transformed their businesses successfully with a Machine First digital approach.

But I would be remiss if I didn't mention another key to their success: designing their information systems so that they can continually improve and learn automatically, getting more intelligent in the process.



Turning Digital Processes into *Intelligent* Digital Processes

Establishing online connections with customers, suppliers, and other parties in your digital ecosystem is only a first step. You will also need to make your online business processes *intelligent*. This means that they can create personalized engagement, provide recommendations, and accelerate straight-through processing with little, if any, human intervention.

This is where artificial intelligence, machine learning, and other technologies come into play.

This is not what traditional systems development was about. Taking a business process and implementing software to improve it, whether by developing custom code or installing an enterprise system, has produced significant improvements in cost, quality, time to market, and other key metrics for decades.

Established companies today can't do without the huge investments in systems they've made over the last 50 years.

However, those systems are static in their design and embed a 'point-in-time' intelligence into a company's business processes. The software captures the best thinking at the moment it was developed on how to automate a business process. That is not enough for today's business environment.

Instead, with a Machine First approach, a company has the opportunity to automate processes and products in ways that they improve themselves with little, if any, human intervention.

This is possible because such software applies machine learning to keep improving from their experience captured as data.

The algorithms that drive the personalization engines of Amazon, Spotify and other companies automatically improve themselves based on what people are actually buying. Machine learning technologies improve the software to get sharper in their recommendations—i.e., to offer better ones.

As a result, companies can shift their software from being highly intelligent at one point in time—the moment the system went live—to software that, on its own, continuously improves. Such ever-intelligent software is another key component of Machine First approaches to digital transformation.

The Never-Ending Transformation of Your Business

Companies that try to preserve age-old routines and tinker on the margins will find that those methods are not nearly enough. Companies that have benefitted from a Machine First approach include a leading airline that improved its Net Promoter Score by 4 points, and a leading retailer that increased online sales 29% in peak season.

In a world of rapid digitization, the companies that lead their digital ecosystems will be those that automate to the max, use AI to do that work, and create new, more stimulating jobs that only people can fill. They'll also use AI

and machine learning technologies to continue improving the work that their robots and people do, both separately and together.

Thanks to these new, intelligent technologies, business opportunities today—for improved customer experiences, business model innovation, enhanced outcomes, and an empowered workforce—are practically limitless in all industries. But seizing them will require a different, new, and more holistic approach to digital transformation.

In a world of rapid digitization, the companies that lead their digital ecosystems will be those that automate to the max, use AI to do that work, and create new, more stimulating jobs that only people can fill.

Using Advanced Technologies to Deliver an Uncommon Customer Experience Every Day

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Companies everywhere are experimenting with artificial intelligence (AI), machine learning, and advanced analytics in the belief that these technologies can be used to improve the customer experience. But, right now, many companies are largely focused on leveraging these technologies to automate labor and thereby reduce operating costs. And, whether they realize it or not, that's a risky approach.

It's understandable that AI is commonly and narrowly seen as a way to cut costs by automating manual and knowledge work. Cost-efficiency is a business imperative, now more than ever as radical digitization has allowed competitors to arise suddenly, unexpectedly, and disruptively. But too few companies are thinking about the new jobs they should be creating in customer-facing areas (marketing, sales, services, and so on)—jobs that AI and analytics cannot replace but should support.



That said, AI and analytics are producing big improvements in quality and responsiveness by automating many manual tasks. About 40% of retailers are implementing some form of intelligent automation, according to a National Retail Federation survey, and more than 80% plan to do so by 2021.¹⁶ But improving the customer experience in most industries will require that humans not only stay involved but that they engage with customers in new ways. That's where these new, intelligent technologies can be most useful: enhancing, not replacing, the human face the enterprise turns toward its customers.

New, intelligent technologies can be more useful enhancing, not replacing, the human face the enterprise turns towards its customers.

Business' Smart Little Helpers

Companies that successfully take this approach—using advanced intelligent technologies to enhance human capabilities—use a Machine First strategy to transform business processes that impact the customer experience: marketing, sales, and post-sale customer services (such as contact centers). [See Table 1, “Taking a Machine First Approach to the Customer Experience,” Page 33.] These companies have made significant improvements in their customers’ day-to-day experience while increasing revenue and customer retention and lowering costs.

¹⁶ “The coming AI revolution in retail and consumer products,” National Retail Federation in association with IBM, January 2019, accessed April 12, 2019 at: <https://cdn.nrf.com/sites/default/files/2019-01/The%20coming%20AI%20revolution.pdf>.



Take marketing. Leading firms have personalized offers to customers based on who they are, where they are, and what they like based on past purchasing patterns, and even current conditions, such as the weather.

For example, customers that opt-in to Starbucks's coffee shop service are recognized by the company's AI through their smartphones when they enter.¹⁷

The AI provides Starbucks's baristas with the customer's ordering history, allowing the baristas to make more informed and personalized recommendations for what new drink or snack the customer might enjoy that day. In a similar vein, Royal Caribbean International rolled out its Ocean Medallion wearable devices that allow guests to unlock cabin doors, and pay for drinks and food, giving Royal Caribbean's employees more time to respond personally to customer needs

and desires. More recently, the cruise line unveiled a tool that uses AI to create personalized vacation music videos for guests based on photos they submit to an app called SoundSeeker.¹⁸ The AI interprets the mood of the photos, and matches it with music, creating a differentiating offering for vacationers.



In sales, AI-enabled systems can present the customer with products that

would not be obvious to a retailer's merchandizers. For example, Walmart is using AI to tailor its stock based on store location and its analysis of local area consumers' shopping histories. "Machine learning makes sure we have the right assortment," says Gallagher Jeff, Walmart's VP of Operations and Business Analytics. "We have to know what's in this four-foot space [in a store] is right for Detroit, Kansas, Mississippi, New York." And on its website, Walmart shoppers are served product recommendations based on their past purchases, like its chief competitor, Amazon.¹⁹

¹⁷ H. James Wilson and Paul R. Daugherty, "Collaborative Intelligence: Humans and AI are Joining Forces," Harvard Business Review, July-August 2018, accessed April 12, 2019 at: <https://hbr.org/2018/07/collaborative-intelligence-humans-and-ai-are-joining-forces>.

¹⁸ Dean Takahashi, "Royal Caribbean uses AI to create personalized vacation music videos," VentureBeat, August 7, 2018, accessed April 12, 2019 at: <https://venturebeat.com/2018/08/07/royal-caribbean-uses-ai-to-create-personalized-vacation-music-videos/>.

¹⁹ "How Walmart is going all in on artificial intelligence," Clickz.com, January 21, 2019, accessed April 12, 2019 at: <https://www.clickz.com/walmart-artificial-intelligence/224407/>

More remarkably, in China, KFC recently partnered with search engine Baidu to experiment with facial recognition technology at one of its KFC restaurants. The technology analyzes a customer's gender, expression, and other visuals to provide menu recommendations, incorporating data on the customer's previous orders.²⁰

In all these examples, intelligent technologies are being used to improve the customer experience by personalizing it, and in all these examples the people who serve the customers are empowered, not replaced.



In the customer service area, AI and machine learning systems can quickly route the

highest-value customers to the most knowledgeable, capable people to resolve customer issues while providing enhanced insight to customer-service agents, shortening the time it takes to resolve problems.

The examples cut across industries. At one energy utility, predictive call routing evaluates a call, directs customers to the right agent, and informs the agent of both the reason for the call and the actions necessary to resolve the issue. Swedish Bank SEB uses a virtual assistant to manage natural language conversations, answering customer questions about how to open an account or make cross-border payments. The assistant (Aida) can ask follow-up questions to solve problems and is programmed to analyze the customer's tone of voice (frustrated or appreciative) to provide better, more personalized service. In the 30% of cases where Aida is unable to address an issue, it automatically turns the call over to a less-burdened, less time-constrained human call center representative.²¹

MetLife also uses AI-enabled voice analytics software to help call center agents better understand the mood of callers. It helps them understand their own mood by providing feedback to let them know when they are

²⁰ Blake Morgan, "10 Customer Experience Implementations of Artificial Intelligence," *Forbes*, February 8, 2018, accessed April 12, 2019 at: <https://www.forbes.com/sites/blakemorgan/2018/02/08/10-customer-experience-implementations-of-artificial-intelligence/#2f9cd94a2721>.

²¹ H. James Wilson and Paul R. Daugherty, "Collaborative Intelligence: Humans and AI are Joining Forces," *Harvard Business Review*, July-August 2018, accessed April 12, 2019 at: <https://hbr.org/2018/07/collaborative-intelligence-humans-and-ai-are-joining-forces>.

Table 1. Taking a Machine First Approach to the Customer Experience

Business applications of AI, big data and analytics in the CX	Internal data required	External data required	Examples of implementations
Marketing			
Identifying the best prospects for the sales force to focus on	Customer data; Product/Service and Pricing data	Competitive data; Customer data; Location data	B2B Cloud Company
Sales			
Making personalized offers based on demographics, location, conditions, past buying behavior	Loyalty information; Purchase behavior	Weather data; Location data	Coffee House Chain
Merchandising (making products more visible and accessible to buy) based on local trends	SKU information; Product information; Customer segments	Location; Weather; News	Major Retailer
Customer Service			
Call centers with predictive call routing. Routing high-value customers rapidly to highly knowledgeable service people based on customer history and service need. Accelerates problem resolution	Customer information; Billing information; Energy usage	Customer information	Energy Utility
New Product/Service Development			
Personalized products/services	Personalized video for cruise ship guests	Customer photos, music and video	Royal Caribbean International
Identifying new product/service opportunities	Customer information; Purchase behavior	Customer segment information	Netflix launching of new movies/TV series based on customer data

sounding tired or terse, enabling them to adjust their tone to provide more productive and humane customer service.²²

Early adopters, of course, are leveraging intelligent technologies in a global and holistic fashion. Netflix, for example, uses AI for programming, predicting

what people will want to see. It has replaced the old model of programming based on audience demographics by crunching enormous volumes of data about what people actually watch, where. In so doing, it has found ways to aggregate niche viewers, thereby maximizing content that was once thought suitable only for small markets.²³



How to Take a Machine First Approach with Smart Technologies

To begin taking a Machine First approach to improving the customer experience while empowering the organization's people, a company must start by assessing its current practices in data collection, data management, and its analytics capabilities. This means analyzing the company's current use of metrics (for example, in the call center) to determine whether you are measuring the right things. *Remember: it is not replacing people; it is capitalizing on AI and analytics-generated insights to redesign the customer experience.*

For example, ethnographic research is still important, and companies must still interview customers to understand how they experience their interactions with the business. These interviews, and the data they provide, should be used in design thinking to explore the customer journey step by step.

²² Tom Simonite, "This Call May Be Monitored for Tone and Emotion," *Wired*, March 19, 2018, accessed April 12, 2019 at: <https://www.wired.com/story/this-call-may-be-monitored-for-tone-and-emotion/>.

²³ Josef Adalian, "Inside the Binge Factory," *New York Magazine*, June 11, 2018, accessed April 12, 2019 at: <https://www.vulture.com/2018/06/how-netflix-swallowed-tv-industry.html>.

Next comes the process of getting customers to opt in, from which companies can begin to amass the huge volumes of data needed to feed smart systems. One valuable vehicle for retrieving this data is loyalty programs, in which customers share their purchasing data with companies in return for discounts, special offers, and other rewards. It is important that this data be of the highest quality, and completely accessible and usable by the company's smart systems.

Once a company understands where and how its customers' experience can be improved, it should employ an agile approach to build minimally viable products and services to market test, launching proof-of-concept projects on a technology platform. The end-user feedback one receives from these projects can be used to refine and improve the products and services. This process will help companies evolve in real-time in a process of continuous innovation and delivery (CI/CD) to ensure the customer experience is refreshed in real time.

Finally, the company must identify the new jobs it needs to create so it can provide a superior, AI- and analytics-enabled customer experience while making sure it meets its customers with a human face. Companies must

All the smart tools in the world will not help a company if, for example, its call center employees don't know how to use them or ignore them using workarounds.

**See “The
Crucial Role
of People
in a World of
Extreme
Automation”
on page 47.**

train people on how to use new systems and tools, and how to collaborate with automated processes. All the smart tools in the world will not help a company if, for example, its call center employees don't know how to use them or ignore them using workarounds. In some cases, these new jobs will require skills an organization does not possess in-house. That means hiring as needed.

Training should not be limited to end-users. Top management also needs to become conversant and knowledgeable about these new technologies to fully understand the competitive advantages they can offer, and the new revenues they can generate, by identifying nascent customer needs for new products while improving customer retention by focusing resources on the highest-value customers. Some executives still resist making the investments in time and money needed to collect and leverage the huge volumes of internal and external digital data needed to optimize the performance of AI, machine learning, and advanced analytics. This resistance is why many established companies in the media, retailing, financial services, and travel sectors have been disrupted and have seen non-traditional competitors and startups make significant inroads in their markets.

Duty now for the future

Almost all companies, to a greater or lesser degree, are experimenting with digital technologies, especially AI, machine learning, and analytics. But not all companies understand that the purpose of their projects should be to expand the capabilities of their workforce so that they in turn can help improve the customer experience in both B2C and B2B businesses. Machines are important and understanding the possibilities of the new technologies is critical, but only people, armed with human insights provided by machines, can provide a customer experience that will resonate with people even as it evolves to keep pace with their ever-changing needs and desires. Helping companies keep up with that rapid pace of change is the true value of these technologies, and that value cannot be overstated.





Giving Power to the Machine: Offering Technology the First Right of Refusal

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Many companies are digitally transforming key operations, looking for ways that automation technologies such as artificial intelligence (AI), analytics, and machine learning can increase both productivity and customer engagement while reducing costs. Over the past two years, C-suite executives have banged the drum for change. Nearly half (47%) of CEOs surveyed in 2017 told Gartner they were under pressure from their boards to make digital change happen.²⁴ CIOs in 11 of 15 industries said digital transformation was among their top three priorities for 2018²⁵ and almost one in four CIOs said they have deployed AI technology or plan to in the near

²⁴ Gartner 2017 CEO Survey Infographic, April 27, 2017, accessed at <https://www.gartner.com/smarterwithgartner/2017-ceo-survey-infographic/>.

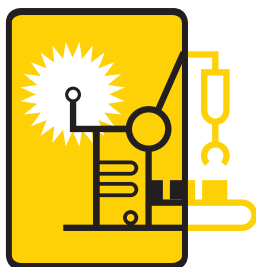
²⁵ "Here's Why CIOs Will Be the New Executive Leaders," Gartner 2018 CIO Agenda survey, October 7, 2017, accessed at <https://www.gartner.com/smarterwithgartner/heres-why-cios-will-be-the-new-executive-leaders/>.

future.²⁶ IDC predicts overall spending on digital initiatives will continue to rise, reaching close to \$2 trillion by 2022.²⁷

In spite of these broad trends, there are many firms that continue to have difficulty making their digital transformation efforts pay off. A 2018 Forrester survey found that one common problem plaguing companies pursuing digital transformation was the limited scope of their efforts. For example, less than half of the banks surveyed were attempting to transform customer care at a time when customers were demanding it.²⁸

In our dealings with enterprise leaders attempting to lead their organizations in the adoption of new digital systems, and coping with the organizational changes they require, we find that many see themselves on a hamster wheel, trying to keep up with rising customer expectations that outpace enterprise initiatives.

In this article, we will describe why companies typically have a difficult time incorporating automated business processes, and the strategies leaders can employ to keep up with customer expectations while engaging workers to meet transformational goals.



Automation Starts That Misfire

Conventional approaches to digital transformation initiatives typically misfire because they don't go far enough on two fronts. First, they fail to automate all the work in a company that can be automated. Second, they don't identify, create, and staff the new, more critical jobs the company will need to thrive in a world in which customers, suppliers, business partners, and employees are all looking to use digital tools to accomplish their to-do lists.

²⁶ "Gartner Survey of More Than 3,000 CIOs Reveals That Enterprises Are Entering the Third Era of IT," October 16, 2018, Gartner press release accessed at: <https://www.gartner.com/en/newsroom/press-releases/2018-10-16-gartner-survey-of-more-than-3000-cios-reveals-that-enterprises-are-entering-the-third-era-of-it>.

²⁷ "Worldwide Spending on Digital Transformation Will Be Nearly \$2 Trillion in 2022 as Organizations Commit to Digital Transformation," November 13, 2018, accessed at <https://www.idc.com/getdoc.jsp?containerId=prUS44440318>.

²⁸ Ted Schadler, "The Sorry State of Digital Transformation in 2018," Forrester, April 24, 2018, accessed at <https://go.forrester.com/blogs/the-sorry-state-of-digital-transformation-in-2018/>.

It's not that companies don't want to automate. Judging by their AI investments, they certainly do. In a 2018 survey, 47% of companies said they are adopting at least one AI capability in their standard business processes, up from 20% the previous year. But only 21% of these firms said they were using AI across multiple business functions, and most said their investments made up less than 10% of their digital business budgets.²⁹ Clearly, companies are not automating all of the work that they could. It's therefore no surprise they are not seeing all the benefits they expected, from new products launched to costs savings realized. They could (and should) be doing much more.

A narrow approach to automation is counterproductive; it harms employee morale and consequently slows the adoption of new systems.

What gets in their way? We have seen that many firms conceive of next-generation technologies like AI as a path to reducing costs and replacing people rather than as a way to offer cross-skills training to empower employees to improve performance and deliver value-added service. A narrow approach to automation is counterproductive; it harms employee morale and consequently slows the adoption of new systems.

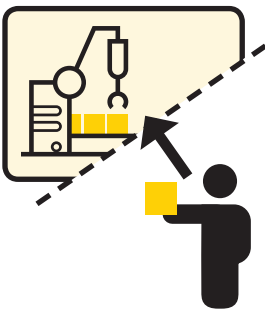
There are at least two additional issues at work. First, executives who think of automation and imagine robots on an assembly line, moving heavy chunks of metal and spraying paint on auto body parts overlook the potential of AI to perform other, value-added tasks—everything from analyzing market trends to writing news articles about corporate results. Secondly, concerns that aggressive, holistic automation efforts will produce widespread job loss (with accompanying morale problems) prevent some leaders from acting. But, like the story-writing application, this view fails to imagine the new types of jobs companies will need after they free employees from doing manual

²⁹ Irving Wladawsky-Berger, "The Current State of AI Adoption," Wall Street Journal, February 8, 2019, accessed at: <https://blogs.wsj.com/cio/2019/02/08/the-current-state-of-ai-adoption/>.

Failing to recognize how automation can create value across an organization, or to identify the new jobs that will be needed, and the people to staff them, will leave companies at a long-term disadvantage.

and knowledge work that can be done faster, better, and less expensively by AI. One only has to remember that jobs like social media manager, IoT application developer, and vision system engineer barely existed 15 years ago.

Failing to recognize how automation can create value across an organization, or to identify the new jobs that will be needed, and the people to staff them, will leave companies at a long-term disadvantage. Automating everything that can be automated is a key tenet of the Machine First approach to digital transformation. It means removing the unnecessary steps, costs, time, and errors that manual activities introduce in any process, and scoping out the new, higher-level work the company will need to operate in a world of accelerating digital change.



The Right of First Refusal

A Machine First approach to digital transformation looks at every business activity performed manually and asks: “Can a machine do it better?” This is what we mean by giving technology systems the ‘first right of refusal.’ Powered by analytics and AI, and by the digitization of all kinds of data (images, voice, printed words, video), automation drives efficiency by performing routine tasks faster and more accurately than ever before. Testing the machines on tasks and processes is best done with an agile development approach (rapid trials that apply lessons learned from trials that come before it) to develop new business processes and products.

See “The Crucial
Role of People
in a World
of Extreme
Automation” on
page 47.

Importantly, the goal of this approach is not to deliver dramatic reductions in headcount. Rather, it is a way to free people from routine and repetitive work, and instead use their talents for more sophisticated jobs in which they do the new work their companies now need. In this way, a Machine First approach extends the boundaries of human potential. Managers will quickly see which tasks can't be automated and can then determine what new roles must be created to accomplish them. These new jobs may approximate or outnumber the jobs that have been given to the machines.

It's essential that employees be engaged and comfortable in the new ways of working, with technologies like AI creating systems that make it easy for them to do their jobs rather than forcing them to work with machines and systems in the name of progress or innovation. ***Ultimately, these technologies must become an integral part of employees' work lives, enriching and enhancing them.***

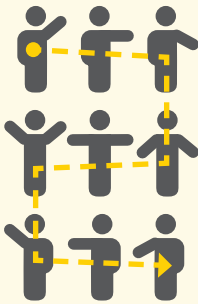
There are two stages in implementing the Machine First approach. The first is to identify those business areas that should be automated. While automation targets will vary by company, the overarching concept is that if a task will provide measurable benefits to the organization if it could be done faster, it should be automated. Closing the books at the end of each quarter is a good example and applies to most firms. Saving time on this repetitive process can add days to managers' schedules, days in which he or she can use to plan for future growth, or, to adjust spending based on recent performance.

The second stage involves redesigning manual business processes and using automation technology—software, hardware, and networks—to execute them.

A business process is a clearly defined set of tasks that when finished achieves a goal. Each process includes steps that people do and steps that machines can do. By analyzing current activities in a business process, and determining which tasks machines can do, a company can redesign the process so that machines perform more of those tasks, freeing up people to perform higher-order, value-added tasks that machines can't.

This stage begins with managers identifying both the physical and knowledge work in business processes that machines can and should do. The answers will generate a list of higher-value work the company should pursue; for example, what service improvements will customers value and pay for? The company can then develop a list of new jobs and skills the organization will need to provide those services, and help employees acquire them.

When machines are given the right of first refusal, companies will be liberated to begin thinking about what their customers and businesses really want and need.



An enhanced retail customer experience.

Analyzing patterns of customer activity, including correlating purchase histories to levels of technology sophistication, will shed light on unmet customer needs. One retailer we worked with found that less technically savvy consumers were open to purchasing technical services in addition to goods.

Key benefits: A new sales channel for services, a new revenue stream, improved customer loyalty and retention.



A better help-desk.

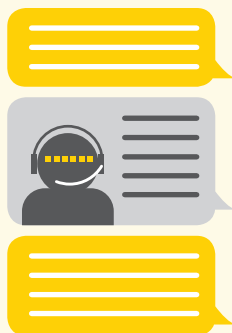
A German electronics manufacturer used a Machine First approach (including AI) to create intelligent agents that help employees with customer questions about the firm's products. The system automatically provides contact center representatives with answers, FAQs, and screenshots from the company's digitized knowledge base.

Key benefits: Productivity improvement, reducing time to solve customer problems (in some cases from days to minutes).

A revitalized call center.

One call center system we worked on uses a combination of technologies: AI to provide voice-activated or text responses in a chat box; analytics to determine a customer's profile to personalize answers. More complex calls are automatically routed to an employee who sees all this customer information so she (or he) can handle the call quickly.

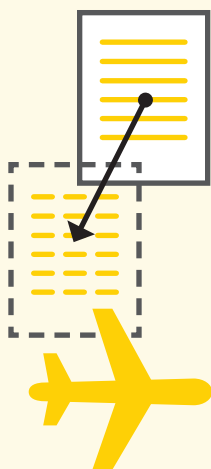
Key benefits: This Machine First system makes customer service more efficient while freeing up people to handle special requests.



A more human HR department.

By applying corporate rules to employee vacation schedules one employer was able to reduce employee disappointment. A combination of scheduling software and analytics tracks correlations among individual employee benefits and group schedules with AI-enabled interfaces to make the system user-friendly.

Key benefits: Improves employee morale by speeding approvals while saving HR time and labor.



A rationalized T&E process.

Everyone who has ever worked in a business knows what an irritant travel and expense payments can be, both for the employees filing them as well as for the finance people vetting them. At one company, an AI-enabled interface gathers expense data from an employee; a vision-enabled system converts images to data (photos of receipts, for example); analytics calculates expenses and compares employee reports data with company spending guidelines, automatically sending expense data to an accounting system that processes them for employee reimbursement.

Key benefits: Speeds approval for employees. For the company, it enforces spending policies with precision while saving time for accounting employees.

These examples, which are relevant to most industries, are just a start. With a Machine First approach, all companies have opportunities to drive gains for customers, business partners, and employees by automating business processes.

Strong Leadership, Data Management Required

It requires strong leadership, and a technology foundation built on robust data management, to adopt a Machine First approach to automating business processes.

Leaders need to communicate how automating systems fits into the company's strategic vision, clearly stating the purpose and benefits of

automation—from more efficient use of resources to innovative new services for customers. They also need to articulate the opportunities that changes will bring such as better service for customers and tighter connections in an ecosystem of suppliers, distributors, customers, startups, and academic researchers.

In addition, leaders must manage the cultural changes that are part of automating business processes. This means designing new jobs to perform tasks that machines cannot, and training people for these new roles. As noted earlier, many firms overlook this to their regret. The best way to gain support from employees is to start by automating basic tasks that people find boring. By identifying new tasks that are interactive and require people to solve problems, leaders can win buy-in while helping their people be (and feel) more productive and fulfilled.

Giving machines a 'first right of refusal' also means, of course, that the machines can do the work. Companies must have stellar data management, the right analytics in place to make good use of the data, and intuitive

tools so that people can work effectively with the system outputs. An infrastructure bolstered by cloud computing capabilities to provide flexibility and security is another must.

The technologies available today can enable companies to adopt a Machine First approach to automate every task that can be automated. Doing so will help them exceed customer expectations while generating productivity benefits, new business models, and new jobs for their employees.

By identifying new tasks that are interactive and require people to solve problems, leaders can win buy-in while helping their people be (and feel) more productive and fulfilled.



The Crucial Role of People in a World of Extreme Automation

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The drive to automate is a critical part of a Machine First™ approach to digital transformation. Such automation enables organizations to respond faster to shifting market conditions and improve the customer experience. After they reduce cycle times and operational costs, they can more easily adopt new business models, generate new digital revenue streams, and put their people in new and important jobs that only humans can do.

However, leaders at many companies are holding back from going all-in on automation. Some may not realize how much work today's technologies can automate. With rapid advances in artificial intelligence, machine learning, and related technologies, plus the availability of immense but affordable computing power in the cloud, many paper- and people-intensive activities can now be done by machines.

Other leaders may be restrained from unleashing widespread automation because they fear the human cost—the specter of massive job elimination.

There is no doubt automation will bring dramatic changes to the workplace. For example, about 40% of U.S. retailers are implementing some form of intelligent automation, and more than 80% plan to do so by 2021.³⁰ Of course, online retailers have been doing this for years with automated product recommendations. Banks and other firms have been investing heavily in AI in their call centers. Businesses in a range of industries are replacing work done by people with software, automating such back-office chores as processing invoices, employee travel, and expense reports.

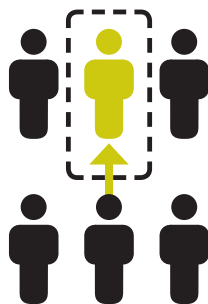
Thus, it's easy for CEOs and CHROs to believe a digital transformation that automates work to the max will be a big job killer. However, in our experience, companies that take a Machine First approach wind up creating many new jobs—sometimes more and better jobs than the ones they eliminate.

Many have retrained their existing staff for these new jobs. Helping functional leaders determine exactly what these new jobs are, and figuring out how to staff them, represent a great opportunity for HR leaders. In this article, we'll explore these issues for functional and HR leaders.

³⁰ “The coming AI revolution in retail and consumer products,” National Retail Federation in association with IBM, January 2019, accessed April 12, 2019 at: <https://cdn.nrf.com/sites/default/files/2019-01/The%20coming%20AI%20revolution.pdf>.

Identifying the New Jobs Automation Will Demand

Even as machines take over a number of organizational tasks, many new tasks will emerge that can only be conducted by people. One study notes that while greater automation will mean people spend less time on physical work, as well as data input and processing work, they will need to spend more time managing people and operating advanced technologies.³¹



Companies that take a Machine First approach to digital transformation will create many new and higher-order jobs. Over time, we believe many of these companies will see a net increase in employment. But that requires human resource and other enterprise leaders to determine the new jobs and skills they will need. The time to do that is during the planning of the automation work—not after it is done.

Companies that take a Machine First approach to digital transformation will create many new and higher-order jobs.

Identifying the new roles and the people who can fill them in a digitally transformed company will be a key success factor for HR leaders. Done properly, it will mean that your people will stop doing work that machines can do better and start doing work of greater corporate value.

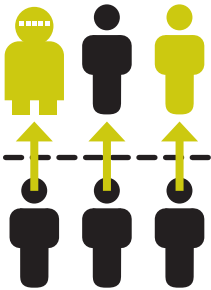
³¹ "Skill Shift: Automation and the Future of the Workforce," McKinsey Global Institute, May 2018, accessed at: <https://www.mckinsey.com/featured-insights/future-of-work/skill-shift-automation-and-the-future-of-the-workforce>.

Retaining Valuable People While Planning for the Future

Unfortunately, organizations that aren't thinking this far down the road run the risk of watching people with important domain expertise walk out the door. These employees are highly familiar with the company's workings. Many have intimate knowledge of the needs of customers they have spent years cultivating, and often have played key roles in fostering a productive workplace culture.

Rather than driving key people away, companies that embrace automation must use these initiatives to strongly connect their business and human capital strategies. Consider a firm that automates its call centers or its accounting department. Early on, leaders must clarify what new jobs they will need. Can they retrain employees for those new roles? If they can, it could be far more efficient and cost-effective than competing in the open market for new hires.

We have found three initiatives essential in this endeavor:



1 Analyzing changes in individual tasks, and identifying new tasks that people must perform. Examine how automating a particular process will change the work that people perform. Identify tasks that machines will take over, existing tasks that people will still need to execute, and new tasks that people must handle. Doing this for every process and every task touched by automation will give leaders an overview of how the workforce must change.

The process will make both people and machines more productive, by themselves and with each other. Consider automobile factories, which have long served as laboratories for human-machine collaboration. In 2018, General Motors installed AI-enabled 'cobots,' or collaborative robots, to work alongside employees in the U.S. and China in factories that need constant adjustments to assemble more than one car model. The

cobots can perform ‘dirty, dully, difficult, and dangerous’ work like stacking tires on a conveyor belt and applying heated glue to the interior lining of a car. Factory workers, meanwhile, monitor progress, ensure the plant is performing well, and execute fine-tuning and finishing tasks on the line.³²



2 Training employees to perform new tasks.

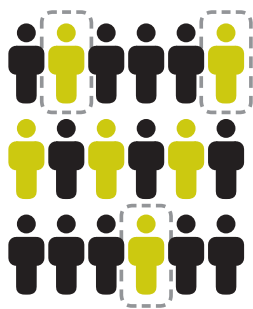
Companies need to continually identify new tasks, and they should help employees cultivate new skills. This could mean training people how to work with machines to perform new tasks. It could also mean freeing them up to do more sophisticated tasks.

Companies need to be explicit with employees about the new jobs they need and the skills they will require. They then need to be just as explicit about where those employees can gain those skills—both internally and externally.

As it has increased automation at its South Carolina manufacturing plant, German automaker BMW has invested in training programs with nearby community and technical colleges. The goal: train more people to keep the machines running properly at the 1.2 million-square-foot plant. The automaker hires students with the right technical skills from the colleges. They go to school part of the week and work part-time at the plant. BMW established the program in 2011 and expanded it in 2018, when it reported 130 graduates.³³

³² Norihiko Shirouzu et al, “The auto plants of the future may have a surprisingly human touch,” Reuters, April 26, 2018, accessed at: <https://www.reuters.com/article/us-autos-robotics/the-auto-plants-of-the-future-may-have-a-surprisingly-human-touch-idUSKBN1HY060>.

³³ Anna B. Mitchell, “BMW doubles down on tech apprentice program,” USA Today, January 31, 2018, accessed at: <https://www.usatoday.com/story/money/2018/01/31/bmw-doubles-down-tech-apprentice-program/1080832001/>.



3 Improving human capital management through automation.

It's common today for HR leaders to analyze patterns of workforce fluctuations, attrition, and employee engagement. Just over half (51%) of HR functions use predictive analytics on indicators like these.³⁴ For example, by automatically data gathering on employee satisfaction from surveys, hiring, and resignations, organizations can continuously improve their understanding of what roles are at risk of attrition. That enables HR to take proactive moves such as changing employees' responsibilities or providing training and growth opportunities. This is especially important in industries that rely on quality customer service.

Take the distribution centers for shipping companies like FedEx. With rising numbers of shipments and high customer expectations for fast deliveries, these companies have turned to robots to automate picking, packing, and shipping tasks in their giant warehouses. Machines are ideal for moving larger items like canoes and car tires. However, the shipping firms still need people to handle smaller and irregular-shaped items that robots can't manage. FedEx has been automating its warehouses for decades with sorters, scanners, and newer robots that move and lift boxes. "Everyone will have a job. It might just be in a different place," a FedEx manager notes.³⁵

Workforce planning is an integral part of a Machine First approach to digital transformation. Proactive talent management—putting people in positions to succeed, with training and data to support them—is crucial to improving organizational performance. It should also

³⁴ Thomas H. Davenport, "Is HR the Most Analytics-Driven Function?," Harvard Business Review, April 18, 2019, accessed at: <https://hbr.org/2019/04/is-hr-the-most-analytics-driven-function>.

³⁵ Cade Metz, "FedEx Follows Amazon Into the Robotic Future," New York Times, March 18, 2018, accessed at: <https://www.nytimes.com/2018/03/18/technology/fedex-robots.html>.

boost employee engagement. The reason is that it will demonstrate the organization cares enough about its people to give them new responsibilities and new, in-high-demand skills. Additionally, higher employee engagement inevitably leads to higher performance.

Empowering Employees, Increasing Enterprise Value

We have helped leaders automate their operations and empower employees in the ways we've mentioned. Here are three real but anonymized examples.



Retraining back-office staff at a B2B company.

When the company automated a back-office process—the administration of outgoing invoices and incoming payments—it deemed a number of accounts receivable (AR) positions to be unnecessary. At the same time, in improving its data analysis capabilities, it realized it needed additional people to analyze market trends in new ways to support the firm's strategy.

The company trained most of its AR staff on how to do the new data analysis. While the effort is in its early days, the benefits of back-office efficiencies and AR staff focused on higher-value work are already clear. Plus, the firm was able to retain motivated people with institutional knowledge. Their value to the firm has increased.



Providing crucial data to help a retailer's store employees.

Retail success often depends on quality customer service. Store employees, of course, are on the front lines of providing such service. However being helpful to customers requires being knowledgeable about what products are in the store, and what's on sale. One retailer found that its automation of price markdowns was overwhelming employees in the stores. Store employees needed more information

about what was on sale. The retailer created a two-minute daily podcast for employees to alert them to special promotions and what to expect from customers before the store opened for the day. Data alerts on handheld devices gave store workers timely progress reports on tasks such as changing prices on goods for sale. Apps with data about expected deliveries for in-demand goods helped employees respond instantly to customer queries, which previously had been a big source of employee stress. By providing the right information to the right person at the right time, the retailer was able to improve employee engagement and maintain top-notch customer service.



Improving a manufacturer's workplace safety.

A manufacturing firm boosted productivity by automating aspects of its production. Unfortunately it also saw an increase in workplace accidents and injuries as workers were getting accustomed to the new machines around them and new factory processes. To address this issue, the company developed training programs augmented by technology-enabled tools to help people and machines coexist safely. For example, vibration alerts delivered to workers' wearable devices, activated by signals from sensors on factory machines, informed employees when they were too close to robots.

The company also used HR analytics to track hours worked by machinists, welders, and other employees. With this data, the company adjusted work schedules to prevent fatigue and reduce the risk of injuries. The system sent alerts to managers when workers were close to their hour limits. Notably, the company worked in concert with its labor union to win support of this effort. While the effort is ongoing, the company has increased workers awareness of workplace hazards and demonstrated its commitment to employee safety.

The Value of People Power

As these examples illustrate, automating our enterprises is far more than a technology issue. It is about more than creating efficiency, cutting costs, and shedding newly obsolete positions.

To succeed, a Machine First approach to digital transformation also has to be about people.

- ✓ People have the institutional knowledge about the organization that allows it to run smoothly.
- ✓ People know the customers and the industry.
- ✓ People make our organizations places where the next generation of top talent wants to work.

As companies automate their operations, they must not miss this opportunity to invest in their people. This is the time for company leaders to make employees more engaged and more effective. Digital transformation through automation requires the right human capital to conceptualize, build, operate, and continually update the machines. By creating new roles and helping people excel in them, company leaders will take their digitally transformed organization to new heights.



Building the Unbiased and Continually Self-Improving Machine

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Large enterprises that take a Machine First™ approach to digital transformation are using Artificial Intelligence (AI) to automate both manual and knowledge work. While the technology will supplant some workers, we believe the most effective implementations will help people do their work better, whether that means a robot performing repetitive tasks in a factory, freeing up workers for more creative tasks, or an AI system illuminating traffic patterns in a retail store so that salespeople can better serve shoppers.

The benefits of using AI and machine learning are piling up fast. These intelligent systems can help companies react faster to fleeting revenue opportunities, such as identifying customer needs (at the moment when customers experience them) because AI-based machines are tracking those needs at a volume and pace that's beyond the capability of humans. They can pinpoint organizational bottlenecks, such as suboptimal manufacturing processes and delivery routes

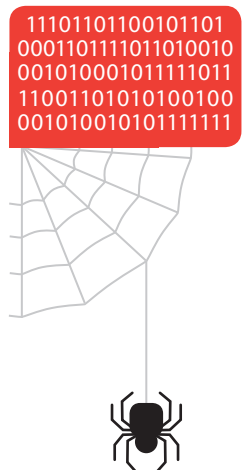
to make them more efficient, reducing waste and costs. They can help organizations make better hiring decisions by logging the qualities of a firm's most productive people and using them to screen potential employees. They can automate processes, from identifying suspicious financial transactions with greater accuracy (and in less time) than humans, to predicting when a machine might fail so it can be fixed before it brings a line to a grinding halt. Without human intervention, they can ensure that corporate purchases comply with an organization's procurement policies.

With this wide array of opportunities, a clear challenge presents itself: to be effective, all these systems rely on data that must be continually refreshed and as complete as possible. Dated or incomplete data yields results that are meaningless, or worse, lead to errors.

The answer to this challenge is for enterprises to build unbiased and self-improving machines that continuously take in more data, from more sources.

The Problems of Outdated and Incomplete Data

Increasingly, businesses are trusting their AI-based systems, but no matter how smart they are, they can't do the work for which they are designed if the data they are ingesting is flawed. There are two ways that using AI in automated systems can create more problems than benefits: first, relying on data sources that are outdated or not refreshed frequently enough, and second, relying on incomplete data.



Data that is outdated or not refreshed constantly can lead to biased recommendations or incorrectly automated actions. It may prompt a system to consider the wrong things or fail to consider the most recent things. Data needs to be updated to reflect changes in a marketplace, or changes in the makeup of a company's customer base.

Data that is outdated or not refreshed constantly can lead to biased recommendations or incorrectly automated actions.

The state of Michigan's child welfare system, for example, suffered from poor data quality (including data entry errors) which led to mistakes in tracking the status of neglected children relying on the government for protection and care.³⁶

Relying on incomplete data can send a package to an old address or direct a delivery truck to a recently closed road. It can lead to hiring the wrong person for a critical job or eliminate a whole pool of candidates due to unconsciously biased hiring parameters.

In both cases, outdated or incomplete data can lead to failure. If leaders rely on AI systems to make superior decisions, faulty data can derail their organization quickly.

³⁶ "Report: Flawed state software program could hurt Michigan children," Lansing State Journal, March 13, 2019, accessed at: <https://www.lansingstatejournal.com/story/news/2019/03/13/report-shows-flaws-michigan-child-welfare-computer-system-misacwis/3149656002/>

Building Unbiased Machines

The work of creating unbiased systems differs from traditional software quality practices. Those practices focused on looking for errors in software code and then fixing the bugs. ***With AI, a company's quality measurements must shift from examining lines of software code to examining the quality of the data and the algorithms they use to make meaning of that data.***

Successful implementations must include three quality-control steps:



1 Ensuring that data sets are complete and well understood. This requires a company to set up a mature data management capability, review the data inputs for the AI system, and vet the sources of that data for accuracy and completeness.



2 Employing experts to validate the use of data by AI algorithms. Skilled people trained in specific domains need to ensure that systems using AI (or machine learning or natural language processing) are producing high-quality outputs. For example, that can mean having a customer experience expert review the results of a system that produces automated responses to customer requests.

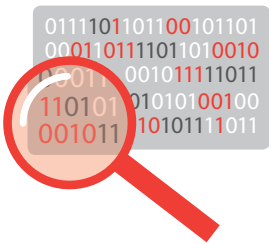


3 Adding new data. To improve, a successful AI system requires fresh data on an ongoing basis. Updating the data continuously makes for more accurate outputs. Additionally, more data sources give the AI algorithm more evidence from which to draw insights, improving the quality of its work. Therefore, it is important to take advantage of new technologies—such as visually enabled systems that can interpret text and images, as well as augmented and virtual reality systems that can replicate physical environments—that can supply new data to AI systems.

When combined, these efforts will increase the probability that an automated system will provide accurate results. They will become self-improving, which guards against the risk of biased outcomes based on incorrect or incomplete data.

How Unbiased Machines Reduce Risk

This article looks at two areas where we have worked to create and sustain unbiased and self-improving machines: systems that automate operations monitoring and systems that automate labor-intensive, regulated processes. In both areas, machines can detect anomalies in patterns of data more quickly and accurately than humans.



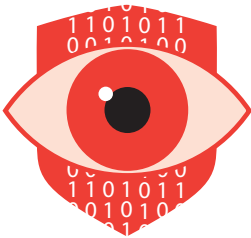
Operations monitoring.

Systems that monitor operations collect data from a range of sources, analyze it to detect irregularities, and automatically determine the next-best action based on those signals, whether the system performs the next action itself or alerts a person. The data the system digests can arrive in the form of text, voice, images, video, transaction streams (as in finance or corporate purchases), unstructured social media data, emails, or online chats. With AI-enabled systems, the more data, and the greater its variety, the more accurate the system, and the less potential for bias. This makes it essential for companies using these systems to seek out new forms of relevant data to add to the analysis.

Where do enterprises deploy such self-improving systems to monitor their operations? Retail banks use them to mitigate the risk of fraud by assessing the flow of credit card transactions. Oil and gas companies, as well as transportation firms, have long automated preventive maintenance by monitoring the wear of equipment to

predict when it's time for repair. Manufacturing plant operators can run simulations based on data about plant conditions to optimize operations, such as finding the best, most efficient ways to run a blast furnace. Corporate procurement can automate the auditing of purchasing histories to detect anomalies and ensure compliance with policies.

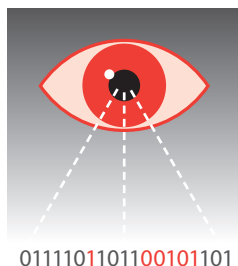
Each of these settings lend themselves to the continuous addition of new data to analyze patterns of activity and automatically determine the next action. A credit alert is automatically sent to a consumer when the system identifies a never-before-seen purchase. An oil company dispatches a repair crew to replace a pump before it fails and disrupts operations. Procurement automatically generates a monthly list of purchases that cost too much, shedding light on previously dark corporate expenditures.



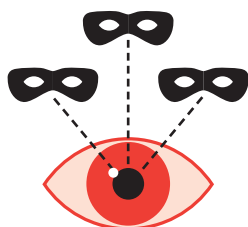
Security surveillance.

Historically, security professionals have relied on manual efforts to track threats. They scan documents, electronic messages, video, and satellite images. A bank might collect employees' electronic and recorded voice communications with customers and other external parties. It's still a prevalent practice: firms assign staff to sift through inputs from various channels, manually, as best they can. But it is difficult, time-consuming work. Vast quantities of 'junk data' that on first blush may signal an important event turn out to be a false positive.

Now, AI and machine-learning applied to monitoring systems makes the work easier at both government agencies and private-sector enterprises.



Government agencies can use machines to analyze ever-growing data sources that provide a bigger picture from which to detect unusual patterns. As technology improves—for example, satellite systems that can identify objects with greater precision from greater distances than ever before—the ability to detect anomalies, even minuscule ones, improves. The results can bring greater clarity to risk assessments as the systems and analytics surfaces risks with greater precision in less time.



Banks can use AI to identify potentially illegal transactions, mitigating the risk that they are enabling fraud and money laundering, violating government sanctions, or unwittingly facilitating financing for terrorists. The system analyzes transaction data as well as data from conversations between traders and external parties conducted via voice, email, and electronic chat. It automatically identifies correlations that emerge between transactions assessed as risky and the parties involved. Then it can offer analyses to security experts for further evaluation and investigation, saving time by having machines carry out more tasks than people could. These intelligent systems also reduce the number of false-positives, helping experts focus on truly risky transactions without having to employ armies of investigators.

How Automated Systems Can Improve Processes in Regulated Industries



The same principles—strong data management, the continuous inclusion

of additional data sources, and AI-enabled automation—can be of great worth in the heavily regulated and resource-intensive pharmaceutical industry. Automating essential aspects of pharmacovigilance, a labor-intensive process that requires monitoring the effects of approved drugs on patients and showing all the results to regulators, demonstrates how a commitment to building unbiased and self-improving machines can pay off.

Traditionally, pharmaceutical firms employ teams of 250 to 300 people, including doctors and pharmacists, trained to interpret data in a variety of formats about patients' experiences with medications, especially adverse reactions. The process must also consider health events that may or may not be related to the drug being monitored.

Much of this work is manual: collecting documents about patient reactions and complaints, records of hospital visits and doctor examinations, and scanning social media sites for patient posts alerting friends about their experiences. Then the work of evaluating the data begins, with a team of doctors assigned to assess complaints to determine if the issues are relevant to the company's drug. Finally, the company gathers the findings in reports to submit to regulators.

With AI, pharmaceutical firms can automate this difficult process. First, the system receives data files, both structured and unstructured: emails, medical records from doctors' offices and hospitals, and data from social media feeds. Sometimes, the data is contained in partially completed forms, or fragments of reports. All of these sources serve as 'training data' for the system.

Next, the system performs a triage process to determine the relevance and severity of an identified medical issue: Is it related to the drug? How could

it be related? How serious is it? The system makes its analysis using another set of data: information about the monitored drug, such as its interactions with other drugs and other conditions, white papers, legal cases, and any other relevant information.

The automated pharmacovigilance system is not static. It continues to gather more data to sharpen the insights it generates according to rules developed by experts. These rules enhance accuracy, reduce the chance of error, and provide transparency into the system's workings. That is critical. A misidentified health facility cited as the source of a patient reaction, for example, could lead a regulator to question the accuracy of the company's entire report. Rules programmed into the system can identify a potential error, signal for more scrutiny, estimate the probability that it is an error, and alert trained specialists (such as a physician) to

scrutinize the results. This step is also required to show regulators how the system achieved its results.

Such an automated process can save millions of dollars, shrinking hours of manual pharmacovigilance work to minutes.

This AI-enabled automation approach will have applications in other regulated industries, from banks checking loan activity for compliance with policies to insurance firms examining claim payouts for potential fraud risks. In all these cases, the systems must do the work while also being able to produce transparent reports about how they did it that can be examined by regulators.

What connects all these cases is the requirement that organizations provide an ever-larger set of data sources so their machines can continue to improve their accuracy while avoiding the potential for bias caused by missing or incomplete data. This takes strong data management capabilities. It takes

expertise in developing and managing systems that use AI, machine learning, and natural language processing. It requires a commitment to an ongoing search for new sources of data.

Many companies are adopting automation techniques to improve their operations. The technology is readily available, and opportunities for their use look promising. However, the winners will be those companies that combine a strong data management foundation with a Machine First™ approach to automating processes where AI systems can do the work of many in less time and with better results. These organizations will take advantage of the opportunities to gain benefits that will grow over time with continually self-improving systems.

The winners will be those companies that combine a strong data management foundation with a Machine First approach.



Cloud Computing: The Essential Platform for a Machine First™ Digital Transformation

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The cloud is the catalyst for pursuing a Machine First approach to digital transformation. It enables a company to automate the business processes that make such transformations possible. Rather than maintaining its own cumbersome data centers and expensive infrastructure, an enterprise can leverage cloud computing resources to plug into enormous, on-demand computing power, data-analysis, and other capabilities for a lower total cost of ownership than traditional computing architectures.

Famously, the cloud is the foundation that digital natives like Amazon, Uber, Spotify, Airbnb, and Netflix, among others, have used to build disruptive business models, taking advantage of its flexibility, scalability, and affordability. But even in companies established long before the Internet was commercialized, the cloud has been critical:

In pharma, Johnson & Johnson (\$82 billion in revenue) uses a hybrid cloud as a computing platform that is more flexible and less costly to maintain. It allows J&J to do complex data modeling better and less expensively than in the past.³⁷

In automotive, (\$265 billion in revenue) Toyota Motor Corp. appointed a chief digital officer this year to accelerate its development of a 'connected car' digital ecosystem.³⁸

In the supermarket industry, Kroger Co. (\$121 billion in revenue) since 2017 has been using cloud-based analytics software to create new digital and in-store customer experiences.³⁹

In financial services, HSBC (\$54 billion in revenue) has gone 'all-in' on cloud to accelerate time-to-market for consumer payments services.⁴⁰ The global bank also plans to launch an anti-money laundering program built on the cloud.⁴¹

In hospitality, the \$1.9 billion Wyndham Hotels and Resorts chain has migrated 'a hodgepodge of core systems that had grown unwieldy' to a public cloud as a key element of its digital transformation, designed 'to remove friction' from its business processes.⁴²

In our view, it will not be possible for most companies to transform their businesses digitally unless they move some of their IT applications and infrastructure into public or hybrid clouds. There are two reasons for this.



First, cloud computing is a crucial platform for accomplishing compute-intensive tasks such as:

- Providing highly interactive digital customer experiences (especially those that use streaming video, audio, and other data-intensive resources).
- Continuously monitoring the performance of key digital business processes, such as demand creation and customer support, especially when such efforts use artificial intelligence-fueled analytics technologies to track and adjust those processes in real time.
- Tracking a company's IoT-enabled products in the field, such as

³⁷ Amazon Web Services, Johnson & Johnson case study, accessed at: <https://aws.amazon.com/solutions/case-studies/johnson-and-johnson/>.

³⁸ Peter High, "Zack Hicks Is Defining The Future Of Driving For Toyota," Forbes, March 18, 2019, accessed at: <https://www.forbes.com/sites/peterhigh/2019/03/18/zack-hicks-is-defining-the-future-of-driving-for-toyota/>.

³⁹ Deena M. Amato-McCoy, "Kroger Co. goes all in on its cloud strategy," Chain Store Age, November 9, 2017, accessed at: <https://www.chainstoreage.com/technology/kroger-co-goes-cloud-strategy/>.

⁴⁰ "HSBC goes cloud-first," Dig Fin, April 2, 2019, accessed at: <https://www.digfinngroup.com/hsbc-cloud/>.

⁴¹ Trond Vagen, "HSBC set to launch cloud-based AML system next year, says senior official," Reuters, November 28, 2018, accessed at: <https://www.reuters.com/article/bc-finreg-hsbc-data-cloud-aml-idUSKCN1NX1KU>.

⁴² Clint Boulton, "Wyndham Hotels checks into the cloud," CIO.com, January 9, 2019, accessed at: <https://www.cio.com/article/3331845/wyndham-hotels-checks-into-the-cloud.html>.

products that customers are using, or the self-operating vehicles now under development.

- Continuously monitoring customer satisfaction (as expressed through social media and other channels).



The second reason is that shifting on-premise systems to public or hybrid clouds creates new capabilities and flexibility. Companies can shift their business models faster by leveraging the latest technologies. Just as importantly, the cloud enables them to connect their systems seamlessly with those of their ecosystem partners: customers, suppliers, distributors, and others. Instead of managing connections among multiple systems, they can use cloud-based systems as a common medium.

This means companies can use the cloud to experiment with new business models that require advanced or different computing resources available through cloud platforms, such as artificial intelligence (AI) and machine learning. The cloud also allows businesses to launch new services faster because they can offload much of the IT development work. They can integrate acquisitions faster with the cloud as a digital meeting place of sorts for combining IT resources, rather than having to build bridges and migration paths from scratch. The same holds true for companies that divest businesses. If a company's business units run their systems in the cloud, it will be much easier to divest those businesses than it would be if those systems were running on proprietary, on-premises hardware and software.

Achieving these and other cloud benefits requires first understanding your strategic goals for the cloud.

When Capabilities Are More Important Than Costs



Cloud computing's presence continues to grow in the enterprise. For the first time, organizations last year spent more on cloud-based IT infrastructure than on traditional infrastructure, according to IDC.⁴³ It forecasts overall spending on public cloud services and infrastructure will grow 23% this year to \$210 billion.⁴⁴ IDC found that private cloud implementations also grew 23% in 2018 and would continue to climb, though at a slower rate.⁴⁵

Traditionally, many leaders have viewed the cloud as a way to reduce IT costs rather than to build new digital capabilities. For example, deploying cloud-based versions of enterprise applications like enterprise resource planning (ERP) and customer relationship management (CRM) software (in a technique known as 'lift and shift') has been a go-to solution for managing expensive and difficult-to-maintain legacy systems.

This, of course, can reduce costs. However it misses a bigger benefit from shifting to the cloud: enabling a company to digitally transform its business. In determining the right cloud adoption path, leaders should think beyond short-term cost-cutting. They should focus on transformational goals such as adopting new business models, changing how IT operates, powerful new digital customer experiences, and more efficient relationships with businesses partners. The cloud's potential is bounded only by an organization's imagination. Business leaders need to drive their cloud-based digital transformations with such goals in mind.

Moving systems from on-premise computers to public or hybrid clouds is complex. It requires deep technological capabilities. Companies must also adopt common technology standards such as cloud application programming interfaces, or APIs.

⁴³ IDC press release, "Cloud IT Infrastructure Revenues Surpassed Traditional IT Infrastructure Revenues for the First Time in the Third Quarter of 2018," January 10, 2019, accessed at: <https://www.idc.com/getdoc.jsp?containerId=prUS44670519>.

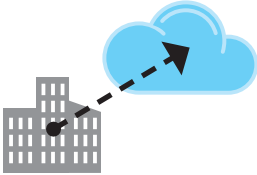
⁴⁴ IDC press release, "Worldwide Public Cloud Services Spending Forecast to Reach \$210 Billion This Year," February 28, 2019, accessed at: <https://www.idc.com/getdoc.jsp?containerId=prUS44891519>.

⁴⁵ IDC press release, "Cloud IT Infrastructure Revenues Surpassed Traditional IT Infrastructure Revenues for the First Time in the Third Quarter of 2018," January 10, 2019, accessed at: <https://www.idc.com/getdoc.jsp?containerId=prUS44670519>.

We see three major technical challenges in shifting to the cloud:



1. Thoroughly understanding current IT operations, data management maturity, and how existing systems support the company's business strategy. How easy will it be to shift from current systems to the cloud?



2. Determining how to shift on-premises business applications (of which there are likely dozens or hundreds) to the cloud, including whether to shift to their cloud-based versions or equivalents; whether they need to be re-engineered and rewritten, and if they can (or should) remain on-premise.



3. Identifying the cloud destinations for enterprise-critical applications. Options include platform-as-a-service, software-as-a-service, infrastructure-as-a-service, public cloud, hybrid model, and private cloud.

Addressing these issues in these ways has helped a number of companies take a Machine First approach to digital transformation. In the next section, we'll explain how they did it.

The Critical Role of Automation

Along with AI and analytics, cloud computing is a key technology enabler of the Machine First approach to digital transformation. A Machine First approach seeks to automate every aspect of a business that can be automated, including its products and services, how it develops those offerings, how it supports customers, and more. Automating as many business processes as possible lets a company shift people to higher-order tasks that machines are as yet unsuited to perform.

A company pursuing a Machine First vision can apply the same emphasis on automation across the cloud journey—from automated cloud assessments to automated cloud migrations, and autonomic cloud operations. Key steps include:



Articulate the business drivers and benefits from cloud computing.

It's important to clarify exactly how the company will benefit from migrating its systems to the cloud. For example, how will cloud-based systems drive the business model? One financial services firm we worked with realized the cloud was critical to developing and taking to market a new payments platform in six months. In no way could the company have done it as quickly if it had built the platform on its on-premise systems.

Another organization we worked with identified improving collaboration among its researchers around the world as key to its digital transformation strategy. Using a cloud-based hub for sharing data enabled tight collaboration.



Examine the organization's value chain for additional opportunities.

Because the cloud can help companies improve the way it does business with customers, partners, and employees, it's worth evaluating every business process and activity for its potential to be cloud-supported.

These could include presenting new services or product features to customers faster; leveraging the Internet of Things to analyze product performance data; optimizing back-office business processes; improving manufacturing operations through more intensive data collection and performance analysis; and automating the collection and analysis of that data.

One organization we worked with aimed to digitally transform its shipping and logistics by leveraging Internet of Things services on a cloud-based model. By doing so, the firm was able to handle enormous shipping volumes during peak seasons, which improved the customer experience significantly.



Conduct a pre-migration assessment.

A Machine First approach in the assessment phase helps a company prepare a migration roadmap. This includes business cases for specific cloud migration moves. To do so, company leaders must assess the existing state of its IT operations, particularly its platforms, business applications, and the data in its data centers.

A Machine First approach allows a company to automate this work. Software assesses the details of its IT landscape, including applications and infrastructure. Based on pre-built mapping rules, the software suggests a future architecture and cloud migration roadmap. This work includes:

- Identifying the best ‘future landing zone’ for a company’s existing technology components, including applications, infrastructure, and data layers.
- Mapping existing application technology layers to identify which are best suited to infrastructure-as-a-service (IaaS) and platform-as-a-service (PaaS), and which providers are the best fit based on the company’s needs and the appropriate cloud vendors.
- Recommending the best choices for technology architectures on cloud platforms, whether it is a hybrid or some other configuration.
- Recommending the sequence and chronology of moving applications.
- Estimating the costs of the migration.



Monitor the migration.

A Machine First approach enables leaders to monitor progress in real-time and quickly evaluate the results of the migration.

Careful Planning to Avoid Pitfalls

Many companies will find they need to keep some of their computing chores on on-premise systems. These can be due to regulations that require customer data be kept in the country in which those customers live. In other cases, legal agreements in mergers and acquisitions will demand that data sets be kept separate. It is important to isolate these processes and activities before beginning a cloud migration program. The goal is to ensure compliance with all relevant regulatory requirements, which can vary by country and region.

The cloud is fundamental to taking a Machine First approach to digital transformation.

Companies must also safeguard data they will transfer to cloud-based systems—before, during, and after a migration. While leading cloud providers offer robust security, companies must still evaluate how their services will protect data during and after migration.

The cloud is fundamental to taking a Machine First approach to digital transformation. But shifting on-premises to the cloud is a delicate operation, one that requires careful planning long before the company begins moving its systems.



Protecting Your Robots: How to Design Security into Your Machines

Authors

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For many organizations, automating hundreds or thousands of manual tasks has become a competitive necessity. However the same attributes that make automation so effective also open up organizations to new risks.

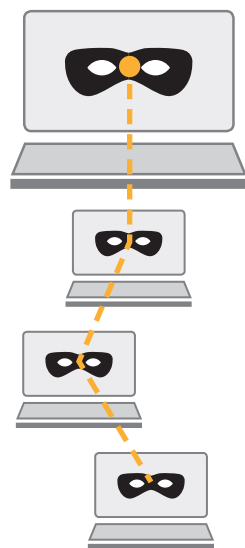
The reason: Because AI enables a company to remotely manage machines and make them interact with other machines, bad actors could take control of the technology and wreak havoc.

Consider the common threats to a computer network: malignant software such as viruses and phishing emails for tricking people into revealing valuable information. If a worker clicks on a malware link and damages his computer on the network, the virus can spread to others. As a result, other workers on the network must then decide whether

to click on the malicious link. In contrast, when you take people out of a business process, a virus that finds its way on an automated machine-to-machine network spreads much faster, worsening the impact.

Now consider a bad actor who uses AI to do his nefarious deeds. That person could break into a network and scoop up information about a company's employees. Then, using AI to personalize text and images (i.e., showing pictures of familiar people), the hacker could convince employees to share customer data, or blackmail the company through a ransomware attack. ("Pay me \$500,000 or I'll leak the data," the threat might be.)

Enterprise leaders are aware of this need. In 2016, General Motors CEO, Mary Berry, said the auto industry had to protect self-driving cars from cyberattacks "as a matter of public safety."⁴⁶ Among the risks highlighted in the Information Security Forum's 2019 and 2020 "threat horizon" alerts were bad actors using AI for malicious intent. For example, AI systems can automatically spread convincing misinformation.⁴⁷ Bad actors are expected to use AI "to develop malware that can learn from its surrounding environment and adapt to discover new vulnerabilities."⁴⁸ Notes a chief data protection officer at a major pharmaceutical firm: "Once AI technologies are widely available, cybercriminals will be able to launch a new wave of sophisticated attacks that may evade most traditional security-detection and monitoring tools."⁴⁹



⁴⁶ Simson, Garfinkel, "Hackers Are the Real Obstacle for Self-Driving Vehicles," MIT Technology Review, August 22, 2017, accessed at: <https://www.technologyreview.com/s/608618/hackers-are-the-real-obstacle-for-self-driving-vehicles/>

⁴⁷ Information Security Forum, "Threat Horizon 2019," March 2017, accessed at: https://www.securityforum.org/uploads/2017/03/ISF_Threat-Horizon-2019_Report_PWS.pdf.

⁴⁸ Information Security Forum, "Threat Horizon 2020: Executive Summary," March 2018, accessed at: https://www.securityforum.org/uploads/2018/03/ISF_Threat-Horizon-2020_Executive-Summary-1.pdf.

⁴⁹ Scot Finnie, "Cyber threats fueled by AI: Security's next big challenge," CSO, October 30, 2018, accessed at: <https://www.csoonline.com/article/3315740/cyber-threats-fueled-by-ai-securitys-next-big-challenge.html>.

While machine-to-machine communications may obviate the need for human intervention, IT managers must rethink how they provide security clearance to access their growing number of automated systems. Even when a machine gets an automated request from another machine (rather than a person) to retrieve some data, the first machine must be able to rigorously authenticate the request. This is a new challenge for firms whose information systems are largely accessed by people and not by other computers. If a primary goal of AI-driven automation is to eliminate unnecessary manual work within and across departments, many of these companies are less likely to have enough security built into their machines.

This article will explain why many conventional computer security approaches are now inadequate in this Business 4.0 era of rampant automation and AI. We will discuss how to tighten security, a key tactic of which requires using AI. ***AI and machine learning algorithms can be used to thwart such attacks by detecting code patterns used in previous attacks, and using those insights to identify new threats.***

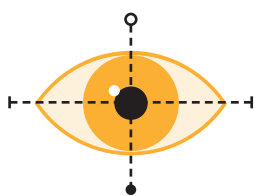
The Vulnerabilities of Existing Approaches

While CIOs have great interest in AI, IT security is of greater interest, according to a 2018 Gartner survey. Some 88% of 3,000 CIOs said cybersecurity was a top focus, more than double the number who said AI (37%).⁵⁰

It's taken years—and many highly publicized data breaches, government regulations, and penalties—for companies to build effective IT security defenses. However, they have largely designed their approaches to thwart human attacks on machines—i.e., to stop the evil but skillful hacker. Guarding such systems begins with the people who manage them (such as system administrators) and people who use them (employees, business partners, customers). Passwords have served as a foundational human-computer gate-check. If you know the password, you have the authority to use this system.

⁵⁰ "Gartner Survey of More Than 3,000 CIOs Reveals That Enterprises Are Entering the Third Era of IT," October 16, 2018, Gartner press release accessed at: <https://www.gartner.com/en/newsroom/press-releases/2018-10-16-gartner-survey-of-more-than-3000-cios-reveals-that-enterprises-are-entering-the-third-era-of-it>.

However, in a world of rampant automation, passwords have glaring weaknesses. They are vulnerable to sharing, and thus being hijacked to access multiple systems. People write them down and share them. Moves to strengthen passwords have focused on securing people's access to machines. Two-factor authentication, such as when a user receives a text message, is a second checkpoint for someone with a password. Hardware such as USB fobs act as a digital key to unlock computer access. Other techniques, like a fingerprint reader or facial recognition



system, use a person's fingerprint or facial appearance, to authenticate an authorized

user's identity. But all of these approaches are limited to protecting computers against unwarranted entry by people.

These techniques were designed to let one person access a machine and do many tasks. The same theme applies to a system administrator who uses a script, or program, that enables her to manage many computers. With one

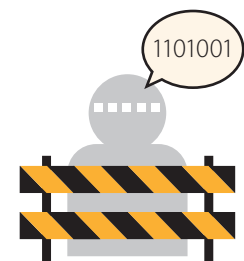
script, an administrator can update software security patches on 1,000 servers. The problem, again, is that one script provides a green light to many machines. Like a password or a fingerprint reader, it does not account for the prospect of machine-to-machine connections.

The security model must be upgraded when machines interact with other machines. We can tell workers not to put Post-it Notes passwords on their computer screen. We can tell them not to leave their computers running and unattended, and not to click on untrustworthy email links. We can institute network security protocols to detect and block network intrusions. All of these moves can reduce the chances of unwanted access to valuable systems.

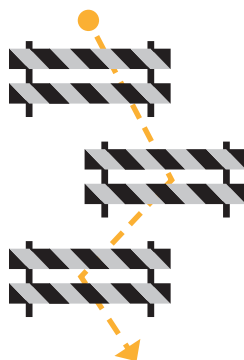
The trouble comes when an automated process lets machines communicate with other machines. Passwords and other conventional checks won't be nearly enough. We need better ways for machines to detect and deny access from the illegitimate machines.

Three Keys to Protecting Your Robots

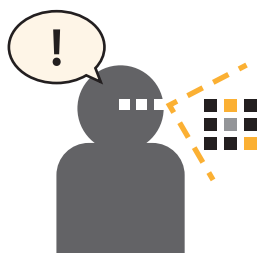
Three moves will go a long way toward securing your robots, both of the hardware and software types:



Managing credentials for machines. Building new gates that require the machines to present the right credential, like a form of password or a digital identifier, so that a machine can verify that another machine has access rights. Using specialized hardware to store and safeguard passwords is one technique. Cryptography, in which automated parties exchange digital signatures to authenticate their interactions, is another.



Tighten systems' ports of entry through 'fine-grained' access. A traditional system administration approach is having one remote administration account to access multiple devices on a network. From a risk perspective, it would be better to create separate accounts for each asset, down to individual items like a shared printer. Why so granular? Attackers seek out often-overlooked access points (such as remote management of a printer) to gain access to a corporate network. Requiring authentication to access every asset reduces this risk.



Use AI for defense. As noted, bad actors can use AI to personalize phishing emails and otherwise accelerate their efforts. But AI can also be used against them. Security experts can develop systems using AI and machine learning to analyze various threats—network intrusions, distributed denial-of-service attacks, viruses in emails, phishing scams—and identify patterns of behavior. AI and deep learning approaches have detected and prevented malware by analyzing its software code.

AI can strengthen existing anti-virus software, which use more reactive approaches. These conventional tools check for patterns too, but they are vulnerable when bad actors change course and create new methods. It can take time for conventional anti-virus systems to catch up.

The use of AI in IT security is an emerging field. Yet it's also one of great interest. A SANS Institute survey found that 57% of firms from a range of industries were implementing, or planning to implement, security solutions that use AI.⁵¹ In the United States, financial services firms, encouraged by government regulators to explore new ways to fight corruption, are exploring the use of AI to detect money laundering and disrupt terrorists' financing.⁵² IDC

projects banks globally will spend \$5.6 billion this year on AI-enabled automated threat identification and prevention, fraud analysis, and investigation systems.⁵³

As they secure their systems, enterprise leaders should monitor the legal and regulatory landscapes in the geographies in which their companies operate. A number of countries are likely to develop laws that penalize perpetrators for their involvement in damaging cyberattacks. They are also likely to establish regulations that require corporations to show they have made every effort to secure their systems—and to account for their actions. That means that as the regulatory landscape takes shape, leaders must also ensure that their AI systems are trained in a way that prevents their robots from turning rogue.

⁵¹ G.W. Ray Davidson and Barbara Filkins, "Security Gets Smart with AI," SANS Institute, March 2019. Press release accessed at: <https://www.sans.org/press/announcement/2019/03/14/1>.

⁵² Dean DeChiaro, "Hunting money launderers? There's AI for that," Roll Call, March 26, 2019, accessed at: <https://www.rollcall.com/news/policy/artificial-intelligence-fintech-money-laundering>.

⁵³ IDC, "Worldwide Spending on Artificial Intelligence Systems Will Grow to Nearly \$35.8 Billion in 2019," press release, March 11, 2019, accessed at: <https://www.idc.com/getdoc.jsp?containerId=prUS44911419>.

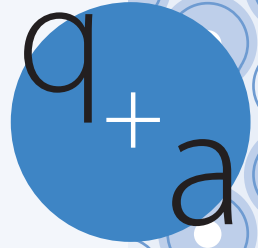
Raising Awareness of Security Benefits

Tightening IT security in the ways we've mentioned takes time and money. As a result, some leaders may balk and hope present security procedures and processes are adequate. That's why it's crucial to make leaders aware of the threats of a security breach or virus outbreak.

Another challenge is keeping up with the pace of emerging threats. That's why technology companies are making huge investments in AI-based security solutions.

Converting manual work into automated work is making companies more competitive. But the machines that are doing the work that people once did are subject to cyberattacks too. Protecting them from the new wave of human and robotic hackers has become paramount.

As they secure their systems, enterprise leaders should monitor the legal and regulatory landscapes in the geographies in which their companies operate.



Managing Businesses that are Rooted in Software:

Interview with Dr. Vijay Gurbaxani

Vijay Gurbaxani

Founding Director, Center for Digital Transformation and Professor
of IT, Paul Merage School of Business, UC Irvine

Vijay Gurbaxani is founding director of the University of California Irvine's Center for Digital Transformation, a center of excellence in the university's business school. He has written and been quoted extensively on strategic digital business issues.

His research has appeared in *Harvard Business Review*, MIT Sloan Management Review, *MIS Quarterly* and other leading publications. He earned his master's and PhD degrees in business administration from the University of Rochester (N.Y.) Graduate School of Business. He graduated from the Indian Institute of Technology, Bombay, with a master's in mathematics and computer science.

In his 2016 *Harvard Business Review* article⁵⁴, Gurbaxani argued that every firm today competes on the software that drives its business. That doesn't mean they must sell software. Instead, they must understand the competitive dynamics of software companies, and then adopt management practices of the best ones.

⁵⁴ Vijay Gurbaxani, "You Don't Have to Be a Software Company to Think Like One," *Harvard Business Review*, April 20, 2016, accessed May 17, 2019 at: <https://hbr.org/2016/04/you-dont-have-to-be-a-software-company-to-think-like-one>.



We talked to Dr. Gurbaxani about the practices of leading companies that have made software a competitive differentiator.

TCS: *Every company today seems to be digitally transforming some piece of their business, or many pieces. You have told executives to view their companies as software businesses because their products, services, and business processes are increasingly rooted in software. TCS has been saying something similar: that companies must automate every task that can be automated; create new, high-level jobs; and use AI to help employees whose jobs can't be automated. Our question is this: How many companies are ready for this new world?*

Vijay Gurbaxani: Many companies are not ready to move from the physical to the digital world: how you compete, where you get value and competitive advantage from—digital technology fundamentally changes all of this.

Companies that, as TCS puts it, take a Machine First™ approach to transforming their business are going to need much more expertise in software development. You can easily see this when you compare the proportion of software engineers in a software-driven company vs. a more established company. Compare Tesla, which started in 2003, with Volkswagen, an 82-year-old company. By the way, I'm not commenting on whether either company—or some other—will dominate the electric vehicle market in the future. I'm only comparing the composition of their work forces. So the question is why Tesla has led the way so far. I argue that one reason is that it's been a more software-driven company than the rest of the auto industry.

Fifty percent of Tesla's engineers are software experts; it's much lower at VW.⁵⁵ But VW is catching on. Its CEO acknowledged two years ago that Tesla has software capabilities that VW lacked. No surprise then, it recently announced it would create 2,000 new software jobs.⁵⁶

⁵⁵ Reuters, "Volkswagen brand CEO says Tesla has abilities Volkswagen lacks," August 4, 2017, accessed May 17, 2019 at: <https://www.reuters.com/article/us-volkswagen-tesla-diess/volkswagen-brand-ceo-says-tesla-has-abilities-volkswagen-lacks-idUSKBN1AK261>.

⁵⁶ TheDrive.com, "Volkswagen Will Slash 7,000 Automatable Jobs and Hire Software Engineers instead," March 14, 2019, accessed May 17, 2019 at: <https://www.thedrive.com/news/26934/volkswagen-will-slash-7000-automatable-jobs-and-hire-software-engineers-instead>.



TCS: *Companies that are rapidly digitizing need to dramatically ramp up their software development capabilities, and quickly. But doing it internally is not easy, right?*

Gurbaxani: It's not easy at all. Just look at General Motors. Tesla announced its autopilot feature—its self-driving software—in 2016. Traditional automakers, including GM, recognized they had fallen behind. They understood that while they knew how to manufacture cars, they did not have the know-how to build self-driving software.

Companies that take a Machine First approach to transforming their business are going to need much more expertise in software development.

Now they could have developed this know-how themselves by hiring new talent. But that would have taken a long time, and it was crucial to not let their competitors get too far ahead. So GM approached Cruise Automation, at the time a 3-year-old venture capital-funded company, about striking a joint venture. But as GM examined the company's capabilities, it decided to buy Cruise for \$581 million (a price that's closer to \$1 billion including incentives for its top talent).⁵⁷ Beyond acquiring Cruise's technology, GM precluded its competitors from getting access to the technology.

⁵⁷ "GM Is Exploring Listing Shares of Cruise Self-Driving Unit," Bloomberg, June 15, 2018, accessed May 17, 2019 at: <https://www.bloomberg.com/news/articles/2018-06-15/gm-is-said-to-explore-listing-shares-of-cruise-self-driving-unit>.



TCS: *Companies could spend lots of money automating every business process and product in their organization that can be automated. That's a huge investment. How do they know where to begin?*

Gurbaxani: That's a very important question. I tell executives to be very selective about their digital transformation initiatives. They should start by determining what their company does uniquely well in delivering value to customers, and what knowledge they possess that competitors don't—knowledge that's crucial to their distinctiveness.

Formally, you must evaluate your customer value proposition. Why do customers do business with your company rather than your competitors? Is it because the customer experience in buying and using your product is better? Your products are more innovative? Your offerings cost them less, or are of higher quality? Then focus on how digital enables you to redefine your value proposition.

Invariably, most companies will have to partner since it's impossible to do everything in-house.

Again, let's look at GM. With ride-sharing companies fundamentally transforming how we get around, GM is attempting to become a mobility company. Beyond the Cruise acquisition, it made a \$500 million investment in Lyft in 2016, both to ensure that GM cars remain in the fleet and to understand the mobility services market. It built hubs where Lyft drivers can rent vehicles in the short-term rather than using their own cars.

GM is investing a lot of money in the technology behind self-driving cars, and technology that enables people to digitally connect and share cars. But ultimately, GM is focusing its digital investments on generating higher returns on the assets it already produces—its automobiles. GM wants to more deeply take on customers' problems of owning and operating a car, including helping customers make money on their cars.⁵⁸

⁵⁸ "General Motors designs a new 'brain and service system' for its vehicles," Ars Technica, May 21, 2019, accessed May 21, 2019 at: <https://arstechnica.com/cars/2019/05/general-motors-designs-a-new-brain-and-nervous-system-for-its-vehicles/>.



One way to do that is using digital technology to continuously engage with its customers. These business opportunities are only possible when a company has the software to continually monitor, operate, and monetize its products after they're sold.

In fact, GM has done this for more than 20 years, starting in the late-1990s with OnStar, an onboard device that enabled Cadillac vehicles to summon help for customers who had been in a crash. This year, the company unveiled a new digital platform for their cars.

TCS: *This sounds like a good opportunity for many companies.*

Gurbaxani: It truly is. Once a company has a continuous digital connection to its customers, it can offer an ongoing set of services, with products being only a part of the overall solution. Many companies have ignored or underestimated these life-cycle opportunities—even companies that have begun rethinking the customer experience. The reason is they haven't fully grasped the new opportunities in a world in which digital technologies enable companies to personalize at scale how they serve customers' needs.

I tell executives to be very selective about their digital transformation initiatives.

I'll give you two very interesting and very different examples of companies that *haven't* underestimated these opportunities: an enterprise software company, Adobe, and a fast-food chain, Taco Bell.

Adobe has been known for years by marketers and graphic designers for its packaged software products like Illustrator, Acrobat, and Photoshop.



When the cloud emerged in 2011, CEO Shantanu Narayen embraced it. It was a bold move. Think about the courage it takes to go from a \$1,900 product to a \$50-a-month product. That means it takes more than three years to make that same \$1,900 off that one customer. And then they had to change their entire philosophy for delivering upgrades because they now had to release enhancements far more frequently than before.

But it reduced the high cost to purchase Adobe products—a high barrier to entry for customers—and all of a sudden many people could engage with Adobe products in a way they couldn't before. And then when mobile technologies like the iPad and the iPhone became big, Adobe execs started thinking, "Why does a creative professional need to be tethered to their desk to design a web page or a graphic? Why can't they create a web page on a mobile platform?" So they delivered products for these technologies. Today, with the advent of AI, Adobe is thinking about how to implant AI technology into its software.

Now, Adobe has recognized that their history as a creative software company allows it to expand into the digital marketing arena. To this end, it purchased B2B and B2C software companies: Magento and Marketo. Adobe is now reframing itself as a digital online experience company.

TCS: *So tell us about Taco Bell's digital transformation.*

Gurbaxani: In a different way than Adobe, Taco Bell has been using digital technology to make it far easier for customers to get its products. Their core premise is that customers want what they want, when they want it, and where they want it. That means getting them food customized to their preferences, faster at its restaurants, or delivered to them. Today's digital technologies, and a delivery infrastructure that's now in place, make that viable.



I'm sure you have heard about the restaurant chain. It's owned by Yum Brands (which also owns the KFC and Pizza Hut chains). Taco Bell has more than 7,000 drive-through and sit-down Mexican quick-service restaurants around the U.S. Their value proposition, like every other

If you look at leading software companies, you will see that they have remarkable adaptability throughout the organization.

fast-food chain, has always been this: getting good, affordable food to customers rapidly. But today, with the fast food industry declining in overall sales, and food delivery services grabbing a foothold, Taco Bell knows that it must innovate faster. And digital is a big piece of their strategy.

They are a digitally-driven company. From using kiosks to improve the ordering process, to sophisticated data analysis to design menus, optimize prices, and even their ad campaigns, Taco Bell is driving productivity and efficiency with technology. Taco Bell even struck a strategic partnership this year with food order and delivery service Grubhub.



TCS: *To do what these companies have done, who needs to lead the change?*

Gurbaxani: Our research shows CEOs must lead these changes. Clearly, the rest of the company has to buy in and that's where leadership and culture really count. If you look at leading software companies, you will see that they have remarkable adaptability throughout the organization. They must have it, since they'll go out of business if they don't evolve to reflect market shifts and the evolving digital world.

Shantanu Narayen of Adobe has said you have to plant flags for employees to aspire to—key goals—and then believe in, and empower, your employees to get there. The best software companies leave it to amazing individuals below the top management team to help them figure it out.

I believe strongly that CEOs must have a point of view about how their sector and company must evolve in a digital world. Yet, it's impossible to always be right amidst such uncertainty.

So we need businesses that can adapt to market shifts and to bets that didn't work out. The solution is to grow with high performance people, not with rules.

Trusting employees to make the best decisions for themselves and the company is a huge part of building a great team. This means you have to give them the rope to be creative and make many decisions on their own. Above all, you must ensure everyone has a built-in commitment to your company's success.



The CEO as Chief Exhilaration Officer

By Krishnan Ramanujam

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As the decade nears its close, it's no exaggeration to say it's been an enthralling one for executives everywhere. The 2010s will go down as a time of digital experimentation spawning multibillion-dollar businesses. Of ingenious online methods for reeling in and supporting customers. Of digital products that customers can't live without. Moreover, the next decade promises to be even more exciting given that technology, and the ingenuity to use it productively, never stand still.

Yet many workers in these same companies are not likely to say they're enthralled at all about the future impact of digital technology. The specter of robots, hardware, and software, makes them question their near- and long-term futures. Even surveys of workers in the U.S., a country that's been an incredible job-creation machine since the 1950s, confirm this. A Northeastern University Gallup 2017 survey of nearly 3,300 Americans found about three-quarters believed artificial intelligence would end more jobs than it created. Some 23% worried their own jobs might go.⁵⁹ A more recent survey by Pew Research Center found 82% of U.S. adults believe automation will likely do the work that people do today.⁶⁰

⁵⁹ Gallup web page, accessed May 3, 2019, <https://news.gallup.com/poll/226841/workers-unafraid-losing-jobs-robots.aspx>

⁶⁰ Pew Research Center survey was conducted in December 2018, accessed May 3, 2019, <https://www.pewsocialtrends.org/2019/03/21/the-future-of-work-in-the-automated-workplace/>

So while leaders have much to get excited about in digitally transforming their businesses in the decade ahead, most of their workforce isn't nearly as enthusiastic.

Therein lies one of the greatest leadership challenges today: how to keep employees energized, not demoralized, about going to work when the workplace of the future is so uncertain.

The best leaders will succeed at this challenge. They will master a role that I refer to as *chief exhilaration officer*. A person who is exhilarating is someone “causing strong feelings of happy excitement and elation,” according to the Merriam-Webster dictionary. Admittedly, that's a tall order today.

But I believe that CEOs and division heads who want to master the role—who view automation as empowering workers, leading to better jobs, and ultimately expanding the workforce—must excel in four areas: communicating in uplifting ways; pushing managers hard to identify the company's ‘new, new’ jobs; earmarking significant training investments to reskill employees for those jobs; and rewarding those who acquire new skills relevant for the future and continuing to provide value.

Let's look at each area, and CEOs who have been leading their workforces in these ways.

1. Lifting People Up



Employees with acute job fears will look hard for signals from the top of the company that suggest they

may be about to lose their jobs. They'll read every CEO memo carefully, trying to determine what's unsaid about an upcoming initiative to ‘transform’

or ‘streamline’ work. They'll wonder whether terminated colleagues were let go because their jobs were eliminated. Some may even try to read the tea leaves in transcripts of management's quarterly earnings discussions with stock analysts.

“Some of America's workers are literally getting sick from their fear of robots taking over their jobs,” says Frederico

Vione, CEO of a \$3 billion unit of Adecco Group, the Switzerland-based global temporary services firm.⁶¹

With such fears in mind, some workers are apt to misread statements from the C-suite. This happened to the CEO of Kaiser Permanente, the \$79 billion (revenue) California health care services and insurance company. Bernard J. Tyson had to change the way he talked about the impact of AI and other automation technologies in the company. "I was trying to tell employees that technology is going to augment what they do because they are the human touch. What they were hearing was: 'I'm replacing all of you with technology,'" he said. Tyson decided he had to put the emphasis on people. "I consciously now speak directly about the importance of humans touching humans in health care."⁶²

CEOs who discuss the impact of automation gain adherents by stressing the importance of people in the workplace. But they must also exude optimism about the future workplace opportunities in their companies. "Every optimist moves along with progress and hastens it, while every pessimist would keep the world at a standstill," Helen Keller, the deaf and blind American social activist and author, once wrote. "Optimism is the faith that leads to achievement. Nothing can be done without hope and confidence."⁶³

Or, more succinctly, "Tremendous things happen to the believer," as Norman Vincent Peale, author of *The Power of Positive Thinking*, put it.⁶⁴

You can include Bob Iger in that camp. The CEO of the Walt Disney Company since 2005 views positivity as a key leadership trait.

⁶¹ Adecco company blog post, March 6, 2019. Accessed May 2, 2019. <http://blog.adeccousa.com/how-to-help-adapt-to-automation/>

⁶² Work Design, Feb. 22, 2018. Accessed May 2, 2019. <https://workdesign.com/2018/02/ceos-weigh-in-from-davos-transforming-the-workplace-is-key-to-survival/>

⁶³ From Wikiquote. Accessed May 7, 2019. https://en.wikiquote.org/wiki/Helen_Keller

⁶⁴ Wikipedia. Peale published his bestselling book in 1952. With his book having sold 5 million print copies since then, Peale's thinking continues to find a big audience. Accessed May 4, 2019. https://en.wikipedia.org/wiki/Norman_Vincent_Peale

"If you're leading a lot of people in a big company in times that are really challenging, the ability to project optimism is one of the most powerful tools a leader can have," he said.⁶⁵

Iger should know. His job-expansion and wealth-creation credentials are

impeccable. Since becoming Disney's CEO, the company's payroll has risen by 70,000 jobs (to about 200,000) and its share price has more than quintupled.⁶⁶

Amid so much job uncertainty, uplifting leadership becomes essential.

2. Uncovering the New, New Jobs



Yet uplifting leadership won't be enough. Leaders' positive messages will go a lot farther if they explain the employment opportunities in a workplace that is becoming more automated. Pointing the workforce to such facts as automated teller machines actually creating more bank jobs can only go so far.⁶⁷ Employees naturally want to know about the jobs in their company.

As Intuit's new CEO, Sasan Goodarzi, says, "While much of what we do today will become automated, AI will simultaneously generate many new jobs in new areas that we cannot even think about today."⁶⁸ In the early 2000s, who knew that companies would soon need social media specialists? Or machine learning experts?

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⁶⁵ Vanity Fair 2018 conference, "The New Establishment," accessed May 4, 2019, at the 8:00 minute mark. <https://video.vanityfair.com/watch/the-new-establishment-summit-bob-iger-discusses-sneaking-in-to-watch-black-panther-and-moving-beyond-partisan-politics?>

⁶⁶ Forbes article about Iger, published May 2, 2019. Accessed May 7, 2019, <https://www.forbes.com/sites/maddieberg/2019/05/02/bob-iger-rebuilt-the-magic-kingdom-and-its-likely-made-him-richer-than-a-disney-heir/#6349170f78c9>

⁶⁷ "Automation Is Expected to Create Jobs but Only You can Make Sure You Get One," Entrepreneur magazine, March 2, 2018, accessed May 3, 2019. <https://www.entrepreneur.com/article/309193>

⁶⁸ "Intuit's New CEO: Culture and Customer Focus Remain Top Priorities," Forbes.com, November 26, 2018, accessed May 2, 2019. <https://www.forbes.com/sites/peterhigh/2018/11/26/intuits-new-ceo-culture-and-customer-focus-remain-top-priorities/#733ce3f563bd>

A number of CEOs have gone quite far to explain the future jobs in their organizations, and why employees need to prepare for them. One of those leaders is AT&T CEO Randall Stephenson. “Over the next five to six years, one of our biggest logistical challenges will be how to reskill our workforce,” he said in 2016. “You can’t just replace them” because the skills are hard to find anywhere.⁶⁹

Since early this decade Stephenson and other executives at the \$184 billion telecommunications and media giant have been upfront with employees about technology’s impact on their jobs. An internal study in 2012 (when annual revenue was \$126 billion and the employee count was 241,000⁷⁰) predicted 100,000 AT&T jobs would be obsolete by 2020 because of automated switching, artificial intelligence, and other technologies. AT&T’s leaders also told employees that many of them would need scientific, math, technology, and engineering skills.⁷¹

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AT&T placed bets about where the new jobs would be, and then earmarked \$1 billion for a multiyear effort to train employees for those roles.⁷² That is the next leadership quality all CEOs will need: giving the green light to reskill the work force.

⁶⁹ “How Randall Stephenson Took AT&T into the Future of Digital,” Q&A interview in Chief Executive magazine, July 12, 2016. Accessed May 2, 2019. <https://chiefexecutive.net/randall-stephenson-took-att-future-digital/>

⁷⁰ AT&T 2012 annual report, p. 2 for revenue, p. 32 for number of employees. Accessed May 5, 2019. https://www.att.com/Investor/ATT_Annual/2012/downloads/ar2012_annual_report.pdf

⁷¹ “Shaping the Future Workforce: AT&T’s chief learning officer helps instill a culture of lifelong learning,” Working Nation, Jan. 29, 2018, accessed May 2, 2019. <https://workingnation.com/shaping-future-workforce-john-palmer/>

⁷² CNBC, March 13, 2018. Accessed May 2, 2019 at <https://www.cnbc.com/2018/03/13/atts-1-billion-gambit-retraining-nearly-half-its-workforce.html>

3. Unleashing Training Investments



Training workers for the new, new jobs could be viewed as a costly proposition, a luxury perhaps. But companies like AT&T don't view it that way. They realize that while they must automate every task that can be automated, they also need to train managers and workers for the multitude of new jobs that technology can't automate.

On this front, AT&T again serves as a good example. The company spent a quarter billion dollars in one year (2017) on reskilling its work force.⁷³ But the price tag would have been much higher had the company trained employees the old-fashioned way: sending them to classrooms. Instead, the company has been offering online classes. By the end of last year, AT&T employees had taken more than 2.6 million online courses.

The cost to AT&T: one-sixth of what it would have been to get a master's degree at a university like Georgia Tech.⁷⁴ Through online courses, companies can do massive work force retraining at a fraction of the cost of the old classroom model.

However simply offering online courses won't necessarily spur all employees to be retrained. AT&T found it helped to tell employees what jobs might be hot or not. "“You can't just put these tools out there and say, ‘Go train yourself,’” said Stephenson. “By integrating it with your HR system, people see what jobs are trending up and which ones are declining. They can tell what online training they need to qualify for specific internal jobs.”

AT&T's massive training initiative is doing its job. It is shifting employees whose positions will be automated—and who are willing to master new skills—for the new jobs. The company is also retraining workers and managers for new, more complex management positions. In 2018, AT&T filled nearly 70% of the management jobs in its technology and operations groups with existing employees.⁷⁵

⁷³ “Shaping the Future Workforce: AT&T's chief learning officer helps instill a culture of lifelong learning,” Working Nation, Jan. 29, 2018, accessed May 2, 2019. <https://workingnation.com/shaping-future-workforce-john-palmer/>

⁷⁴ “How Randall Stephenson Took AT&T into the Future of Digital,” Q&A interview in Chief Executive magazine, July 12, 2016. Accessed May 2, 2019. <https://chiefexecutive.net/randall-stephenson-took-att-future-digital/>

⁷⁵ “Business Leaders Set the A.I. Agenda,” The New York Times, March 3, 2019. Accessed May 2, 2019. <https://www.nytimes.com/2019/03/03/business/new-work-summit-questions.html>

4. Valuing People



The fourth trait of CEOs who also want to be known as chief exhilaration officers is the ability to

express gratitude towards employees. That has always been a key trait. At a time in which many employees view themselves as being replaceable, such gratitude can go a long way.

Intuit's former CEO Brad Smith was known for his penchant of ending leadership sessions with employees saying, "I love you like brothers and sisters." He believed that in every interaction they had, leaders had to leave employees with three 'E's': energized, educated, and empowered.⁷⁶



This is especially the case in companies under severe market pressure, where a downturn in the business has every employee worried about the firm's

survival. As Paul Grangaard, who turned around high-end shoe retailer Allen Edmonds, said: "Many a turnaround artist treats employees like they're part of the problem. That leads the best people to leave and the downward spiral continues."⁷⁷

The time leaders spend appreciating their people, for their past performance and their embrace of new workplace demands, is time very well spent. It will be crucial to making a digital transformation succeed.

Leaders who become known for their positivity, who direct the HR function and others to determine the new jobs, who approve the training investments necessary to shift willing and able employees into those new jobs, and who recognize those who make that shift are what companies need to thrive in a world of digital transformation. These exhilarating leaders will be the true drivers of a Machine First™ world, the force that gets their people to follow to in earnest.

⁷⁶ "Leadership and Legacy Lessons from Former Intuit CEO Brad Smith," Entrepreneur magazine, March 1, 2019, accessed April 28, 2019. <https://www.entrepreneur.com/article/328301>

⁷⁷ "How Hubert Joly aims to turn Best Buy into a 'happiness' company," Minneapolis Star-Tribune, January 12, 2019. Accessed May 4, 2019. <http://www.startribune.com/how-hubert-joly-aims-to-turn-best-buy-into-a-happiness-company/504230112/>

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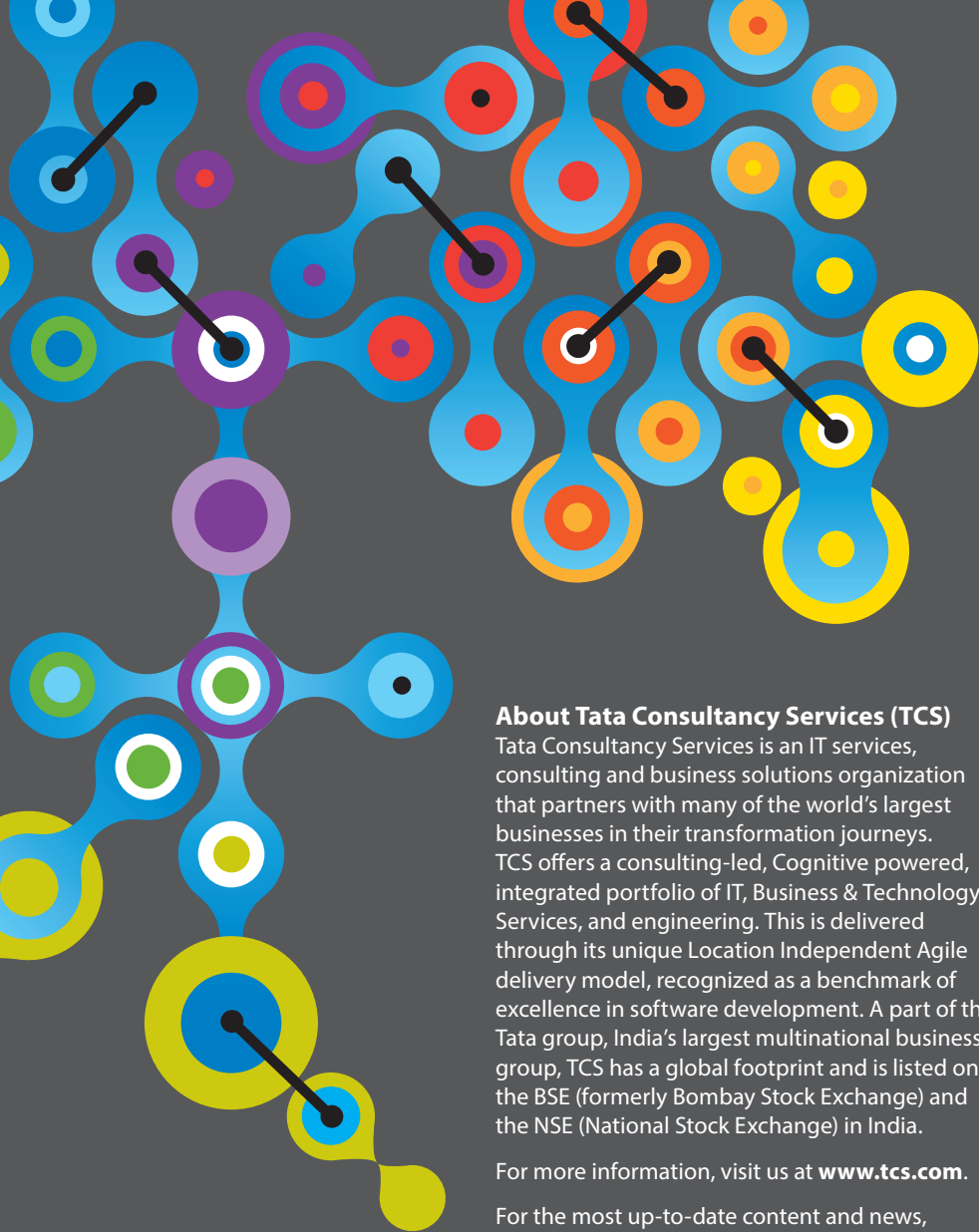
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