



World Economic Forum White Paper

Digital Transformation of Industries:

In collaboration with Accenture

Digital Enterprise

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1. Foreword

There is widespread recognition among leaders in most industries that the role of digital technology is rapidly shifting, from being a driver of marginal efficiency to an enabler of fundamental innovation and disruption.

Digitalization is the cause of large-scale and sweeping transformations across multiple aspects of business, providing unparalleled opportunities for value creation and capture, while also representing a major source of risk. Business leaders across all sectors are grappling with the strategic implications of these transformations for their organizations, industry ecosystems, and society. The economic and societal implications of digitalization are contested and raising serious questions about the wider impact of digital transformation.

While it is clear that digital technology will transform most industries, there are a number of challenges that need to be understood. These include factors such as the pace of changing customer expectations, cultural transformation, outdated regulation, and identifying and accessing the right skills – to name just a few. These challenges need to be addressed by industry and government leaders to unlock the substantial benefits digital offers society and industry.

Digital Transformation of Industries (DTI) is a project launched by the World Economic Forum in 2015 as part of the Future of the Internet Global Challenge Initiative. It is an ongoing initiative that serves as the focal point for new opportunities and themes arising from latest developments and trends from the digitalization of business and society. It supports the Forum's broader activity around the theme of the Fourth Industrial Revolution.

A key component of the DTI project in 2015 has been the quantification of the value at stake for both business and society over the next decade from the digital transformation of six industries. The 'compass' for these industry sectors is being set and it is imperative that all stakeholders collaborate to maximize benefits for both society and industry. Digitalization is one of the most fundamental drivers of transformation ever and, at the same time, a unique chance to shape our future. The World Economic Forum is committed to helping leaders understand these implications and supporting them on the journey to shape better opportunities for business and society.

In 2016, the DTI initiative will focus on the impact of digital transformation on an additional 10 industries, further deep-dives into industries from this year's project, as well as examine a number of cross-industry topics such as platform governance, societal impact, and policy and regulation.

The report was prepared in collaboration with Accenture, whom we would like to thank for their support. We would also like to thank the Steering Committee, the Working Group members, as well as the more than 200 experts from business, government and academia and over 100 industry partners who were involved in shaping the insights and recommendations of this project. We are confident that the findings will contribute to improving the state of the world through digital transformation, both for business and society.

Bruce Weinelt
Head of Digital Transformation
World Economic Forum

2. Executive Summary

The digital revolution is already transforming companies and even entire industries. In this new world, analog incumbents – large, successful companies that predate the digital revolution – can feel like they are being ‘hunted’ from all sides, with hundreds of startups attacking traditional markets. But our view is that it is not too late for incumbents to adapt, especially as they have considerable resources to fight off the attacks of leaner challengers, including invested capital, strong brands and relationships with customers, apart from a broad range of capabilities and decades of institutional know-how.

Becoming a digital enterprise requires far more profound changes than merely investing in the latest digital technologies. Companies will need to search for new business models, fundamentally rethink their operating models, revamp how they attract and foster digital talent, and consider afresh how they measure the success of their business. The report focuses on the following areas:

- **Digital business models.** Companies need to fundamentally change the way they identify, develop and launch new business ventures.
- **Digital operating models.** The report identifies operating-model archetypes designed for the digital era and outlines the steps needed to implement them. Digital leaders follow a lean approach to both core and support functions.
- **Digital talent and skills.** This report takes a look at how enterprises can attract, retain and develop the right talent. The report also highlights the imperative for organizations to embrace the cultural transformation and encourage millennials to join their workforce. Finally, it assesses how companies need to adapt to different ways of working, whether it's integrating robots or on-demand workers.
- **Digital traction metrics.** Many companies have discovered that traditional key performance indicators (KPIs) are no longer effective at measuring the performance of a digital business. The report outlines the digital traction metrics that matter and explain the importance of monitoring – and reacting to – them in real time.

With that in mind, we have identified a number of recommendations and a set of questions to aid incumbent industry leaders in their digital transformation.

- **Identify, develop and launch new, digital business models.**
 - To what extent have you enhanced your strategic toolkit? Do you have build, buy, partner, invest and incubate/accelerate as possible strategic choices?
 - Is your corporate development approval cycle sufficiently agile? Should you move to a weekly or biweekly cycle similar to early-stage investors? Do you emphasize decisions informed by solid analytics?
- **Set up a successful corporate venturing business.**
 - Do you feel secure in sensing and anticipating digital disruption? Do you need to create or bolster corporate venturing capabilities?
 - For existing corporate venture capital arms, is it bringing scale and protection to the existing business? Has the culture of the digital native continued to bring innovation in combination with the scale of the existing business?
- **Re-examine every aspect of operations.**
 - Is digital explicitly integrated into strategic plans in and across business functions?
 - How are you empowering employees through digital channels to enable faster decision making and encourage greater agility within your organization?
 - To what extent have you adjusted your operating model toward a multi-speed operating model on the one hand to keep pace with breakthrough innovation coming from new business models, and on the other hand supporting your day-to-day steady-state activities?
 - Does your operating model flexibly support ecosystem partnerships, be it by creating an own platform versus ‘plugging in’ to others?

- **Understand and leverage data.**
 - How much of your revenue is coming from new sources of digital business? Is the growth rate at par with or higher than digital competitors?
 - Does your company leverage analytics around customer data, operational data, fraud analytics and compliance?
 - Do you benefit from data to launch new business and revenue models to mitigate erosion in the core business?
- **Consider increasing your investments in security.**
 - Is investment in security an important board-level issue? Have you increased your investments in security – is your budget at 0.3% of revenues or at 3%?
 - What is the worst case scenario for a security breach? Do you have a clear emergency drill tested? Should you incentivize friendly hackers with a bounty for breaking in?
- **Build a high-quotient digital workforce.**
 - Do you have a digitally literate leadership team? To what extent is it multigenerational, diverse and with sufficient expertise in business and technology topics?
 - Have you established appropriate training schemes to overcome the digital skills gap and reskill your existing employees?
 - Are your internal policies up-to-date to allow collaboration and knowledge sharing using social media tools?
 - To what extent can your corporate culture cope with constant change and is it considered attractive for millennials? Is the cultural transformation visible at every level of your organization and driven by the CEO and leadership team?
- **Integrate automation and on-demand workers into the workforce.**
 - Is your existing workforce demonstrably improving productivity and quality? Are you efficiently leveraging an on-demand workforce and automation?
 - Have you identified areas in your business where automation is most relevant? Have you assessed the likely impact of robots and artificial intelligence on the traditional workforce?
 - Have you developed strategies and frameworks that take into account all the functions and tasks in your enterprise where you can leverage and benefit from the on-demand workforce?
- **Establish the right digital traction metrics.**
 - Have you established the right behavioral KPIs to measure the traction of your digital business models (e.g., user engagement) or do you solely rely on financial metrics?
 - To what extent are capabilities and mechanisms to track metrics in real-time in place and do you take the appropriate decisions and initiatives to benefit from the insights you gathered?
- **Convince your investors about your digital transformation journey.**

Which steps have been taken to convince your investors about your digital vision and the long-term value-creation impact (top and bottom line) of your digital transformation journey?

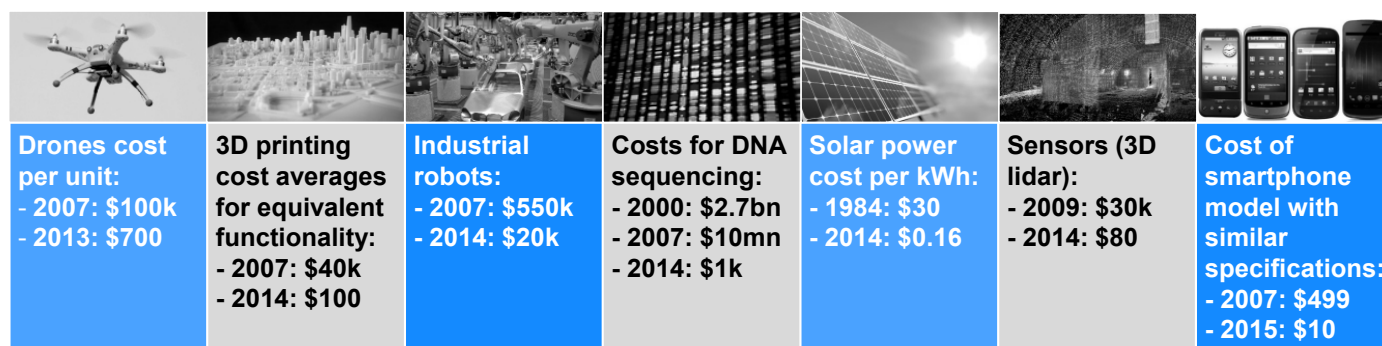
Leaders across all industries are writing the next chapter of the digital economy. It is time to either become part of the story or just another footnote in the history of disruption.

3. Surviving Digital Disruption

Just as the steam engine and electrification revolutionized entire sectors of the economy from the 18th century onward, so the Internet, robotics, artificial intelligence (AI) and data analytics are beginning to dramatically alter today's industries.

The pace of technological change is accelerating. It's been frequently observed that improvements in computing power have largely kept pace with Moore's Law. The plummeting cost of advanced technologies (see infographic) means that the world around us is becoming ever more connected. In 2005, there were just 500 million devices connected to the Internet; today there are 8 billion. By 2030, it's estimated that there will be 1 trillion.

Figure 1: The cost of key technologies has fallen rapidly



There are five technology trends that business leaders should base their thinking on, as they contemplate how best to digitally transform their company.

Five key technology trends

Accenture Technology Vision highlights five emerging technology trends shaping the new digital landscape. Technology is an integral part of an organization and its strategy, but these trends reflect the fact that it is people who underpin success in a world that continues to reinvent itself at an unprecedented speed. Tomorrow's leaders are taking these trends on board and executing strategies to secure a clear digital advantage.

1. **The Internet of me:** Through the personalization of apps and services, the third wave of the Internet is placing users at the center of every digital experience.
2. **Outcome economy:** As sensors and connectivity become ubiquitous in a growing number of environments, enterprises have an increasing ability to measure the outcomes of the services they deliver. Business models that sell results appeal to customers far more than those that just sell products.
3. **The Platform (r)evolution:** Rapid advances in cloud and mobile connectivity are dismantling the technological barriers and reducing the costs associated with establishing global platforms. These platforms offer huge potential for innovation and the delivery of next-generation services. In fact, as research by the MIT Sloan School of Management shows, 14 out of the top 30 brands by market capitalization in 2013 were platform-oriented companies.¹
4. **The intelligent enterprise:** Advances in data science, cognitive technology and processing power have combined to open up the possibility of 'intelligent enterprises', built around smart machines and software intelligence. By turning big data into smart data, firms can achieve higher levels of operational efficiency and innovation.
5. **Workforce reimagined:** The digital economy is creating ever-greater demand for machines and humans to work together effectively. Advances in wearable devices, natural interfaces and smart machines are opening up new opportunities to empower human talent through technology.

Source: Accenture Technology Vision 2015

a. Busting myths about digital transformation

The astonishing speed of change is making it difficult to clearly understand digitalization and fully grasp its implications. Consequently, a number of myths have sprung up, which need to be debunked before an effective strategy for digitizing the enterprise can be developed. We would like to highlight three particularly common myths:

Myth 1: Digital disruption is bankrupting incumbents. All is lost for incumbents and they fear there is no way back.

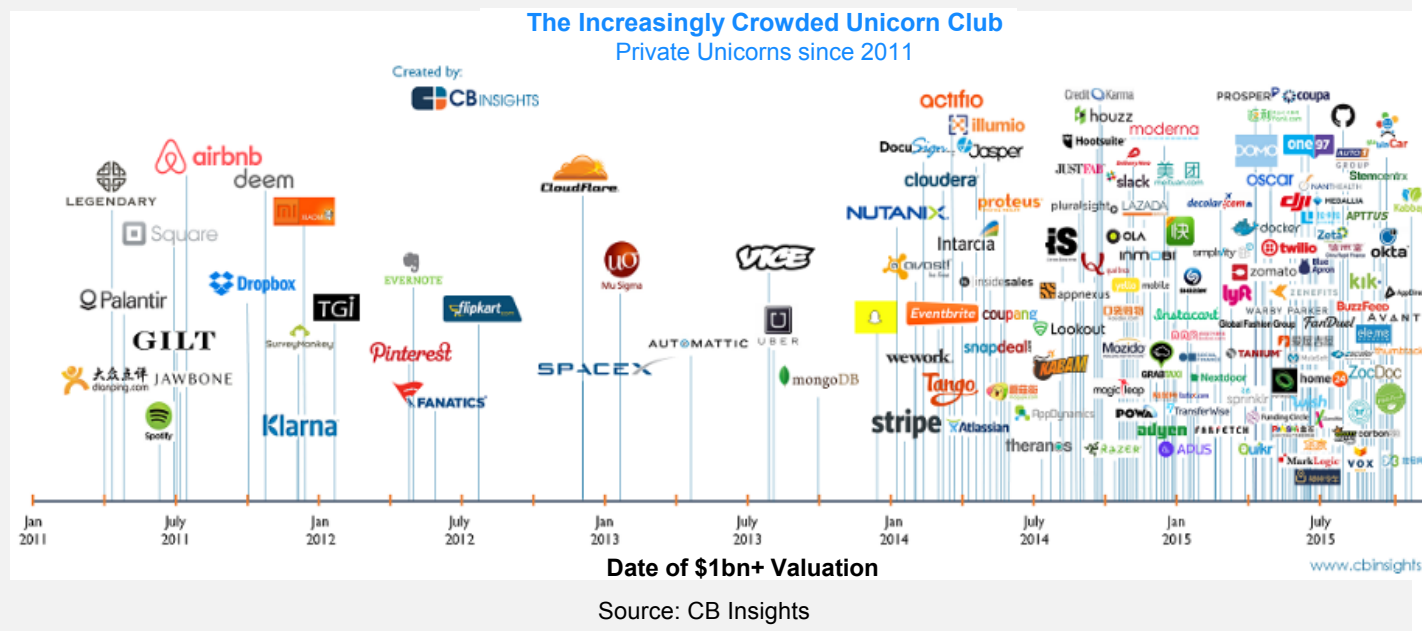
Empowered customers, big-bang disruption and winner-takes-all economics may seem like a perfect storm for analog incumbents (which we define as large successful enterprises that predate the digital revolution). For incumbents, the cautionary tale of Kodak's bankruptcy, brought on by its failure to react quickly to the disruptive impact of digital photography, is frequently cited.

During 2015, around 70 startups achieved unicorn status, attaining valuations of \$1 billion or more. The rise of the unicorns has implications for analog incumbents. Hundreds of startups are now attacking traditional markets, thanks to the democratization of technology, increased access to funds and a rising entrepreneurial culture.

Reality: The game is not over for incumbents. They have significant resources such as hard assets, brands, global distribution, customer relationships, data and decades of institutional know-how to harness for their digital transformation. In a sense, they are too big to fail. The fact that Kodak's story is cited so often is evidence that its fate is the exception rather than the rule. Digital disruption is not (yet) bankrupting Forbes Global 2000 companies.

Rise of the unicorns

The democratization of technology (driven by its plummeting cost), increased access to funds and a rising entrepreneurial culture means that there are now hundreds of startups attacking traditional markets. Uber, Twitch, Tesla, Hired, Clinkle, Beyond Verbal, Vayable, GitHub, WhatsApp, Airbnb, Matternet, Snapchat, Homejoy, Waze and the list goes on. These startups are achieving scale far quicker than analog companies ever did. Whereas the average Fortune 500 company took 20 years to reach a market capitalization of \$1 billion, Google managed it in eight years, and the likes of Uber, Snapchat and Xiaomi in three years or less.



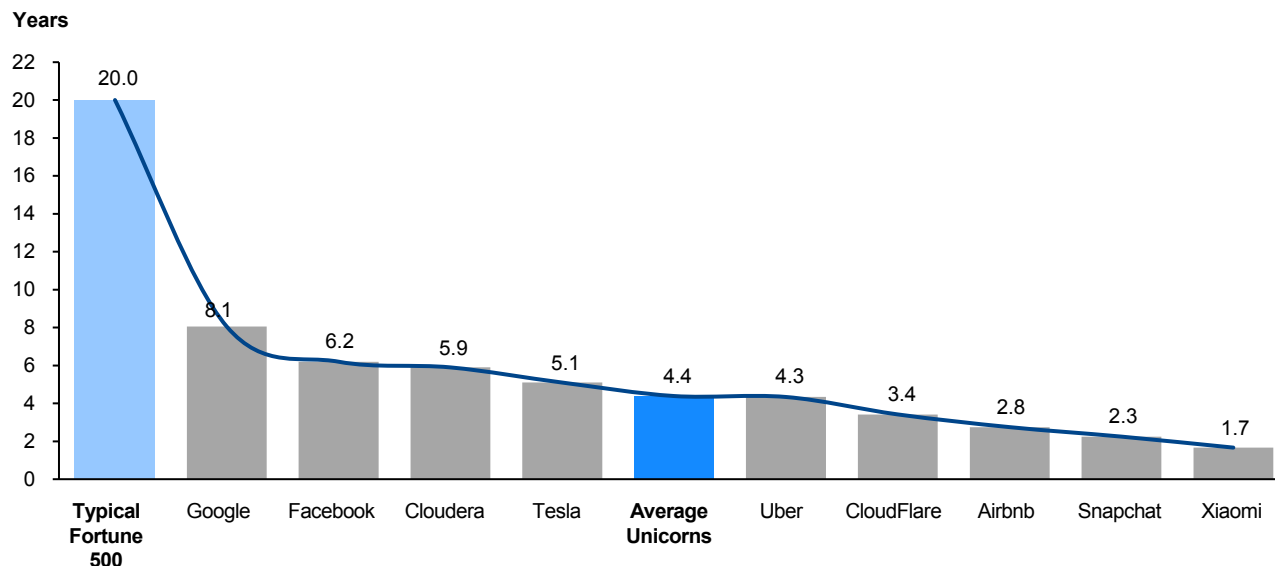
Evidence: Although the top 100 startups have an impressive combined valuation of approximately \$470 billion, this is exceeded by Google and Apple's valuations individually, and dwarfed by the total valuation of the top 10 S&P 500 companies, which stands at \$3.6 trillion. Incumbents have also attracted more employees over the past decades, with the average full-time employee count of S&P 500 companies increasing by 17% from 42,000 to 49,000 during this period.

Myth 2: Digital is a back-office issue focused on achieving operational efficiencies.

Reality: Companies that have implemented digital technologies across their business have been successful in enhancing revenue sources, competing against digital natives and outperforming peers.

Evidence: It used to take Fortune 500 companies an average of 20 years to reach a billion-dollar valuation, but today's startups are getting there much quicker: Google managed it in eight years, and the likes of Uber, Snapchat and Xiaomi in four years or less, partly through successfully harnessing digital technology.

Figure 2: Time to reach a valuation of \$1 billion or more



Source: Accenture

Many businesses are moving beyond viewing technology merely as a cost and seeing it as an important enabler of revenue generation. This is reinforced by a Gartner/MIT CISR study which suggests that on an industry-adjusted basis, companies with above-average levels of digital revenue have been growing on average 1.5% faster than the industry mean.² A recent survey found that 45% of IT executives see growing revenue through improving digital capabilities as a top priority.³

Myth 3: Companies can implement a successful digital transformation simply by launching a digital business unit and hiring a Chief Digital Officer.

Reality: Successful digital transformation demands a culture sponsored by the leadership that promotes innovation, encourages risk taking and empowers employees at all levels of the company.

Evidence: While launching a digital business unit has worked well for GE, it hasn't been successful for all companies. Spanish telecommunications giant Telefónica made a similar move in 2011, but had another group reorganization in 2014 after revenues declined. Many boards do not have the generational diversity or digital literacy to successfully digitize. Digital transformation needs to be owned by the CEO, who must be accountable for its success.

Busting these myths leads us to an important point: incumbents will need to transform themselves into digital enterprises to thrive, and this transformation will need to be far more profound than merely investing in the latest digital technologies. Analog companies do, however, need to develop digital capabilities to survive. Without these, they may not go bankrupt but will have to settle for a low-margin utilities model for their business. More than 80% of business leaders responding to a Gartner survey expect their company to become a digital enterprise by 2019.⁴

It may be a daunting challenge, but the time to start is right now.

4. Becoming a Digital Enterprise

“We learned this from the consumer Internet world: by the time it’s obvious it’s too late. What that means is, now is the time to act. That you’ve got to realize we’re in the first two minutes of a soccer match; by halftime it’s too late.” – William Ruh, Chief Executive Officer, GE Digital

A truly digital enterprise stands for more than just using new technologies for the sake of it. Rather, what truly distinguishes and gives a digital enterprise its competitive advantage is its culture, strategy and way of operating. Digital enterprises strive continuously to enable new and leaner operating models underpinned by agile business processes, connected platforms, analytics and collaboration capabilities that enhance the productivity of the firm. A digital enterprise relentlessly searches out, identifies and develops new digital business models, always ensuring that customers and employees are at the center of whatever it does.

There are a number of areas that many companies will need to reassess and reform if they are to become digital enterprises. Three key areas have been identified: digital business models (what companies need to do); digital operating models (how they can do it); and digital talent and skills (who they need to work with to succeed).

a. Digital business models

The innovator’s dilemma

Analog incumbents looking to become digital enterprises face two main challenges. First, the business model that served them well for decades has been disrupted by digital innovation and no longer works as desired. Second, attempts to create a new, viable business model for the digital age will flounder unless a company is willing to disrupt itself.

This bind has been termed the innovator’s dilemma and was first outlined almost 20 years ago in Clayton Christensen’s influential book of the same name. As Christensen puts it: “The innovator’s task is to ensure that this innovation – the disruptive technology that doesn’t make sense – is taken seriously within the company without putting at risk the needs of present customers who provide profit and growth”. He explained that the reason disruption is so problematic for existing firms is because “their processes and business model that make them good at the existing business actually make them bad at competing for the disruption”.

iPods and iTunes – the innovator’s dilemma in action

For incumbents, the dilemma can be particularly testing as the disruptive technology may directly compete with their profitable existing business. This could be reduced to one sentence: “In the years before the launch of the iPod and iTunes in 2001, both Nokia and Sony had similar products under development but chose not to proceed with them, for fear of disrupting their existing business.”⁵ In fact, an IMD/Cisco report published in 2015 found that only a quarter of the companies surveyed said that they would be willing to disrupt themselves in order to compete.⁶

A fear of cannibalizing profits is just one obstacle standing in the way of incumbents looking to launch new business models. These companies often have a risk-averse culture that focuses on the present rather than the future. Managers often are very adept at running existing business units but do not have the creativity to identify radically different business models or the decisiveness to commit resources to experiment.

Despite the difficulties involved, some incumbents have successfully disrupted their businesses – SAP’s shift from selling software licenses to offering software as a service (SaaS), and Apple’s launch of the iPhone. For some organizations, the need to disrupt themselves was even more pressing. Here are some examples of declining businesses that managed to successfully cannibalize their core business and enjoy a comeback.

From Old Business Models → To New Business Models

	Near bankruptcy in 2004, LEGO underwent a restructuring, reducing the number of divisions they had and outsourcing unprofitable ones such as LEGO computer games	LEGO's design capabilities are increasingly being handed over to its fans, e.g., Lego Digital Designer. LEGO has set up new digital businesses: movies, Lego Mindstorms, video games
	Axel Springer struggled with its declining print business and in the early 2000s, its shift toward digital was perceived as chaotic	Revenues from digital business surpassed print in 2012 and today accounts for more than 50% of revenues. Core business models adopted are paid models, marketing models and classifieds
	Microsoft's main sources of earnings, PC royalties and licensing, were increasingly being challenged due to a shift toward mobile technology	Microsoft adopted new advertising and subscription-based models, with an increasing focus on mobile devices, in the process cannibalizing its existing business models
	Autodesk, a leader in software solutions for 3D design and engineering, had a perpetual licensing model, that was faced with diminishing profits due to increasing digitalization	In 2013, Autodesk made a shift toward recurring a subscription model. This move was widely appreciated by analysts, who projected an increase in operating margins from 13% to 30%
	HBO's subscription-based model was increasingly being challenged by new online content distribution models	HBO, to counter the challenge from digital natives, created its own distribution platforms HBO Go and HBO Now and licensed media to Amazon Prime and other streaming platforms
	In the early 1990s, IBM's mainframe business hit the wall and Unix and X86 systems took the datacenter by storm, which led IBM to fire more than 150,000 employees	IBM transitioned from being a hardware seller to a technology and consulting services business, increasing both its operating margins and valuation

Amazon – how to cannibalize yourself

From its start as a seller of paper books, Amazon has had the courage to disrupt itself and cannibalize its products and services. This happened when Amazon launched the Kindle e-book reader at the expense of its physical books sales. In 2010, the Kindle accounted for 62.8% of all e-readers worldwide. Amazon is now the leader in promotion and sales of digital content in an e-book market worth \$1.6 billion.

Amazon also disrupted itself with the launch of Amazon Prime, which undermined its DVD sales. Moreover, Amazon has made other long-term bets with the potential to further disrupt, such as Amazon Web Services, Fire smartphones and delivery drones.

Amazon's success is mainly driven by bold leadership of the CEO and an innovative corporate culture, defined by a relatively high degree of autonomy and by putting the customer in the center.

Michelin solutions – from selling tires to selling outcomes

Tire manufacturer Michelin has leveraged the Internet of Things to shift from a business of selling tires to selling outcomes (performance promise backed by a money-back guarantee). EFFIFUEL™ is a comprehensive ecosystem that includes sophisticated telematics, training in eco-driving techniques and the EFFITIRES™ optimized-tire management system. The service can lead to a reduction in fuel consumption of 2.5 liters for every 100 kilometers driven, representing an average annual saving of €3,200 for long-haul trucks (equivalent to at least a 2.1% reduction in total cost of ownership for truck fleet operators). The fuel savings also cut 8 metric tons of CO₂ emissions.

While the idea for the 'as-a-service model' was developed internally, Michelin realized the need for partnering, especially in the field of big data analytics. Success factors have been an emphasis on cultural change, to convince skeptical employees about the benefits of the new business model, coupled with an iterative approach built around pilots.

Data- and technology-enhanced business models

The innovator's dilemma is tough to crack, but large enterprises usually have some promising options to explore. For a start, analog companies are often sitting on a vast stream of untapped wealth: data. Data monetization can be particularly profitable for companies that have collected large amounts of business-to-business (B2B), business-to-consumer (B2C) and machine-to-machine data. Information from any number of categories – geolocation, socio-

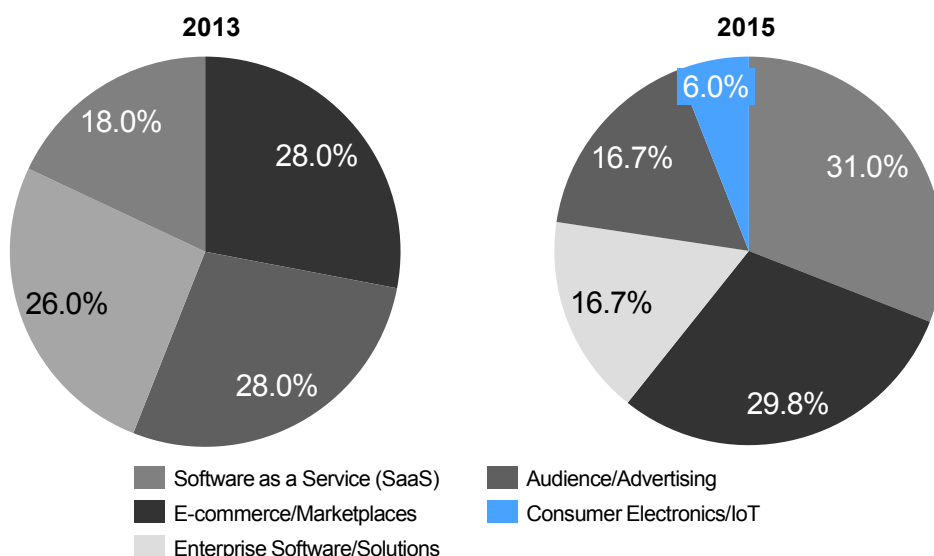
demographic, social relationships, industrial Internet, shopping basket and customer interest – can prove valuable. At the same time, advances in technology are combining to make data monetization more affordable, with the cost of storage falling dramatically and the emergence of technologies and sensors that enable real-time data gathering, analytics and decision making.

Research by Deloitte and OpenMatters has found that investors are placing a greater value on companies with business models that embrace today's technology, emphasize intangible assets (such as intellectual property), and enable the crowdsourcing of products and services through the use of networks.⁷

Digital technologies have enabled the emergence of the following business models: peer-to-peer networks, freemium, delivering outcomes (mainly driven by Internet of Things), crowdfunding/crowdsourcing, as a service, e-commerce/marketplaces and personalization, among others.

Having a look at the business models of unicorns, the prevalence of e-commerce related models (see chart below) is observed.⁸

Despite this, many companies still focus too much on the equation that counts: *revenue = price x volume*. Moreover, focusing solely on product, service and process can obscure other, less obvious ways for companies to create value. Leaders should widen the scope of their strategic thinking to analyze how other frameworks, such as networks, channels and customer engagement can create value for their business.⁹ With that in mind, a number of new revenue sources that enable enterprises to profit from the possibilities that digital technology opens up.



Nine revenue models

1. **Transaction.** Traditional manufactured products are packaged and resold from one to many users; ownership is transferred from seller to buyer through distribution channels.
2. **Capacity leasing.** Capacity is monetized in the form of human time, machine or asset availability; companies manage supply of capacity through demand forecasting, customer orders and sales.
3. **Licensing.** Technology, brand or intangible assets are licensed for periods of time to reflect the value of the original invention but without the inventors needing to market or sell the product/service themselves.
4. **Subscription.** Products/services are subscribed to, usually for a period of time, which can be as short as a day but often for longer, locking customers in with a reduced upfront cost.
5. **Commission.** Agents collect commissions (or a margin) for matching buyers to sellers for a given product/service; agents can be people or, more recently, scalable digital platforms.
6. **Advertising.** Often used in media and entertainment as a way to distribute and share ideas, with associated products/services marketed through the medium.

7. **Trading.** Buy low, sell high, if successful; traders monetize mispriced goods and services due to fluctuations in demand and supply using market knowledge.
8. **Donations.** Often found to be transactional or subscription-based for individuals to participate either on a one-off or regular basis; philanthropic donations can often provide intangible benefits to the donor.
9. **Subsidies.** Often found in public service organizations whereby traditional revenue models only make up part of the cost to provide the service; subsidies typically incentivize improvements in quality of service.

Several analog companies have started promising initiatives to realize the value of the data they collect. John Deere, for example, is using its data to reduce warranty claims and sell licenses for data products related to smart farming. Tesco is creating a \$1 billion subsidiary to monetize its data from shoppers by allowing packaged goods companies to access it. Citigroup has also established a separate business that builds on the bank's consumer distribution channel to sell direct-marketing programs to insurance companies.

State-of-the-art big data analytics of customer or operations data can also bolster efforts to launch other innovative business models by fueling innovation in new product, services and solutions.

Strategic recommendations

Companies need to fundamentally change the way they identify, develop and launch new business ventures. They have to enhance their strategic toolkit – 'buy' versus 'build' is no longer enough. Instead, they need to build, buy, partner, invest and incubate/accelerate. Organizations have to make investment decisions much quicker and change their internal processes to identify and evaluate investments, with greater emphasis on decisions informed by data and analytics. Analog companies can benefit from their large asset base and use cash on their balance sheets to either invest in, partner with or acquire startups. Implementing digital business models is a complex endeavor, but there are a number of initiatives that can help incumbents revolutionize their own business model.

First steps: Silicon Valley safaris and innovation centers

Silicon Valley safaris/boot camps are typically trips undertaken by an analog company's senior leadership for a few days to the Bay Area or other regions with a high startup density (such as Bangalore in India or 'Silicon Wadi' in Israel). However, these boot camps are worthless if a company does not initiate the required follow-through initiatives. Those activities can either be drafting digital strategies, changing the approach to innovation (cultural shift), or developing a better understanding of what digital skills are required. They can also be a first step to establish strategic, closer and institutionalized partnerships with Silicon Valley companies.

Another, more ambitious but more complex opportunity is to launch technology or innovation centers in Silicon Valley. A good structure for an innovation hub could imitate an amoeba, as they continuously change their shape to eat and survive. At P&G, this structure has been established since 2008 and consists of a corporate venture fund, an entity to manage the idea funnel, another entity to catalyze the idea funnel and an open innovation entity.

"The area you can really do damage to your business is if you try and protect the legacy model." –John Kern, Senior Vice President of Supply Chain Operations, Cisco

The decision to entirely rethink an existing business model is a difficult one to take, but once it has been made, an analog company needs to find the most effective way to disrupt itself. Here is a three-step plan for this scenario:

1. **Do not mess with your core business, but inspire innovation at the edge of your company.** Look to projects on the periphery of your company that are focusing on new products, services or customer segments that are aligned with disruptive trends in your industry. Rather than funding this project generously, keep investment to a minimum, so that the project team is forced by necessity to focus on leveraging external resources, tying it into the ecosystem.
2. **Hire black ops/hacking teams.** Analog companies should hire 'black ops' teams (either internally or externally). These teams work in the shadows, with a low profile in the organization. The team should ideally consist of millennials and digital natives whose sole mission is to attack the mother ship. Examples of these types of organizations include Netflix Chaos Monkey, or Cisco and Sequoia in the past. Such an approach helps them establish startups and to achieve a twofold goal: to both defeat and disrupt the mother ship.

3. **Try to copy Google.** This is the most holistic approach, consisting of establishing an internal accelerating technology lab to focus on big ideas (as Google does with life extension, Google Glass, self-driving vehicles or with Project Loon) and of creating a fast-track partnering program with accelerators, incubators and hackerspaces. Good examples are Y Combinator (Uber and Dropbox), Tech Shop, or bolt.io.

Efforts to disrupt need to be underpinned by a culture that is open to innovation. Companies need to have a mindset that can cope with constant change. Five distinct methodologies can be applied to develop new business models:

1. **Scenario-based design** – Creates future business models in response to disruptive industry trends
2. **Epicenter-driven design** – Uses strengths and weaknesses of the existing business model to generate ideas
3. **Unorthodox design** – Forms business models by challenging existing industry logic and company clichés
4. **Customer-centric design** – Builds business models through customers' eyes based on the question: Does this solve their problems?
5. **Mirrored design** – Based on the finding that 90% of new business models are not actually new, this creatively imitates business model patterns from other industries

The incumbent's conundrum

While the quandary over whether to innovate at the risk of cannibalizing existing profits is the innovator's dilemma, the puzzle over which option to choose to create a new business model could be termed the incumbent's conundrum. The options include whether a company should build, buy, partner, invest or incubate/accelerate. The following are some guidelines for business leaders to help them determine which route is most appropriate.

Build

Building new business models might be the best route when an opportunity is related to the company's core business, if there is still time until the market's inflection point and the company has the opportunity to hire the necessary talent. The benefits are that it typically maximizes control and minimizes costs in markets that a company must own because of their strategic importance.

If companies decide to go for the build route, they can benefit from algorithms and machine learning to create and develop new products and services. They should also use 'gamification mechanisms' or 'incentive competitions' to drive ideation, and new product and services development. What CXOs have to add to their toolkit is the business model canvas tool to elaborate how to bring the identified breakthrough ideas to market.

GE is a great example of a successful digital transformation. Here we would like to focus on how it successfully launched new business models. GE historically made most of its revenues by selling industrial hardware and repair services, but with the pace of advances in digital technology, GE was at risk of losing out to competitors.

In 2011, GE launched its Industrial Internet initiative to move toward an outcome-based business model focused on optimizing asset performance and operations with the help of big data and analytics. Digitally enabled and outcomes-based approaches helped GE generate more than \$800 million in incremental income in 2013. In 2015, GE made the next step, with dramatic changes to its strategy and operations, to emphasize and capitalize on its digital capabilities with the creation of GE Digital. This move has helped GE bring together all the digital capabilities from across the company into one organization with a bold ambition to create a digital show site and grow software and analytics enterprise from \$6 billion in 2015 to become a top 10 software company by 2020.

Full sponsorship from the senior leadership has helped GE in its journey. Open innovation is embodied in its innovation centers across the globe, from the GE Garage in Chicago to the GE Health Innovation Village in Finland, which serves as an innovation campus for tech startups in the areas of wireless technologies, sensors, apps and cloud services.

Buy

Buying another company is usually the most appropriate path when there is a strategic imperative to 'own' a market. Buying may be the only option if the market inflection point is close and hiring the right talent is not possible. If the new opportunity bears little relation to the corporation's current business model, this provides a further reason to buy.

Engaging early with a digital disruptor is important to wrong-foot the competition and minimize the investment needed. The ideal moment is often when the startup is gaining significant traction and becoming a market leader. Corporate cores also need to compete with startups, such as Bla Bla Car, that are already using the buy route to achieve higher scale and increase their presence across countries.

A reason for failure of some acquisitions is that a full integration slows the newly acquired operations down. Achieving synergies and striving to integrate the processes of an innovative company can easily cause confusion and frustration.

Innovative companies thrive in an entrepreneurial setup; large organizations can maintain such a spirit by keeping the acquired company away from the mother ship and not undertaking a full integration. Cisco's acquisition of Meraki, which is now its cloud network business, is an example of how a large company has achieved success by keeping the innovative company away from the core.

Cisco announced more than 10 acquisitions in 2015 to focus on its nine strategic themes that include data center, cloud and security (one of their acquisitions was Lancope, Inc., a privately held network security company). "You will continue to see us invest resources across the full landscape, including on the investment side and on the acquisition side," said Rob Salvagno, Vice President of Corporate Development.

UPS recently acquired Coyote Logistics, a logistics startup founded in 2006, and a highly innovative, technology-driven, non-asset based truckload freight brokerage.¹⁰ Other business model-related acquisitions include Facebook acquiring Oculus Rift and WhatsApp, or BMW, Audi and Daimler buying Nokia's digital mapping service HERE, with the aim to better position themselves in the battle for self-driving and connected cars.

Partner

When there is no immediate strategic need to own, a corporation can partner with a digitally native disruptor to learn more about the market and its partner's model. A partnering approach is sensible when it makes sense to watch and learn about emergent opportunities, with an eye toward deeper partnerships or acquisitions in the future. Companies need to develop a more flexible and open mindset toward partnerships; partnerships such as coopetition are expected to play an important role in the digital transformation of incumbents.

Novartis and Google have joined forces to work on a smart contact lens that monitors blood sugar levels and corrects vision in a new way. This helps open up new revenue streams for Novartis, moving away from selling pills to a more holistic offering for patients by enabling them to better monitor their own health and reduce the cost of managing chronic diseases. Adidas has partnered with Spotify to launch Adidas Go, the first running app that uses iPhone's accelerometer to instantly match a runner's favorite music to their workout.

Invest

Investing in interesting startups is often a valid option, allowing an established company to connect with the right skills and capabilities. It will also avoid hindering entrepreneurial forces with a setup focused on internal governance and reporting, which could undermine the startup's agility, velocity, boldness to fail, openness and attractiveness to technology-savvy talent.

Incubate/accelerate

Investment and incubation/acceleration might seem similar endeavors. But while the former is usually focused on external innovation and independence from the corporate core, the latter represents a closer relationship to the funding company, deploying corporate internal capabilities, infrastructure and resources to the startups. Internal incubators are frequently used as a vehicle for intrapreneurship.

Corporate incubators and accelerators need to precisely outline both internal benefits and incentives for startups and entrepreneurs, and a clear strategy, vision and incubation

Corporations must set a commitment and clear goals for a corporate venture capital arm that remain untouched in case of a CEO change.

Ultimately, corporate venture capitals (CVCs) should aim to set up a good portfolio of investments, thus integrating themselves in the standard venture capital (VC) landscape, with similar conditions, deal flow and capital commitment. The startups they screen do not necessarily need to be constrained by competition with the core business.

Support from top management, a clear focus on objectives and recognition that CVC activity is risky are needed. Setting up a framework for internal collaboration (not control) of the ventures is optional.

process. Furthermore, capital and leadership commitment, efficient processes, the involvement of entrepreneurially experienced leaders and a commitment to risk are necessary. Frameworks to enable business unit collaboration and plug-and-play catalogs of services are key. In addition, mentorship, prototyping, launching and scaling services should be considered.

Companies following a corporate incubator approach can benefit from an increased deal flow in business models and technologies, and from an entrepreneurial culture. Great examples are Wayra (Telefónica), Shell Foundation, AT&T Foundry, Adobe's Kickstart, LinkedIn [in]cubator, Ericsson's Ideaboxes, Siemens's Frontier Partners and METRO Group's Techstars.¹¹

"Companies, both large and small, are realizing that they don't have the luxury of time to innovate; they need to look at partnerships or acquisitions much sooner than they would have done earlier."

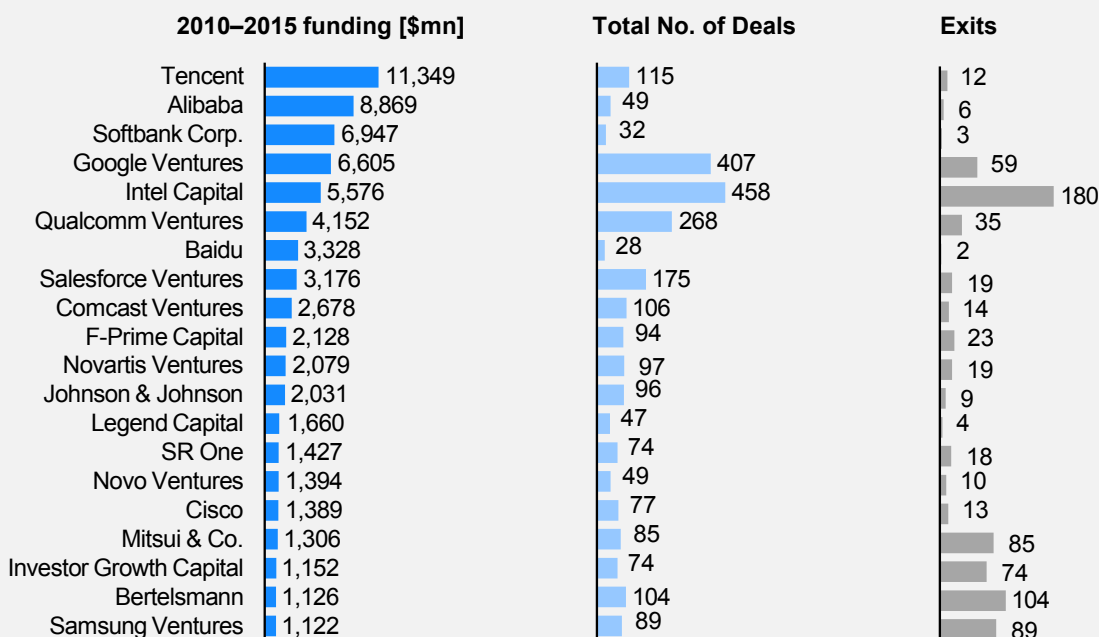
– Mohanjit Jolly, Partner DFJ

The importance of corporate venturing

For large enterprises, active corporate venturing is an important strategy, helping them acquire innovation, protect against disruption and find the right talent. Companies wanting to get ahead of the technology curve, and those looking to stay on top of the latest innovation, are driving a high proportion of this activity.

Infographic: Top 20 Corporate Venture Capitalists

The increase in the value of investments being made by CVCs has outstripped the growth in investment levels by angel investors, (non-corporate) VCs and private equity (PE). The number of CVCs is also growing (by 40% in the United States between 2013 and 2015). The top 20 CVCs globally are shown in this chart:



Globally, there has been an increase in CVC activity and, in just 12 months, the value of these corporate venture capital investments grew by almost 95%, reaching \$67 billion in September 2015. Despite the increase in the level of

investments from CVCs, they still only make up a relatively small proportion (a fifth) of total funding. Consequently, many VCs and private equity firms remain relatively unruffled by the impact that CVCs have on their business, while acknowledging that CVCs such as Google Ventures are big players.

Other noteworthy examples include the Swiss pharmaceutical giant's Novartis Ventures, Qualcomm Ventures, Softbank and Cisco Investments.

There are several critical success factors to be considered when setting up VCs.

- Think of venturing as an ecosystem play, balancing internal research with entrepreneurs to identify future areas of innovation and disruption.
- Get the right team, made up of experienced VCs, founders, etc.; establish the right compensation framework for the team.
- Build the right structures to source deals globally with an emphasis on a solid due diligence and creating exposure and opportunities to learn.
- Always acknowledge the politics.
- Help the portfolio companies build momentum.
- Have the right KPIs to track and analyze the value of investments.

Google Ventures – using analytics to drive investment decisions

Google Ventures is one of the most active and successful CVCs, employing 80 people with more than \$2 billion under management. While Google/Alphabet provides the funds to be invested, portfolio companies remain independent and do not necessarily need to benefit Google itself. In some cases, they can even end up being acquired by competitors. In addition to providing design services that are 10 times faster than those of traditional agencies, Google Ventures hosts workshops intended to hone the product management and operational skills of the founders and employees of portfolio companies.

Google Ventures' use of data analytics and algorithms to assess deals and analyze as much data as possible before deciding where to invest differentiates it from competitors. Google's network of employees is vital in identifying potential portfolio companies, rewarding employees with a \$10,000 finder's fee if an investment is made in the firm they recommended. Google Ventures has already completed more than 50 successful exits, with returns far above market averages.

b. Digital operating models

It is not just changing your business model that counts. Many companies will also have to change how they deliver that business model, re-examining every aspect of their operations. This could involve introducing a digital operating model or adopting new technologies to find operational efficiencies. Many businesses are already making these changes, with 90% of organizations saying that they have significantly adjusted their operations. For the purposes of this report, an operating model is defined as the clear, 'big picture' description of the key relationships between business functions, processes and structures that are required for the organization to fulfill its mission. It is a description of how people, teams and organizational units interact. It is the critical link between strategy definition and execution.

This section describes operating model archetypes designed for the digital era and outlines the steps that are needed to implement them. In addition, several initiatives that can achieve significant efficiencies for analog incumbents – from reinventing R&D to introducing multi-speed IT – are assessed.

Technology is not just a cost

Disruptive technologies are already being applied – or are on the verge of becoming reality – throughout incumbents' value chains, enabling increased efficiency or new revenue sources. These technologies include:

- **Sensors:** Environment-sensing devices that are either passive (sensing) or active (actuating). They are often networked to collaborate with other smart objects, humans or applications. Sensors will become ubiquitous and inexpensive.

- **RFID/near field communications (NFC)/beacons:** Tags, labels or cards that can exchange data with a reader using radio frequency signals. Besides supporting improvements in the customer experience, they can be beneficial for the enterprise, e.g., by better monitoring and tracking inventory.
- **Machine-to-machine communication:** Put into use for monitoring machines and for automated production applications, reducing maintenance costs and optimizing productivity along the supply chain.
- **Robotics:** No longer a vision but already a reality within all automobile manufacturers, the semiconductor sector and logistics-heavy enterprises.
- **3D printing:** Enables new ways of prototyping, reducing inventory sizes and repair costs and will become mainstream in manufacturing in the next three to five years. On the other hand, 3D scanners are imaging devices that collect distance point measurements from objects and translate them into virtual 3D objects.
- **Drones:** Being increasingly showcased for delivery services and for monitoring exercises when equipped with relevant sensors.
- **Blockchain and cryptocurrencies:** Bitcoins are increasingly being accepted as a payment method by retailers while blockchain and fee avoidance are being explored.
- **Virtual and augmented reality:** Have attracted interest from manufacturers as tools for avoiding or significantly reducing costly maintenance work, for modeling experiences or for creating captivating experiences for customers.
- **AI/cognitive computing/machine and deep learning:** Machine learning and deep learning (a more advanced technology built around neural networks) enable computers to accurately perform new tasks after being trained using historic data sets.

Some analog companies are being held back from competing against digital disruptors both by an operating model that is unsuited to the digital economy and an outdated attitude to technology. In traditional thinking, technology is often viewed merely as a cost, but it can also be an important enabler of revenue generation. Many business leaders recognize this, with a recent PwC survey finding that 45% of business and IT executives across 51 countries saw growing revenue through digital enablement as a top priority.¹² This is underpinned by a Gartner/MIT CISR study which suggests that on an industry-adjusted basis, companies with above-average levels of digital revenue have been growing on average 1.5% faster than the industry mean. Above-average organizations also experienced lower costs and higher capital productivity.¹³

'No regret' digital capabilities

The following are a set of no regret capabilities that apply across industries, which are fundamental to the creation of digital operating models or operational efficiencies:

1. **Sense and interpret disruption.** Look beyond your own industry. Be prepared to blur the lines between the physical and digital worlds.
2. **Experiment to develop and launch ideas faster.** Stop innovating and look to solve customer problems instead. Develop platforms for fast and cheap experiments. Find or fund one venture that could most disrupt you.
3. **Understand and leverage data.** Organize data hackathons. Think beyond big data to consider different types of data. Find new ways to monetize data. Create an analytics team.
4. **Build and maintain a high-quotient digital team.** Be honest about how digitally savvy you and your workforce are. Create digital boot camps to reskill employees.
5. **Partner and invest for all noncore activities.** One of the characteristics of effective digital leaders is their intuitive understanding that the journey is not one to be undertaken alone.
6. **Organize for speed.** Ensure CEO support and the presence of a dedicated central team to drive the new digital growth supported by a team of digitally savvy executors.
7. **Design a delightful user experience.** User experience drives IT architectures, and not vice versa.

The successful adoption of new technology and integrating it into a company's operations has considerable potential to bring about efficiencies. The infographics below identify some of the efficiencies that technology can make possible.

Infographic: Cross-industry operational efficiencies

HR. Key technologies include virtual collaboration, peer-to-peer reputation systems and digital interviews. The use of talent portals for hiring was found to reduce talent and HR costs by 7%.

Finance. Innovations will include cloud accounting systems and AI to automate procedures. It is forecasted that these technologies will reduce the costs of the finance function by 40%.

IT. The most significant technologies include cloud computing, SaaS, AI, big data security, and, in the future, also quantum computing. Cloud computing alone can lead to IT costs savings of 25 to 50% (see Move to multi-speed IT below).

Supply chain management/procurement. Key technologies will include autonomous transport and drones, sensors for monitoring supply chains and 3D printing. Digitally enabled companies will incur procurement costs of 0.22% of net revenue, less than half of those of their peers (0.5%).

R&D. Crowdsourcing, AI and robotics are leading the shift toward the R&D of tomorrow, which could lead to key measures of R&D performance improving by as much as 20 to 40% (see Reinvent R&D and innovation management below).

Infographic: Industry-specific savings

Phase 1 of the Digital Transformation of Industries project identified a number of technology-enabled efficiencies for several industries:

Logistics. Over the course of the next 10 years, digital technology in the logistics industry will lead to creation of 2 million jobs and reduce carbon emissions by 10 million tons. The total value impact to the industry from key digital initiatives is expected to be \$1.5 trillion.

Healthcare. Robots, 3D printing, digestible sensors are all key technologies for healthcare innovation. Smart, connected medical devices could save the US healthcare system alone more than \$30 billion a year, while telemedicine in care homes could reduce hospital admissions by 35%.

Electricity. Key technologies include connected sensors and real-time analytics to create predictive maintenance systems for wind farms and other assets. Cumulative value at stake to the electricity industry in the next 10 years from digital initiatives is \$1.7 trillion with reduction in carbon footprint by 16 billion metric tons. Digital technologies will lead to creation of 3.5 million jobs in the electricity industry.

Automotive. The cumulative value to the industry from digital transformation initiatives over the next 10 years is expected to be approximately \$700 million. During the same time frame, these initiatives have the potential of saving close to 1.2 million lives and reducing carbon emissions by 540 million metric tons.

Consumer: Key digital trends in the consumer goods industry such as hyper-personalization, shift from products to services to experiences, smart factories, etc. are expected to result in significant synergies and savings to the industry. Total value at stake for the consumer goods industry from digital initiatives in the next decade is close to \$5 trillion. Time saved due to digital technologies will also lead to increased productivity at the workplace.

Schneider Electric and Box – deploying cloud computing to improve operational efficiency

Box is a cloud computing solution that provides file-sharing, collaboration and other tools for working with files that are uploaded to Box's servers. Schneider Electric uses Box for both internal and external sharing of files. Determined to find a solution that would address its users' needs for external collaboration and mobile access while giving IT centralized management and enterprise-grade security, Schneider's IT team conducted an audit of cloud-based solutions. Key criteria included user-friendly UI, simple global document-sharing and universal mobile access.

During Schneider's 4,200-person pilot, users were so satisfied that IT couldn't contain deployment. Employees were inviting colleagues to join so quickly that Box took off without any push from IT – at a rate of roughly 1,000 users every 1.5 weeks. As the rollout continued, IT integrated Box with the corporate social networking app Tibbr to get

feedback from employees. Schneider currently has roughly 67,000 users on Box and adoption continues to increase. Currently, 20TB of Schneider's data is currently stored on Box, none of which was previously accessible to IT. Schneider has been able to offload its on-premises file servers, cutting costs by 30%.

Introduce flexible operating models

With the right technology in place, analog companies can transfer to innovative and flexible operating models. Digital winners are able to rapidly adjust supply and demand or crowdsource innovation and production. To achieve flexibility of this kind in their operations, companies need to move to an asset-light operating model. This type of operating model can deliver a better return on assets and some notable advantages over asset-heavy models, such as:

- **Greater flexibility.** Respond faster to changing demand, advances in technology, new market opportunities and supply chain disruptions.
- **Lower profit volatility.** Firms with high-fixed costs rely on revenues to cover those costs, so net income depends on utilization, and profits can swing widely year-on-year.
- **Higher cost savings driven by operating at scale.** Asset-light models can help companies achieve scale without the need to invest capital.

With profits increasingly shifting to asset-light, idea-intensive industries that revolve around intangibles such as brands and software, capital-intensive industries are witnessing a decline in margins. A study by McKinsey reveals that the profit share of asset-light companies in the West has increased from 17% in 1999 to 31% today, pointing to a migration in value toward more idea-intensive companies. Manufacturers such as Apple and Qualcomm have record profits, which are five to eight times higher than the margins of companies holding more physical assets.¹⁴

Another type of asset-light, idea-intensive models, platforms have been able to outperform incumbents across some key metrics, justifying their higher valuation premiums. These metrics demonstrate that platforms have a leaner, nimble and agile operating model, better utilization of resources and an intense focus on R&D to drive their growth.

Figure 3: Financial performance of platforms versus incumbents (Source: World Economic Forum/Accenture Analysis)

Median	Revenue/Employee	EBITDA/Employee	NWC/Revenue	R&D/Revenue	TEV/EBIT
Platforms	483.77	81.00	-8.7%	9.3%	24.60
Incumbents	259.12	53.78	1.4%	5.8%	13.40

From an analysis of a number of leading companies that have fully embraced the potential that digital offers, five successful digital operating models have been identified. These models have been applied across industries and vary in their focus, but all are based on some common principles. They replace rigid approaches to technology, data and processes with flexibility, while also substituting a perfectionist and siloed culture with one that is open to innovation and interaction with customers and partners.

Five digital operating models

1. **Customer-centric.** This model focuses on making customers' lives easier and emphasizes front-office processes. Leading exponents include Nespresso and the UK retailer Argos, but it can be applied across industries. It works best with a culture that puts the client first and a decentralized structure that empowers front-line staff. Its success is best measured by a higher net promoter score (NPS).
2. **Extra-frugal.** This model thrives on a culture of 'less is more' and a standardized organizational structure. By optimizing manufacturing, supply and support processes, it can provide a high-quality service at a low cost. A prime example of this model is tire manufacturer Michelin.
3. **Data-powered.** Taking its inspiration from one of the precepts of the management theorist W. Edwards Deming – "In God we trust. Others must bring data" – this model is built around prowess in analytics and software intelligence. Epitomized by Google and Netflix, data-powered companies have an agile culture focused on innovation through empirical experimentation. Usually built around a hub-and-spoke structure, this model measures success primarily through its return on investment.

4. **Skynet.** Named after the conscious, artificial general intelligence of the *Terminator* films, this model makes intensive use of machines to increase productivity and flexibility in production. Pioneered by enterprises such as Amazon and Rio Tinto, Skynet organizations are characterized by an engineer-led culture dedicated to automation. This model is often particularly suited to manufacturing processes. A key performance indicator is the ratio of full-time employees to revenue.
5. **Open and liquid.** This model looks outward with a view to creating an ecosystem that can enrich the customer proposition. Built around a sharing customer, all processes in organizations of this kind are characterized by a constant flow of dialog with the outside world. Examples include Facebook and PayPal. A key measure of success is NPS.

Companies may need to reinvent the way they operate, aligning the way they function to one or more of these five digital operating models. Here are two examples of companies that have successfully implemented digital operating models.

Haier – boosting innovation through greater autonomy

Haier is the world's largest maker of white goods with a 10.2% retail market share in 2014 and more than 70,000 employees. By focusing on innovation, CEO Zhang Ruimin turned a state-owned fridge maker on the verge of bankruptcy into the world's largest manufacturer.

Haier uses digital trends and technologies to diversify its products, optimize business processes, reduce the distance to the consumer and develop new products. The company created a community management system (called HOPE), which is an open-innovation ecosystem in which 670,000 users communicate with suppliers and other customers searching for new business opportunities. Employees are encouraged to bring fresh ideas and rewarded for innovative thinking. Haier reorganized employees into 2,000 ZZJYTs – a Chinese acronym for independent, self-managed units, each with their own profit and loss – to create an organizational structure that emphasizes autonomy. These operational changes have paid off with Haier Group's global turnover growing by 11% and profits increasing by 39% from a year earlier.

Xiaomi – fostering an entrepreneurial culture

Xiaomi focuses on low-end Android smartphones. In 2014, it sold 61 million handsets, bringing in annual revenues of more than \$12 billion. Xiaomi promotes an entrepreneurial culture, fostering a family-like setup, focused on mentoring, collaborations and adhocracy. Xiaomi's flat structures consist of its core founders, department leaders and 4,300 employees with an intense focus on performance and quality. The company engages with customers in an informal way by involving fans in discussions on product design, product development and promotions.

The results of this approach are illustrated by the fact that Xiaomi itself developed only three iOS languages; the remaining 22 were developed through crowdsourcing. Employees are required to spend 30 minutes every day interacting with customers. Xiaomi also established a peer-to-peer customer service platform. Xiaomi's innovative approach is paying off. In 2014, its year-on-year sales of smartphones tripled and since June 2012, the company's market valuation has increased tenfold to \$45 billion.

Strategic recommendations

Developing the right technological capabilities is just the first step in a company's digital transformation. Successfully identifying and implementing the most suitable flexible operating model will depend on other changes, particularly to strategy development and culture. There are a number of tangible steps that companies can take to successfully implement flexible operating models and exploit new efficiencies across their business. Companies need to embrace a leaner organizational setup, moving away from traditional hierarchies to a flatter structure, with higher levels of employee empowerment enabling faster decision making and greater agility. Companies have to emphasize agility. Even mission-critical functions should not be considered untouchable. If there is an opportunity to outsource functions and focus on variable costs rather than fixed costs, it should be thoroughly evaluated. Digital leaders' business processes follow a lean approach.

Create an effective digital strategy

Many analog companies are developing dedicated digital strategies, with three-quarters of respondents to the 2015 Harvey Nash CIO Survey saying that they have or are working on a formalized digital strategy. But the same study found that the biggest challenge businesses face in response to digital disruption is a lack of vision.¹⁵ To overcome this, companies may need to rethink their approach to strategy development. Many companies still rely on traditional five-year strategic planning horizons. In today's disruptive and uncertain market environment, this classic planning approach is destined to fall short. Instead, CEOs should consider moving to an experimentation-oriented focus that uses real-time data to give instant feedback about the effectiveness of their strategic initiatives. A move toward a one-year planning cycle would be beneficial. CEOs should also bear in mind that, with the pace of change so high, extrapolating from past data to guide future actions is unlikely to be successful. A culture of constant, iterative experimentation is more effective.

Moreover, businesses should move away from the concept of a unified strategy that may already be out of date by the time it is drafted. As Rita Gunter McGrath, a strategy professor at Columbia Business School argues: "Companies can't afford to spend months at a time crafting a single long-term strategy. To stay ahead, they need to constantly start new strategic initiatives, building and exploiting many transient competitive advantages at once." According to her research, companies should make eight shifts in the way they are operating:

1. Think about arenas, not industries.
2. Set broad themes, and then let people experiment.
3. Adopt metrics that support entrepreneurial growth.
4. Focus on experiences and solutions to problems.
5. Build strong relationships and networks.
6. Avoid brutal restructuring; learn healthy disengagement.
7. Get systematic about early-stage innovation.
8. Experiment, iterate and learn.

Ensure a supportive culture for digital transformation, starting with the CEO

Creating an effective digital strategy is critical, but so too is fostering a corporate culture that is open to innovation and will be supportive of the new strategy. There is a trend at present for firms to hire a chief digital officer (CDO) to drive through the changes that are needed to become a digital enterprise (see below). Installing a CDO, however, does not guarantee success.

Digital transformation is a huge challenge and support for the process needs to be fostered by a receptive corporate culture. Responsibility for creating this corporate culture – and for driving digital transformation – ultimately rests with the CEO. Many companies already appreciate this, with research finding that 38% of digital executives at large companies saying that the CEO was responsible for setting the digital vision and strategy of their company.¹⁶

The rise (and fall?) of the chief digital officer

The number of CDOs at global organizations quadrupled between 2012 and 2014. Despite this increase, 60% of organizations still did not have one in 2014, with Gartner finding that companies in the Asia Pacific region are twice as likely to have CDOs in place as companies in the North American or European, Middle East and African regions. The prevalence of CDOs also varies by industry with media companies (21%), telcos (13%), services (11%) and banking (10%) leading the way. In contrast, only 1% of utilities have hired a CDO. The CDO role has emerged to help lead organizations through digital transformation, but will likely disappear when businesses become fully digital. Successful CDOs will be 'digital transformation leaders' who will make the role obsolete, having transformed the business and operating models.

The digital age will lead to an evolution in decision making

Corporate decision making has been a long-drawn-out process in the past, with scenarios such as decision making spread over a year not unheard of. Decisions are no longer taken on the basis of managerial instincts, but are backed by insights driven by data. Organizations need to speed up their decision making by moving away from a centralized,

control-oriented decision-making body leading to decisions being placed in the hands of a few, to a setup where employees across the organization are empowered to take decisions, leading to increased self-management.

There is a need for organizations to increasingly look at streamlining decision making without direct involvement by too many heads of functions. Enterprises need to pursue edge-centricity by pushing information decision-making authority away from the corporate headquarters to customer-facing points. Tommy Bahamas, for example, enlisted the support of Medallia to understand and improve its customer experience by listening to its customers. Based on feedback from customers, Tommy Bahamas empowered front-line employees to take decisions and address concerns related to poor customer service.

Reinvent R&D and innovation management

Companies need to reassess every aspect of their operations, to ensure they are fit for purpose in a digital world. A prime example is R&D and innovation management. For many years, the classic way to build products has been to follow a regimented process called new product development (NPD), which entails a large number of fixed steps such as idea generation, idea screening, concept development and testing, business analysis, beta and so on. This approach was successful when the problem and the solution were well-defined.

The NPD approach is less suited to today's markets where uncertainty prevails and companies do not have the luxury of time to extensively work up their ideas and test prototypes. As a consequence, successful organizations are reinventing all aspects of product development, from how they generate innovative ideas to how they bring them to market.

New approaches to R&D and product development in the digital age

Crowdsourcing innovation

Using the crowd as an innovation partner not only helps improve the quality of ideas that are produced, but also proves more cost-effective than traditional in-house solutions. Crowds are energized by their own collective and individual motivations and interests. Gartner's research suggests that within two years, more than half of consumer goods manufacturers will obtain 75% of their consumer R&D capabilities from crowdsourcing.¹⁷

Alaska Airlines and GE, in partnership with Kaggle, put crowdsourcing to use to create algorithms to predict airline arrival times with greater precision. The winning algorithm proved to be 40% better at predicting arrival times as already existing technologies, leading to significant reduction in both crew and fuel costs.

GitHub, a Web-based Git repository, has created a streamlined way for software developers to collaborate by creating a single platform where they can write, share and revise code and tap anyone in the community for help. In this way, GitHub provides companies with greater visibility of the process, allowing workflow to be replicated for other clients.

Algorithmia, a marketplace for algorithms, is making finding and using algorithms easier by bringing together their creators and the software developers who need them. It can help companies eliminate the need to set up IT infrastructures to run algorithms and provides organizations with a cheap alternative.

Lean startup and minimum viable product

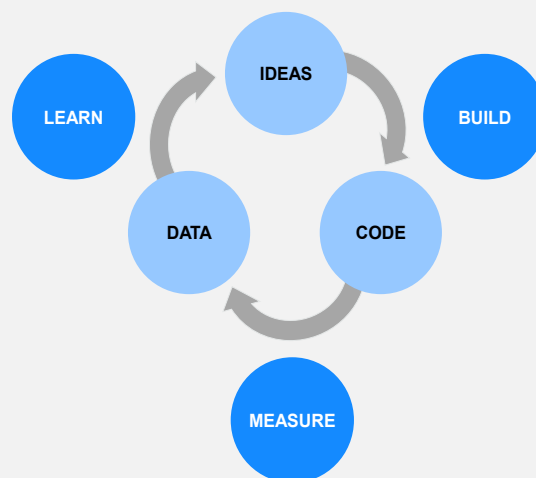
"Startup success can be engineered by following the right process, which means it can be learned, which means it can be taught." –Eric Ries, author and entrepreneur (from his book *The Lean Startup*)

At the heart of the lean startup movement are two key ideas: eliminate all expenses that do not contribute to creating value for the customer, and fail fast and often while eliminating waste. A willingness to accept failure can bring benefits for businesses by freeing up resources and people for other projects that could lead to future breakthroughs and by contributing to a more open and transparent corporate culture.

The fundamental idea is building minimum viable products (MVPs), i.e., creating the simplest possible product that can be brought to market. Once the product has been launched, the team can collect feedback from users and increase their chance of finding investors for the next round of development. The early websites of LinkedIn, Facebook, Twitter and Foursquare were difficult to navigate, but the companies used rapid feedback loops to understand key user requirements.

Despite its name, the lean startup method has also been adopted by larger companies and governments. The MIT entrepreneurship program, for instance, uses a variation of the lean startup movement called the 5x5x5x5 method, which creates an experimental approach to innovation by giving \$5,000 to five corporate teams, each with five members, who have five weeks to create products that meet customer needs.

Further methodologies to be considered by incumbents to close the cultural gap with startups and digital natives include Design Thinking, Scrum, Kanban, test collaboration tools in certain teams, e.g., Jira, Basecamp or the Javelin Experiment Board.



Apple – how to manage innovation

Apple has benefited from an energetic development community delivering apps and other mobile functionality to a large and growing user base, but its success is also founded on a rigorous approach to managing innovation. Apple has a very iterative, visual culture, where demos begin as soon as someone has something to show and continue weekly thereafter, moving up the hierarchy of approvals. Through constant iteration and refinement, the product gets better, and the focus is always on how to make the user experience as exceptional as possible.

All engineering tasks are tracked using bug curves, and, using statistical analysis, it is determined what progress needs to have been made at each point in the six to nine months leading up to the product being released. This data allows hard decisions to be made in each product team about what functionality and features are critical to the upcoming release.

Move to multi-speed IT operations

Another critical function where many analog companies can improve their capabilities is IT. This section outlines three specific areas that enterprises can focus on: multi-speed IT, maximizing returns from data and prioritizing security.

“Agile [iterative processes] versus traditional waterfall development processes are so foreign that you can only really implement it if it’s operating in a separate part of the organization unaffected by risk aversion and bureaucracy.” –Ripley Martin, Vice President, Global Head, Healthcare Strategy, Royal Philips

A recent Accenture survey found that 81% of CIOs believed that most IT organizations do not know how to operate as a multi-speed IT enterprise.¹⁸ Multi-speed IT is achieved by bringing together a network of skills, instituting a dynamic operating model and installing flexible governance models. The challenge is great, but the reward for the CIO is a pivotal role in an organization’s strategic business agenda. To create a multi-speed IT infrastructure, four key actions are needed:

Four key actions to creating a multi-speed IT enterprise

1. **Recognize the business need for different speeds of IT use.**
2. **Employ multiple governance and operating methods.** Introduce iterative methods to support changing user experiences.
3. **Rethink architecture needs.** Initiatives include segmenting into multiple speeds, simplifying legacy architecture and building an application program interface (API) layer to expose core data to faster-moving digital channels and ecosystem partners.

4. **Invent the new IT organization.** Determine where new skills are required and educate your teams in new methods such as iterfall (a mix of iterative and waterfall development) and agile operations. They should also be up to speed with new tools and techniques such as DevOps and APIs.

Multi-speed IT requires agility in the development of IT infrastructure. The culture and best practices of technology companies from Silicon Valley offer some insight into how that can be achieved. These enterprises foster an open, impatient culture that celebrates innovation and looks to collaboration and partnerships to create technologies faster than they can be built independently. Companies are also turning to cloud and open-source technologies, such as Apache Hadoop, to enable rapid, scalable improvements. Finally, they employ iterative development disciplines, coupled with automated tests, to create systems very fast.

WhatsApp – staying lean while growing fast

WhatsApp has achieved astonishing growth in users while retaining a lean operating model. At the time of its acquisition by Facebook in October 2014, WhatsApp had 450 million users but had just 35 engineers. By 2015, the user base doubled but the company had only recruited an extra 15 engineers.

A significant factor in WhatsApp's ability to scale is its decision to use a programming language called Erlang to build its service, which is well-suited to juggling communications from a huge number of users, and allows engineers to deploy new code on the fly. Erlang lets coders work at high speed by offering a way to deploy new code to an application even as the application continues to run. WhatsApp uses Erlang and an operating system called FreeBSD, in an effort to keep its operation as simple as possible.

Maximize returns from data

To exploit the potential of new, data-driven business models, companies will need to use data to disrupt their business (before someone else does). Companies have to explore the entire big data ecosystem and be nimble. The big-data landscape is in a state of flux with new data sources and big-data technologies emerging, such as Hadoop and Hive.

Enterprises will need to:

- Explore all available data and be prepared to consider a broad range of technologies when developing a big-data strategy that could prove differentiating in the market.
- Start local, end global; users in larger companies are winning big by starting small and staying realistic with their expectations, helped by frequent, direct CIO involvement and strong C-suite support.
- Focus resources on proving value in one area and then letting the results cascade across the wider enterprise, rather than attempting to do everything at once.
- Remember the differences between good data and bad data; every hour spent hunting down an orphan database hurts the return on investment of your analytics team, so businesses need to make data as ubiquitous as possible.

Prioritize security

“My key recommendation for CEOs is that they should be spending 3% of revenues on security; today, they are probably spending <0.3%.” –Nico Sell, Cofounder and Co-Chairman, Wickr

With cybercrime a growing threat, security should not just be the responsibility of the IT department and the CTO or CIO. Prioritizing security can, in fact, reduce operating costs. A properly funded security program can save an average of \$2.8 million in attack-response and management costs. The appointment of a high-level security leader (or a chief security officer at the board level) can reduce costs by \$2 million.

But despite the cost savings that improved security can bring, many companies need to rethink their approach to security. Current arrangements are often ineffective, with the FBI estimating that only 6% of corporate breaches are detected by IT departments. The prevalence of insider attacks, (which accounted for more than half of all cybercrime costs for organizations), coupled with the growing number of devices, technologies and users accessing corporate IT systems, means that a shift is needed from traditional network control and perimeter management security strategies to ones that focus on protecting interactions among users, applications and data.

Breaches of corporate security are inevitable, so the focus should be on protecting data. Tom Patterson, general manager of global security solutions firm Unisys, calls this new approach micro-segmentation: building lots of little walls around those parts of your business containing data you can't afford to lose.¹⁹ In addition, companies should consider further measures to improve security, such as using big-data analytics, hacking teams or quantum computing. Palantir, for example, offers services that harness data analytics to detect breaches and secure data. Salesforce.com has established ethical hacking teams whose role is to find and eliminate complex vulnerabilities across the organization.

Get your operating model ready for partnerships

Only operating models that support partnerships and platforms will survive in the future. Among the Fortune Global 2000, digital industry platforms and ecosystems are fueling the next wave of breakthrough innovation and disruptive growth. Increasingly, platform-based companies are capturing more of the digital economy's opportunities for strong growth and profitability. By understanding the network multiplier effect of platform-driven ecosystems, companies can digitally tap into the many networks of people who are working toward the same goals. They can then leverage these networks to drive sustainable growth in faster and economically smarter ways.

Enterprises realize that their fortunes depend not only on their own successful efforts, but also on the success of their platform-driven ecosystems. They offer significant benefits such as operational efficiencies, scalability, improvements in innovation and a better customer experience. But to fully leverage the ecosystem benefits, companies have to rethink several aspects of their operating model:

- Culture (sharing approach, openness)
- Business processes (tailored to collaborate)
- Collaboration (knowledge management, communications)
- Technology (service-oriented architectures (SOA), APIs, social networks, infrastructure and security)

New collaborations are emerging that stretch well beyond historical industry boundaries, nurtured by mobility, payment systems, open information, energy management and infrastructure development. Companies are already recognizing these changes, with 81% of respondents to a recent Accenture survey believing that industry boundaries will dramatically blur as platforms reshape industries into interconnected ecosystems.²⁰

Philips Healthcare & Salesforce.com – joining forces to change the way healthcare is delivered

Philips Healthcare is teaming up with Salesforce.com to build a platform that it believes will reshape and optimize the way healthcare is delivered. The platform is intended to create an ecosystem of developers building healthcare applications that will enable collaboration between doctors and patients across the entire spectrum of care, from self-care and prevention to diagnosis and treatment through to recovery. Improvements in health outcomes would result from the platform enhancing the decision-making capability of medical professionals and encouraging patients to be actively engaged in their own treatment.

Philips envisions that a vast ecosystem can be created to achieve these improved outcomes, bringing together electronic medical records with diagnostic and treatment information obtained from Philips' imaging and monitoring equipment, and data from personal technologies such as Apple's HealthKit.

To lay the foundation for digital industry platforms and ecosystems, organizations should identify potential digital partners and ecosystem scenarios in three categories: existing business partners becoming digital partners, new digital partners within your industry, and new digital partners outside your industry.

Based on their digital business strategy and priorities, companies need to consider the option best suited to them – whether they will create the ecosystem on their own, join or partner with others.

c. Digital talent and new skills

This section considers three aspects of the digital talent and skills challenge: how enterprises can attract, retain and develop the right talent through improving company culture and offering incentives that are relevant in the digital age; the imperative for organizations to bring their leadership to the digital age; and how companies need to adapt to

different ways of working, providing frameworks and strategic recommendations for integrating robots or on-demand workers successfully into their business.

Attracting and retaining talent in the digital age

In the digital economy, two factors have been particularly influential. First, transparency has become the new normal, with job applicants now having access to a wealth of inside information and peer reviews. Second, the competition for talent has intensified, with the digital skills gap widening.

The Internet has revolutionized transparency, with Glassdoor alone having reviews of more than 423,000 companies. Organizations are now publicly accountable for the way they operate, and just like you would not eat in a restaurant with poor reviews, employees do not want to work for organizations that are badly rated.

The only effective response for businesses is to embrace transparency by becoming a workplace with nothing to hide and where people prefer to work. This approach can pay off for companies, with research finding that “employee satisfaction is associated with superior long-run returns, valuation and profitability in countries with high labor market flexibility.”²¹ Transparency and open communication in the workplace contributes to better performance through improved creativity and speedier problem solving. Research by ClearCompany discovered that businesses with high levels of engagement and communication with employees reported productivity levels that were 22% above their peers. They were also 50% more likely to have lower levels of employee turnover.²²

At the same time, companies are collecting more insights than ever about their workforce. Humanyze, a firm founded at MIT, illustrates this new dynamic, with a system that uses a smart employee badge to collect employee behavioral data, which it links to specific metrics, with the goal of improving business performance. Organizations need to define the level of transparency that is appropriate to their business. Ethan Bernstein suggests in “The Transparency Paradox”²³ that transparency should be mitigated with zones of privacy, allowing employees space to carry out localized experiments and not be distracted by attempts to avoid surveillance by management.

Glassdoor – creating a more transparent labor market

Glassdoor is one of the fastest growing jobs and recruiting sites in the world. It holds a growing database of more than 8 million company reviews, CEO approval ratings, salary reports, interview reviews and questions, benefits reviews, office photos and more. Unlike other jobs sites, all of this information is created and shared entirely by employees through a peer-to-peer network.

Buffer – embracing transparency to attract talent

Buffer is an application designed to manage social networks by providing the means for a user to schedule posts to Twitter, Facebook and LinkedIn at the same time. Buffer operates with complete transparency, an approach that has allowed it to attract high-quality talent across the world. Buffer received 2,886 applications for job openings when salary transparency showed up on its blog, compared to 1,263 in the 30 days beforehand. “We’ve never been able to find great people this quickly in the past,” said CEO Joel Gascoigne. He also found that “the percentage of people who were a good culture fit was a lot higher.”

Be a great place to work for millennials

Today, a new set of principles is emerging within organizations, driven by an incoming generation of workers who feel empowered to choose where and how they work. Millennials have grown up as digital natives and are used both to sharing data about themselves and to having instant access to a wide variety of information about individuals, products and companies.

Companies need to work hard to attract millennials. First, millennials are the largest generation alive. By 2020 there will be 86 million millennials working in the United States and they will account for 40% of the working population.²⁴ In addition, they have the digital skills and understand what younger generations look for in products, services and solutions.

“Hiring millennials in general is more challenging, since they want meaning and purpose in their work.” – Andrew Chamberlain, Chief Economist, Glassdoor

Zappos – company culture for millennials

Zappos, an online clothing retailer, believes that “the best ideas and decisions are made from the bottom up”. Soon, Tony Hsieh may not carry the title of CEO, but become another employee with no title. Holacracy, a management structure based on the tasks a company needs to accomplish, rather than a standard reporting structure, is at the core of the Zappos culture.²⁵ Other initiatives include empowering employees to deal with customers in the way they see best, giving them the freedom to let their personalities shine on the Zappos Twitter account, and encouraging them to work remotely at coffee shops and co-working spaces to increase personal connections that will boost creativity.

According to a World Economic Forum survey, career advancement (48%), company culture (38%) and training/development opportunities (32%) are what millennials are looking to get from their employer.²⁶ At present, many companies are not equipped to attract millennials. From a geographic standpoint alone, organizations away from ‘desirable’ locations may struggle because the top 10 destinations cited by millennials to work in the United States are cities.²⁷

However, there are a number of important variables that companies can control. Employee satisfaction derives from many factors, but technology is playing a larger role than ever before. Millennials, especially, align themselves with technology. Consequently, organizations should work to support collaboration tools and hardware preferences in the workplace to improve employee satisfaction. Research has shown that this can have a positive impact on employee morale, with a study by Gordon et al. reporting that organizational support for social media improved employee satisfaction.²⁸

Creating a workforce with digital skills

“There’s never been a better time to be a worker with special skills or the right education, because these people can use technology to create and capture value. However, there’s never been a worse time to be a worker with only ‘ordinary’ skills and abilities to offer, because computers, robots and other digital technologies are acquiring these skills and abilities at an extraordinary rate.” –Erik Brynjolfsson and Andrew McAfee, MIT Initiative on the Digital Economy (quote from their book *The Second Machine Age*)

An ability to use technology effectively will be highly sought after for both skilled and unskilled workers, with 22% of global job growth expected in digital positions by 2022.²⁹ At the same time, as automation plays an increasing role, ‘softer’ interpersonal skills will grow in importance.

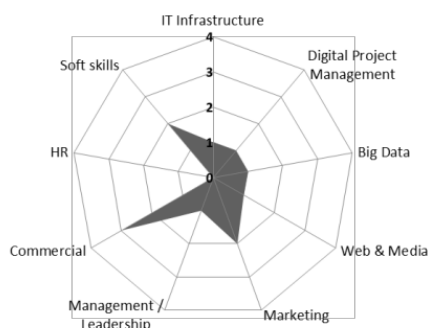
The following example illustrates the need for both aspects of this skill set: IBM is in the process of training its cognitive computing system Watson to analyze more than 30 billion medical images to help doctors diagnose ailments such as cancer and heart disease. According to Mike Svinte, Vice President, Global Client Engagement, IBM Watson Health: “Close to 90% of all clinical data is actually core images. Today, a radiologist may need to look at a thousand images to see size, growth and movement”.³⁰ If radiologists have the skills to successfully harness the power of the technology, Watson will enhance their ability to make accurate diagnoses. Soft interpersonal skills will also still be needed. It is hard to imagine a world in which a machine, rather than a doctor, tells a patient they have cancer. To date, interpersonal and human skills remain something technology cannot replicate.

The imperative to recruit people with the right digital skills is becoming increasingly urgent. In a PwC report, 73% of CEOs cite skill shortages as a threat to their businesses and 81% say they are looking for a wider mix of skills when hiring.³¹ Digital transformation is already prompting the creation of a range of new roles within organizations, which demand a new set of skills, as outlined below.

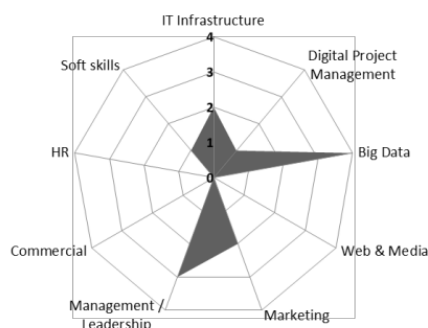
Figure 4: Exemplary new job roles of the future

Commercial	Technology	Web	Marketing	Facilitation	Human Resources
E-business manager	Scrum Master	Web project manager	Digital marketing professional/Micro marketing	Service design thinker	Design learning manager
Digital account manager	CDO (Chief Data Officer)	Webmaster	Digital communications manager/Digital planner	Crowd innovation facilitator/Fabmanager	Digital work experience expert
Digital product manager	Data scientist	Web designer	SEM/PPC manager	Community manager/social media manager	Employer brand director (including social media strategist)
Digital business developer	Data protection officer	Web integrator	Digital copywriters	Editorial manager	
Fraud manager	Traffic manager	Developer	Media acquisition manager	Content curator	
		SEO manager	User experience designer	Chief listening officer	

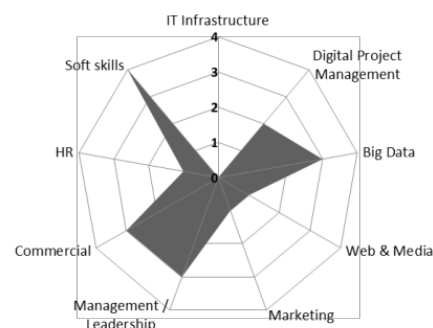
Digital account manager



Chief data officer



Service design thinker



Source: Accenture digital job competency dictionary: 0-4 (where 4 is most important)

Enterprises need to join forces with universities, colleges and schools to create a workforce with the right digital skills. Some companies are already developing impressive initiatives.

Lockheed Martin – supporting STEM skills

Lockheed Martin's 56,000 engineers, scientists and IT professionals are providing support to STEM education outreach activities for students from elementary school through college.³² As part of one of these programs, Lockheed Martin volunteers meet with girls between 9 and 12 years old, with a view to building their interest and confidence in science and technology.

While public and private partnerships are essential for bridging the long-term skills gap, the development of key skills that are needed should start within the organization. Some companies are performing better than others, with digitally maturing organizations four times more likely than organizations at the lower end of the spectrum to provide employees with the skills they need.³³

It is critical to take a long-term view with regard to training. Accepting workers will come and go is the first step in realizing this vision for developing talent. Google's Marissa Mayer started a rotational training program to home-grow managers, stating that if "we get two to four good years, and if 20% stay with the company, that's a good rate".

"We have trained over 50,000 people globally on how to deal with data. We have a whole partner community. We have 100 partnerships with universities. We have MOOCs. How we do that? We try to be an innovator. We work in the OS community, and we also help others build careers." –Tom Reilly, Chief Executive Officer, Cloudera

Rather than one-off classroom-based training sessions, organizations should work to develop a variety of training options such as massive online courses (MOOCs), employee boot camps or rotation schemes as part of a comprehensive, ongoing training curriculum.

Nestlé's – building digital skills in the workforce

Nestlé set up The Digital Accelerating Team (DAT) to upskill its employees on digital. The DAT is Nestlé's digital test lab, where it experiments with new and emerging technologies, and works with startups and technology companies through so-called corporate hackathons. Pete Blackshaw, Nestlé Chief Marketing Officer, commented that the "DAT is giving our markets and brands a reality check on what's required to do [digital marketing] extraordinarily well. You can't just completely outsource it to an agency. You really have to build operations around that. Moreover, you need to build models that understand how to incentivize and reward excellence."

Bring leadership into the digital age

Creating a workplace that attracts high-caliber digital workers requires a progressive and forward-looking organizational culture. The impetus to set this culture has to come from leadership. The traditional attributes that set a good leader apart remain relevant, but today's leaders also need to be well-versed in digital and how it's disrupting their business. CEOs such as Jeff Immelt at GE, Microsoft's Satya Nadella and Marc Benioff of Salesforce.com are moving away from hierarchical, autocratic top-down approaches and looking instead to create more open, collaborative environments, powered through digital collaboration tools. This resonates well with millennials.

"CloudFlare is looking for people that are passionate for their mission to build a better Internet. Two personality traits we have a lot at CloudFlare – curiosity and a continuous willingness to learn – as well as empathetic people." –Matthew Prince, Chief Executive Officer and Cofounder, CloudFlare

Relatively few companies make radical changes to their boards and leadership that may be needed. A study by Russell Reynolds³⁴ found that of the 300 largest companies in the United States, Europe and Asia, 217 had no digital board members; 66 of the companies had one digital board member. Just 17 had highly digital boards (see Figure 5 for examples) with more than one digital member; 11 of these highly digital companies were in the technology sector.³⁵

Successful leaders are able to instill a culture where digital can flourish within organizations. For example, Gmail emerged out of Google's now famous 20% time where leaders encouraged their employees, in addition to their regular projects, to spend 20% of their time working on what they think will most benefit Google. Employees need to feel empowered to experiment with digital in a risk-free environment. To achieve this, leaders need to embrace failure as a prerequisite for success. Amy Errett, CEO and Cofounder of Madison Reed, notes that "if your employees view you as an obstacle, they're much more likely to seek opportunities elsewhere. Focusing on an employee's mistakes will only make them increasingly afraid of failure and less likely to take the necessary risks to do truly outstanding work."³⁶

When appointing new CEOs, it is essential for boards to understand changing role profiles. Below are six key roles they can fulfill:

- **Creator of vision and mission.** Expand company's mission statement to encompass a transformation purpose.
- **Strategic planner.** Move from five-year to one-year planning cycles, driven by data and predictive analytics. Focus more on experimenting instead of long-term planning.
- **Driver of information-based business models.** Find and develop new products and services that are (fully) data- and information-based for scalability.
- **Enabler of the shift to on-demand operating models.** Benefit from communities, crowdsourcing and staff on demand.

Figure 5: Notable Digital Director Additions in Consumer and Technology Companies

	Company	Recent Digital Director Appointment	Select Digital Experience
Consumer	Walmart	Kevin Systrom	Instagram
	Walt Disney	Jack Dorsey	Twitter, Square
	Sainsbury's	Matt Brittin	Google
Technology	STAPLES	Raul Vazquez	Walmart.com
	T-Mobile	Lars Hinrichs	XING, HackFwd
	SONY	Joi Ito	Digital Garage, Technorati, Infoseek
	NEC	Kaori Sasaki	eWoman

Source: Russel Reynolds

- **Innovation promoter.** Promote external innovation and go beyond product, process and service innovation.
- **Operational excellence driver.** Automate processes in all departments.

Create environments where humans and robots can work successfully together

“We believe that the real power of artificial intelligence is to augment what humans are great at and make them better at what they do – making humans super.” –Paul Daugherty, Chief Technology Officer, Accenture

Over the next few years, one of the most notable changes will be increasing instances of robots and humans working together. For decades, humans have successfully resisted the rise of the robot. As a 1965 NASA report about manned space flight famously put it, “Man is the lowest-cost, 150-pound, nonlinear, all-purpose computer system which can be mass-produced by unskilled labor.”

Recent technological advances are removing any grounds for complacency among the human workforce, as technology is increasingly acquiring skills that previously only humans could master. Vast advances in computational capabilities in areas such as image and speech processing are redefining human versus computer roles. Technology such as cognitive computing is now a viable substitute for routine human perception tasks, which can range from sorting items on a factory floor to identifying specific features in images. Cognitive technologies are set to automate or augment a wide range of work activities that today are largely done by humans, including manual workers and knowledge workers.

IP Soft – using artificial intelligence to improve customer service

IP Soft developed Amelia, an artificial intelligence platform that acts as a virtual agent. By leveraging cognitive technologies, ‘she’ is capable of understanding people’s questions – and even their emotions – when they call or email. Using the same instruction manuals as, for example, call center operators, Amelia can be deployed straight from the cloud into real-world scenarios. If Amelia cannot find the answer, she escalates the question to a human colleague. She then observes her colleague’s actions and absorbs the information for future reference.

While uncertainty remains about exactly which human roles might be rendered redundant by intelligent machines, it is certain that robots and humans will increasingly have to work alongside one another in the workplace. Robot sales are expected to grow at 12% a year for at least the next two years and some technologically advanced economies are already building up high ‘densities’ of robots, with 437 industrial robots for every 10,000 employees in South Korea’s manufacturing sector.³⁷

Rethink Robotics – creating affordable and easy-to-use robots

Rethink Robotics (RR) is designing accessible robots for manufacturing that can be used and trained by lower skilled workers. Baxter requires no complex programming or costly integration; it also has a uniquely low price point, offering an alternative to low-cost offshoring for manufacturers of all sizes. As a result, Baxter is being introduced to a wide range of plants that could never previously consider a robotic automation solution.

Intera, a graphical user interface enables nontechnical personnel to train, create and modify programs on Baxter as needed. RR wants Baxter to be a platform that anyone can use to improve on existing applications or develop completely new ones.

Organizations stand to benefit from automation and AI, with MIT estimating that there is an 85% reduction in workers’ idle time when they collaborate with robots.³⁸ Furthermore, 84% of managers at all levels believe machines will make them more effective and their work more interesting. Automation can also be advantageous for entire sectors. Take logistics: autonomous trucking convoys are predicted to create \$31.8 billion in new value for the industry. But this development would put at risk the jobs of 3.5 million truck drivers in the United States. Some firms are already successfully introducing automation into their operations in a way that complements the contribution of their human workers.

Glory Ltd – designing robots for the workplace

As a result of a shortage of labor, Glory Ltd is trialing 19 robots costing about \$60,000 each. These machines have eye-like sensors and two arms that assemble made-to-order change dispensers alongside their human colleagues in a factory employing 370 people.

Rio Tinto – using digital technology to make mining safer and cleaner

Rio Tinto is empowering its workforce with intelligent tools in its ‘mine of the future’. The initiative is improving safety, productivity, energy consumption and environmental impact. The mine of the future concept relies on people and computers working together, one augmenting the other, rather than viewing human and machine as mutually exclusive sources of knowledge. Workers are empowered to operate more effectively on the ground – software interprets complex data sets and creates a user-friendly 3D display of a mine that is easily and quickly understood by the mining workforce.

Prepare for the rise of the on-demand workforce

Just as increasing automation in the workplace has sparked a fierce debate, so has the growth of the on-demand economy. A recent study found that as many as 53 million Americans were freelancing in 2014 (either as their primary source of employment or to supplement their main job), contributing \$715 billion in earnings.³⁹ The gig economy covers a diverse range of activities from crowd work to on-demand work arranged through platforms such as Upwork or TaskRabbit. It can include skilled jobs such as programming and translation to more routine work such as cleaning data or tagging photos.

The on-demand economy can be beneficial for businesses, enabling them to access a much wider range of expertise and skills that might not be readily available in their existing talent pool. Other benefits include functionality, speed, flexibility and mitigation against inertia and traditional thinking in the organization.

Traditional channels for sourcing both contingent and full-time workers are slow, often taking weeks to fully onboard employees. The typical process for onboarding a contingent worker has a variety of steps such as drafting, waiting for and reviewing applications. Moreover, once accepted, there is a legal process that is undertaken and only then can the employee be onboarded. The online gig economy eliminates much of this process through on-demand labor platforms such as Upwork and Amazon Mechanical Turk. In this way, organizations are able to avoid the long and often costly internal transactions that would otherwise be associated with hiring workers, such as benefits, legal compliance, payroll taxes and pensions. For example, a company such as Handy, which runs a platform for on-demand cleaners, can run with 20 to 30% lower labor costs than its competitors.⁴⁰ Furthermore, organizations stand to benefit from drawing on extended workers to gain access to a much wider range of expertise and skills than may be readily available in their existing talent pool.

Amazon Mechanical Turk – a platform for the on-demand workforce

Amazon Mechanical Turk (AMT) is an online talent platform for human intelligence tasks. A Human Intelligence Task, or HIT, represents a single, self-contained task that a worker can work on, submit an answer, and collect a reward for completing. Organizations are able to benefit from the power of AMT’s 500,000-strong workforce to get thousands of HITs completed in minutes, reducing the cost, time and need for large in-house workforces.

Upwork – speeding up talent recruitment

Upwork is leading the way in the online gig economy, hosting the world’s largest on-demand freelance talent marketplace with more than 4 million jobs advertised and 9 million registered freelancers across more than 2,700 skills available to complete them. Research by Upwork suggests that finding and onboarding talent in the bricks-and-mortar world takes an average of 43 days, compared with three days in the virtual world. Companies such as Unilever, Panasonic, Pinterest, Amazon, Cisco and Microsoft benefit from Upwork.

Strategic recommendations

Attract and retain talent

Attracting and retaining talent starts by listening to what employees are saying about your firm, both externally and internally, and taking these sentiments into account. Organizations consequently need to ensure they monitor relevant discussions on social platforms such as Twitter, Facebook, LinkedIn and Glassdoor. Referred employees have a longer tenure and higher job performance.⁴¹

Organizations, therefore, should focus on incentivizing their employees to use online networks to refer potential employees. Creating an effective digital referral program, with the right incentives for internal employees to champion it, is vital to tap into this potential source of high-caliber workers.

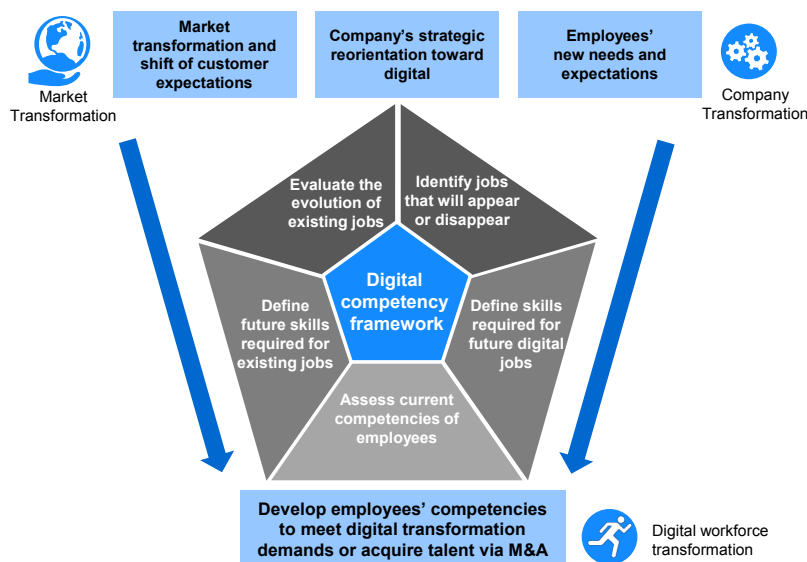
To become the employer of choice for millennials, organizations need to:

- Formulate a multi-year workforce engagement strategy for millennials. Identify the places in your organization that will best suit their skills with digital technology and create adequate rotation programs.
- Jointly define your values by speaking with employees and taking on board their core aspirations and principles – do this throughout the ranks and preferably in person. “You don’t need to ask employees to publish their individual values on the company intranet ... but you do need to convert these aspirations and values from implicit hints to explicit points.”⁴²
- Empower and incentivize the workforce. For example, with employee stock-option plans, project leadership responsibilities or interesting training opportunities. Millennials cite development as one of their top priorities.⁴³
- Build workspaces that attract digital talent. Employees appreciate customized work experiences, created through tailored design of physical workspaces or virtual workplace policies. Ricoh’s innovation team worked out of a collocation space in Santa Cruz for several months to observe how people work and where they hit pain points. Dynamic and flexible work environments encourage spontaneous collaboration and interaction in the workplace. Consider remote and flexible work options to mitigate the effect on recruitment and retention of being located in an undesirable location.
- Create policies that support collaboration and knowledge-sharing tools (e.g., Facebook@work, Salesforce Chatter, Slack, Yammer or Sprinklr among others) and hardware preferences (e.g., bring your own device) in the workplace to improve employee satisfaction.

Creating a workforce with digital skills

With the current and future talent shortages, organizations need to actively develop the skills they need in house by making training a critical component of their talent management strategy. Employers need to be ambitious in their efforts to train and develop their workforce. They need to:

- **Develop required competencies within the workforce** by assessing the skills that are currently needed and creating training strategies that are adapted to these. Do this through mapping out where the high-value work is in three years’ time versus today.
- **Mine your own organization for hidden talent** by regularly assessing employees’ competencies and match these with in-demand skills. Use digital tools such as Rexx systems to quickly and easily enter, retrieve and validate your employees’ skills.
- **Bring new skills into the organization** by hiring digital leaders and digital natives. Quickly tap into skills from outside the company for ‘just-in-time’ competencies by running employee exchange schemes with other digital



Source: Accenture

organizations. Employee rotation schemes, such as the one run by P&G, Google and Amazon, help with sharing and developing new skills.

- **Bring leadership into the digital age.** An authentic cultural shift cannot simply be driven from the top down in a structure where one person owns digital. To ensure real change, digital needs to be owned by every worker in the organization. Leadership must work in collaboration with millennials to set a joint vision for their organization's digital future. For example, Starbucks has 33-year-old Clara Shih, CEO of Hearsay Social and a former Google, Microsoft and Salesforce.com employee on its board.

Leaders need to hire people with digital mindsets and a willingness to challenge the status quo. Moreover, these individuals need to be placed across all levels of the organization to ensure 'real' change. While hiring digital natives might help speed up change, what leaders really need to do is increase their digital fluency, allowing them to effectively articulate the value of digital technologies to the organization's future.

Organizations need to move away from a risk-averse mindset to one that accepts failures and encourages employees to take higher amounts of risks. For example, GE enlisted 500 coaches to train executives to embrace concepts such as risk taking and learning from failure.⁴⁴ However, this change cannot happen without the support of the senior leadership, through, for example, rewarding longer-term thinking over short-term goals. A possible way for organizations to facilitate change at the top is by creating technology immersion workshops for boards, digital acceleration courses or tours of digitally native organizations.

Finally, companies need to move away from bureaucracy and hierarchy, and embrace flatter structures similar to those of organizations such as Haier and Xiaomi. Steve Jobs once declared: "We run Apple like a startup. We always let ideas win arguments, not hierarchies. Otherwise, your best employees won't stay. Collaboration, discipline and trust are critical."⁴⁵

Foster a digital culture in the enterprise

Culture is the shared set of beliefs, values and mindsets that guide a group's behaviors. It gives an enterprise a long-term competitive advantage because it is very difficult to copy. Some of the factors that set a digital company's culture apart are:

- They have a strong mission statement and encourage a sense of purpose.
- They are lean, creating just enough structure and processes to function. Moreover, they maintain an organization based around small, cross-functional teams, as opposed to siloed divisions found in many incumbents.
- They have a diverse, high-quotient digital workforce.

There are four key areas leaders that should focus on in order to move toward a digital culture:

1. **Communication.** Communicate three times as much as necessary. Besides face-to-face conversations, consider all digital channels (e.g., social media, blogs, wikis, forums, shared mailboxes, webcasts and videos). Focus on an honest and open conversation style; this will make the journey easier for employee to accept. Companies should also consider using a communication log.
2. **Journey management.** The leadership team needs to drive the cultural change. Leaders have to consider that the change needs to reach the grassroots level. The 'clay layer' (middle management) of an organization in particular is difficult to address, so it is important to tackle this thoroughly. Leaders need to release people's creativity and apply lean startup methodologies described earlier such as hackathons and design thinking. Companies should also hold digital immersion trainings for leadership to develop their digital literacy. This also needs to be supported by putting in place the right HR policies, rules, etc.
3. **Make changes visible.** Create job aids and reference guides for employees; consider the use of semipermanent visualizations, change journey maps and paintings on the walls of the offices to support the endeavor.
4. **Continuous change monitoring.** Use tools such as change tracking, culture/feedback surveys and performance monitoring.

Lastly, an alternative way to boost digital culture within an organization would be through acquiring a digital native.

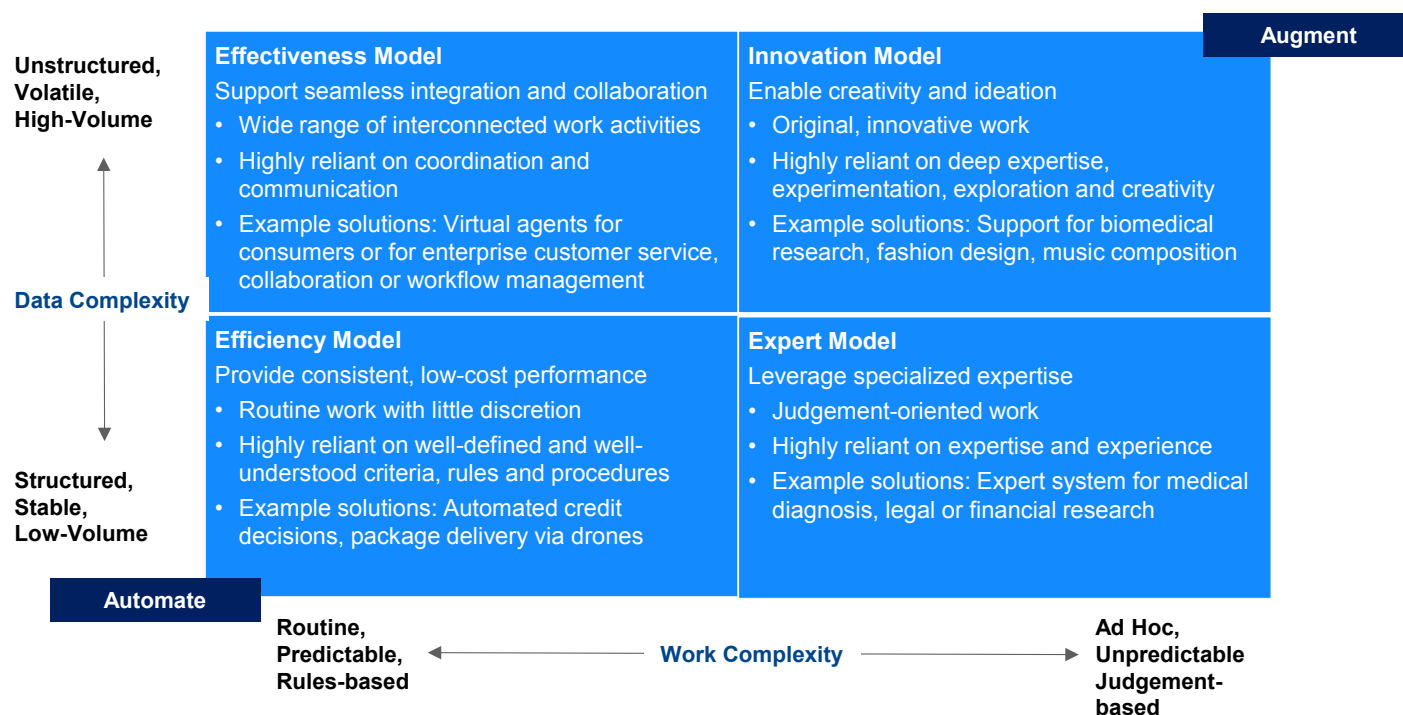
Create environments where humans and robots can work together successfully

In the event that jobs are threatened by automation, employers will have to assess whether it is possible to reskill workers, either to work alongside robots or in new roles.

- **Evaluate the value of automation to your business.** Low-skilled workers are still valued by companies for simple non-routine tasks such as stacking shelves in a supermarket. Despite their relatively simple nature, advanced technology would be needed to automate these tasks.
- **Establish the extent to which automation will form the core of your business.** Quick-service restaurants are increasingly experimenting and adding automated services. EATSA, a restaurant in San Francisco, has fully automated its front-of-house staff, but the core of its business remains the product it is selling: high-quality food. Buying automated technology capabilities – or acquiring them through partnerships – avoids the costly in-house development of a nonessential capability.
- **Where automation is core to the business, invest in developing internal automation capabilities.** Forward-looking organizations will have ownership of the critical intellectual property behind these technological advancements. Examples such as Daimler's autonomous trucks and Amazon's drone delivery program demonstrate the rate at which automation is fast becoming a reality. Organizations that succeed will need to consider their workforce as an asset that can be retrained with the new skills required in the digital age. If a business does not have the resources to develop its own automation capabilities, it should form strong, mutually beneficial partnerships.
- **Consider your social responsibilities.** Organizations should work to retrain workers whenever possible.

Organizations can use the framework below to identify where they should automate:

Figure 6: Framework to facilitate automation decisions



Source: Accenture

Framework for assessing the need for automation:⁴⁶ When work complexity is low and data complexity is low, there is a wheelhouse for automation. In contrast, automation is still applicable in scenarios where both work and data complexities are high. However, the types of relevant automation are altered.

- **Efficiency model.** This characterizes more routine activities based on well-defined tasks that can clearly be understood by computers.
- **Expert model.** The expert model should be used to classify more complex cognitive computing tasks that are harder to automate and non-routine. They do, however, have consistent data.
- **Effectiveness model.** The work identified in this quadrant is highly knowledge-based and requires a high level of interpersonal skills, making it harder to automate.
- **Innovation model.** This identifies cognitive computing solutions that enhance creativity and ideation by humans.

Industry-specific versions of this framework are also available.

Incorporate the on-demand workforce

Companies must create a framework of functions and tasks that on-demand staff can undertake within the organization. The most effective way to recruit on-demand workers is through online talent platforms. This avoids costly transactions associated with onboarding, such as legal compliance, payroll taxes and pensions. Furthermore, platforms such as Upwork have a transparent rating system that allows the credibility of workers to be assessed based on reviews of work undertaken previously. It is critical to advertise for tasks rather than positions. Having specific tasks, with key milestones and expectations that on-demand workers need to complete, reduces the number of processes organizations need to go through in vetting and onboarding.

Use the extended workforce to improve talent pool quality overall. In one study by the Human Capital Institute, 69% of respondents reported that outsourcing and temporary staffing significantly improved the organization's talent quality. For instance, AMP, Australia's largest insurance company, requires half of its 2,600 full-time IT workforce to be formed of contractors to ensure current skills are shared within the organization.

It is critical to ensure a balance between legacy and on-demand staff. Too many on-demand staff can erode corporate culture. Identify areas where you can benefit from economies of scale within the gig economy – for example, software testing. However, be conscious of confidentiality, security and legality. It goes without saying that on-demand workers are not suitable for some roles, such as front-line police employees or those working in high-risk, safety-critical environments.

Lastly, it is important to swiftly integrate staff into projects as on-site experts, to encourage the use of new techniques such as agile project management and to deliver specialist expertise.

5. Measuring the Success of a Digital Enterprise

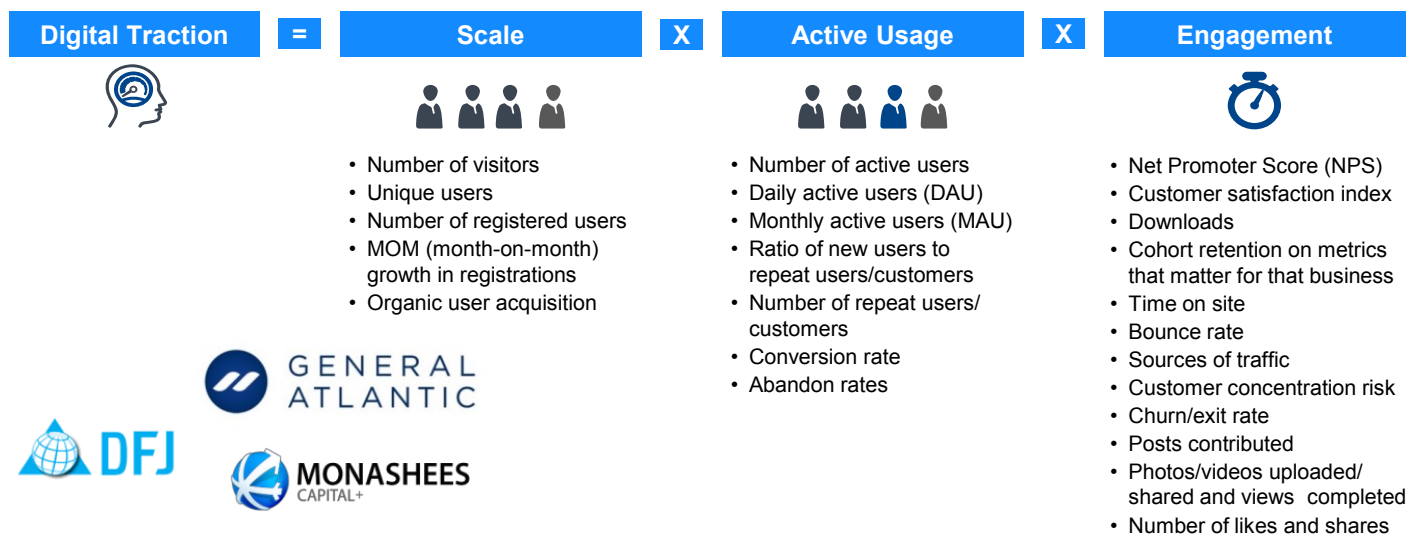
“Good metrics aren’t just about raising money from VCs...they’re about running the business in a way where founders can know how – and why – certain things are working (or not), and then address them accordingly. In other words, these metrics aren’t just for pitching but for discussing in subsequent board meetings, quarterly updates and management meetings.” –Jeff Jordan, Partner at Andreessen Horowitz

Many companies have discovered that traditional financial key performance indicators (KPIs) are no longer effective at measuring the success of a digital business. According to McKinsey’s Digital Quotient analysis, fewer than 15% of companies can quantify the return on investment of their digital initiatives.⁴⁷ Enterprises unable to measure the success of their digital initiatives should be turning to digital traction metrics that provide insights beyond the information on a company’s 10-K statements.

a. Digital traction metrics

In the simplest terms, digital traction metrics provide proof that somebody wants a company’s products or services. Through a combination of essentially behavioral metrics, such as frequency of use, customer engagement and number of users, they can communicate both the popularity and the momentum in market adoption of a product or service. Leading VC and PE firms such as DFJ, General Atlantic, Monashees Capital and Andreessen Horowitz are using the following metrics (or a subset of them) to analyze the digital traction of businesses they are investing in.

Figure 7: Digital traction metrics



Source: World Economic Forum/Accenture

Some additional metrics are required to analyze the financial impact of acquiring, retaining and monetizing customers. It is all about if a company can make more profit from its customers than it costs to acquire them. This, in effect, is a study of the unit economics of each customer, so two more metrics are key:

- **Cost to acquire a typical customer (CAC):** The sum of all sales and marketing expenses divided by the number of new customers added
- **Lifetime value of a typical customer (LTV):** The lifetime value of a typical customer is defined as the average monthly recurring revenue (MRR) multiplied with the customer lifetime. Customer lifetime is calculated as 1 divided by the customer churn rate

Two ratios provide additional valuable insights:

- **LTV: CAC ratio** is about time to profitability and cash flow; as a guideline for SaaS startups, LTV should be three times CAC.

- **Months to recover CAC**, which is defined as $CAC / \text{average MRR (monthly recurring revenues)}$; as a rule of thumb, months to recover CAC should be less than 12.

While Customer Lifetime Value has been around for quite a while, it does not yet consider the network effects of a customer over time (word of mouth, product reviews and ratings, user-generated content). The 'Customer Network Lifetime Value' becomes more relevant for incumbents, especially those with a high exposure to reviews and ratings, e.g., hotels, fast-moving consumer goods, apparel.

Digital traction metrics have to take industry specifics into consideration. The appropriate metrics for a fashion retailer will differ significantly from those for a software-as-a-service company. Similarly, the significance of metrics varies with context; one new customer a month may be a reasonable result for a high-value online B2B service but not for a social media platform.

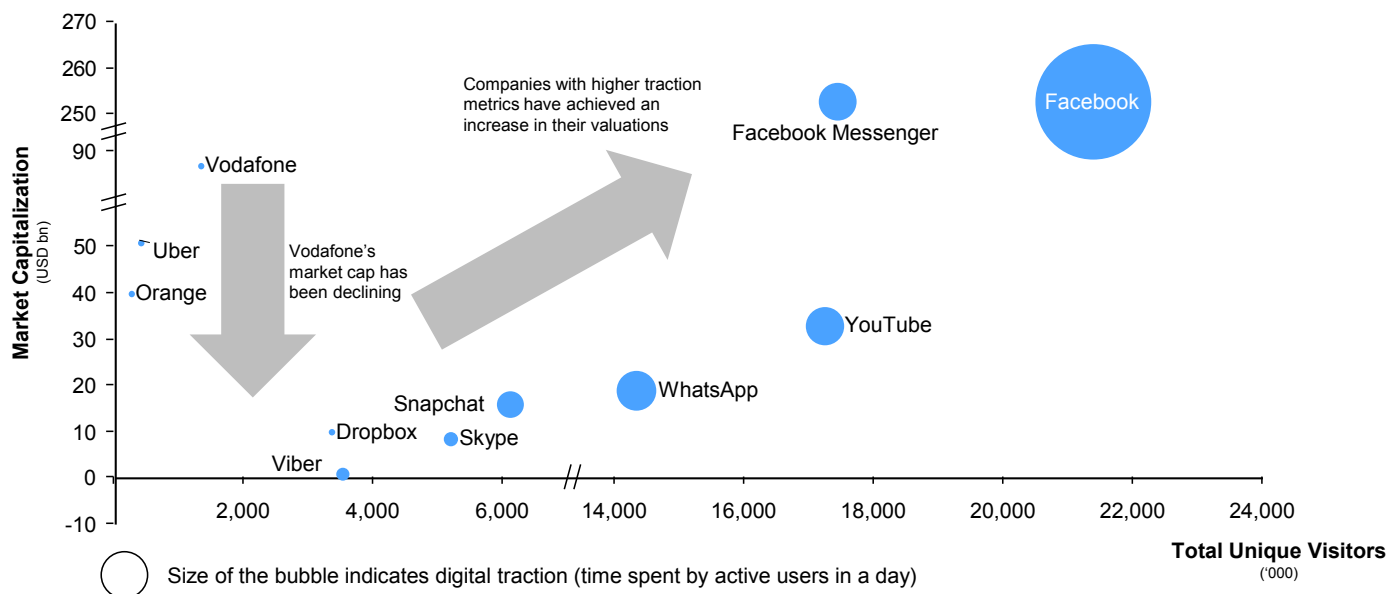
Why is digital traction important for analog companies?

Being able to measure digital traction – and find ways to boost it – is important for both digital disruptors and analog incumbents for two key reasons:

1. High levels of digital traction can benefit a company's performance in a number of ways. Consider just one digital traction metric: the Net Promoter Score (NPS). NPS measures customer loyalty on a scale between -100 (everyone is a detractor) to +100 (everyone is a promoter). A positive NPS is considered good; an NPS of +50 would be excellent. A high NPS would mean that the cost of marketing falls to zero and, in the case of a peer-to-peer business model, service costs could also approach zero.
2. Robust digital traction is often linked to high company valuations. In 2015, another 60 companies have become unicorns; their valuations of \$1 billion or more are often underpinned by digital traction metrics rather than financial performance. Recent Accenture research has found that companies with good digital traction are achieving higher levels of market capitalization than their analog peers (see Figure 8 below). In fact, six of the top 20 companies by market capitalization (as of October 2015) are technology players or super platforms (Apple, Alphabet/Google, GE, Facebook, Microsoft and Amazon).

Digital traction can enable companies to increase their valuation because digital enterprises have more scalable, more highly engaged customers than traditional, analog companies. In a down market, these scale effects are more pronounced and can be seen in investor sentiment and valuations.

Figure 8: Digital companies outperform analog incumbents in valuation

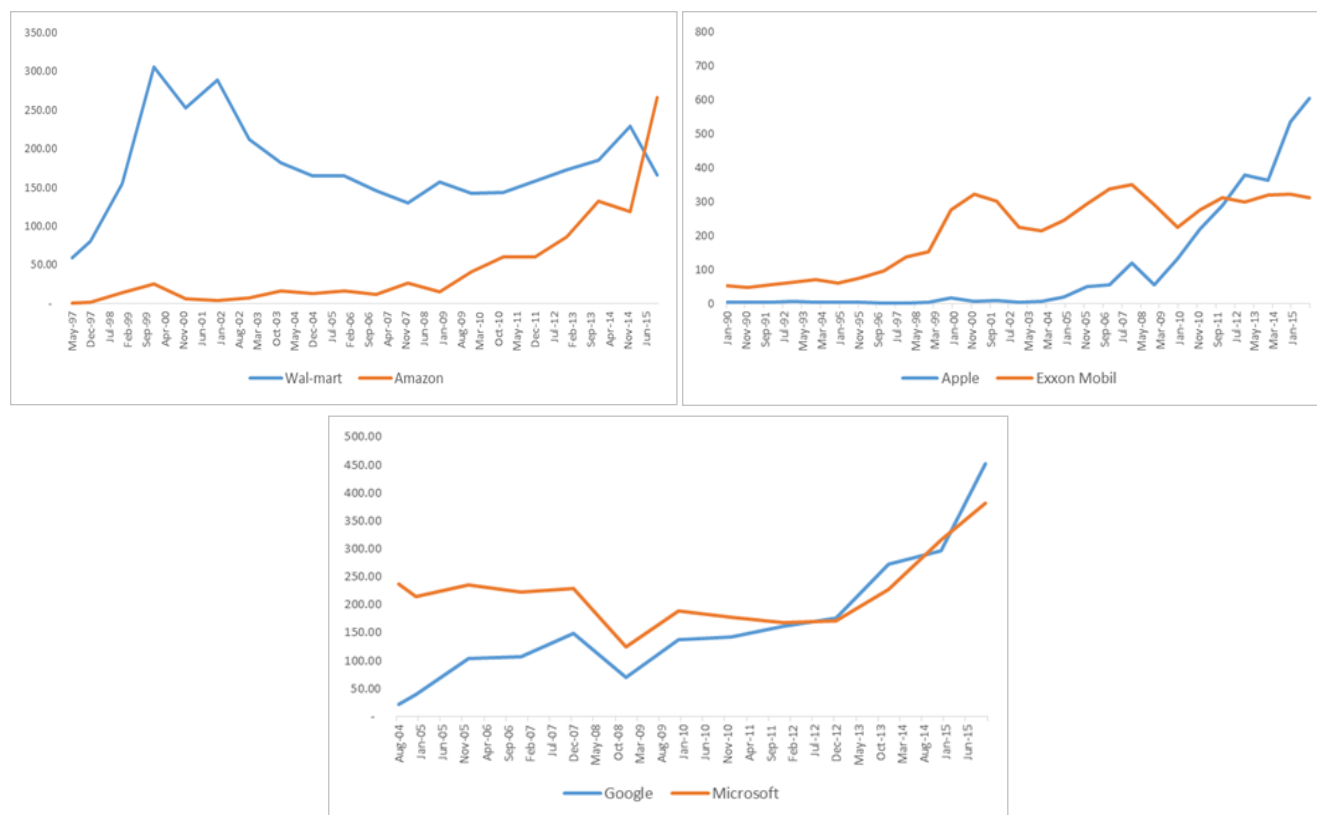


Source: Data extracted from ComScore and Bloomberg, World Economic Forum/Accenture Analysis

How digital success relates to higher valuations and a higher investor sentiment

Over the past few years, companies that have embraced digital technologies have been rewarded by investors with higher valuations. There has been a gradual shift in the list of the most valuable companies, moving from oil and gas companies ranked at the top a decade ago, to technology players and super platforms today. Some one-to-one comparisons of market capitalization over the past 10 years illustrate investors' increasing desire for digital businesses.

Figure 9: Market capitalization analysis of digital companies and incumbents



Source: World Economic Forum/Accenture

- Walmart versus Amazon – “Clicks instead of bricks (and mortar)”
- Exxon Mobile versus Apple – “Data is the new oil”
- Google versus Microsoft – “Ads and mobile technology instead of Office software”

Strategic recommendations

To truly benefit from digital traction metrics, companies need to develop the capabilities to track them in real time, as this case study illustrates:

focus@will – reacting to digital traction metrics in real time

focus@will, a Los Angeles based startup, offers neuroscience-based audio services that help increase focus by 'zoning out' distractions. The company measures a dozen of digital traction metrics in real time. Based on the insights generated from its digital traction metrics, focus@will is providing tailored solutions to its customers.

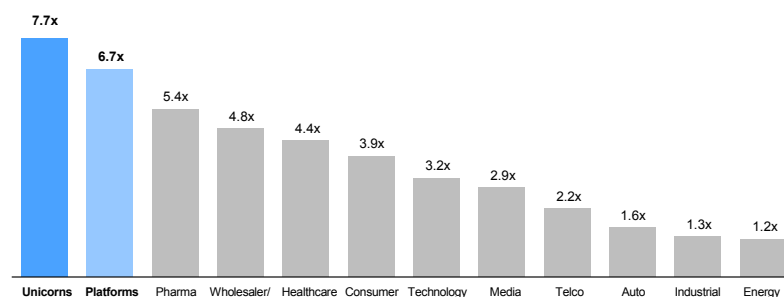
Digital winners are able to track, gather and analyze these KPIs. To catch up, analog players need to:

- Establish the appropriate technological infrastructure (algorithms, databases and data visualization).

- Act based on the insights gained from analyses of digital traction data (e.g., if a company operates in a 'freemium' business model, the insights gained by applying digital traction metrics can be applied to upgrade a customer to a paid account).
- Create adaptable dashboards that can display real-time information for all essential company and customer metrics.

Research of Capgemini and MIT Sloan found that the so-called 'digirati' (companies that understand the value of digital transformation) are statistically significantly more profitable (on average 26%) than their competitors. The markets also reward them with valuations that are 12% higher. In addition, these enterprises are able to outpace their peers on revenue generation. Companies with stronger transformation management also achieve higher market valuations.⁴⁸

Figure 10: Ratio of market price to book value (for unicorns, ratio of valuation to total funding has been taken as proxy)



Source: WEF/Accenture Analysis

A cross-industry analysis comparing incumbents to platforms and unicorns also points toward a preference among investors for digital companies that boast a more scalable model based on higher levels of customer engagement. Listed corporations need to convince investors of their digital transformation. This requires solid and visionary C-level-driven communication targeting investors, focusing on the long term and setting out a clear vision of their approach to digital transformation.

“We convince equity analysts and investors about our use of advanced technologies, such as analytics, big data to focus on long-term value creation by continuously improving our productivity.” –Alan Gershenhorn, Executive Vice President and Chief Commercial Officer, UPS

Digital transformation does not happen overnight. Companies, therefore, need to move away from providing quarterly guidance aimed at appeasing the investor community. Enterprises need to convince investors that they are embracing disruption, and focus on the longer term. Providing quarterly earnings guidance is time-consuming and unnecessarily shifts a company's focus to short-term tactics at the expense of long-term value. Several enterprises (Unilever, Costco, UPS, Coca-Cola and Google) have dispensed with quarterly guidance and prospered. Also, one digital native, Amazon, does not care too much about the short-term view of City and Wall Street analysts. Growth comes before profit – the company recorded its first-ever net profit in 2002 – and all its initiatives focus on a five- to seven-year horizon.

Since not every company has \$21 billion idle cash like Apple, listed incumbents could shift focus from paying dividends such as short-term returns to delivering long-term value by reinvesting profits into the business. Alibaba, Google, Twitter, Flextronics, to only name a few, have refrained from paying dividends, yet investors have rewarded them with higher valuations. It is a myth that companies which do not pay dividends are not preferred by investors as four of the top 10 companies by market capitalization have no dividend history whatsoever. While in the short run, investors might react negatively on reducing dividends, future investments can help regain investor trust as was the case for Deutsche Telekom, Telecom Italia, Frontier Communications, Pfizer, etc.

6. Recommendations

This report has argued that it is not too late for analog incumbents to transform themselves and thrive in the digital world, and can harness their considerable resources to disrupt markets on an even-greater scale than already seen. There is, however, no room for complacency. Analog enterprises need to reassess and remodel every aspect of their business if they are to successfully compete against digital natives. It may still be the early days of the digital revolution, but it is the strategic plays that companies make today that will define their long-term future in the digital economy.

With that in mind, we have identified a number of recommendations and a set of questions to aid incumbent industry leaders in their digital transformation:

- **Identify, develop and launch new, digital business models.**
 - To what extent have you enhanced your strategic toolkit? Do you have build, buy, partner, invest and incubate/accelerate as possible strategic choices?
 - Is your corporate development approval cycle sufficiently agile? Should you move to a weekly or biweekly cycle similar to early-stage investors? Do you emphasize decisions informed by solid analytics?
- **Set up a successful corporate venturing business.**
 - Do you feel secure in sensing and anticipating digital disruption? Do you need to create or bolster corporate venturing capabilities?
 - For existing corporate venture capital arms, is it bringing scale and protection to the existing business? Has the culture of the digital native continued to bring innovation in combination with the scale of the existing business?
- **Re-examine every aspect of operations.**
 - Is digital explicitly integrated into strategic plans in and across business functions?
 - How are you empowering employees through digital channels to enable faster decision making and encourage greater agility within your organization?
 - To what extent have you adjusted your operating model toward a multi-speed operating model on the one hand to keep pace with breakthrough innovation coming from new business models, and on the other hand supporting your day-to-day steady-state activities?
 - Does your operating model flexibly support ecosystem partnerships, be it by creating an own platform versus 'plugging in' to others?
- **Understand and leverage data.**
 - How much of your revenue is coming from new sources of digital business? Is the growth rate at par with or higher than digital competitors?
 - Does your company leverage analytics around customer data, operational data, fraud analytics and compliance?
 - Do you benefit from data to launch new business and revenue models to mitigate erosion in the core business?
- **Consider increasing your investments in security.**
 - Is investment in security an important board-level issue? Have you increased your investments in security – is your budget at 0.3% of revenues or at 3%?
 - What is the worst case scenario for a security breach? Do you have a clear emergency drill tested? Should you incentivize friendly hackers with a bounty for breaking in?
- **Build a high-quotient digital workforce.**
 - Do you have a digitally literate leadership team? To what extent is it multigenerational, diverse and with sufficient expertise in business and technology topics?
 - Have you established appropriate training schemes to overcome the digital skills gap and reskill your existing employees?

- Are your internal policies up-to-date to allow collaboration and knowledge sharing using social media tools?
- To what extent can your corporate culture cope with constant change and is it considered attractive for millennials? Is the cultural transformation visible at every level of your organization and driven by the CEO and leadership team?
- **Integrate automation and on-demand workers into the workforce.**
 - Is your existing workforce demonstrably improving productivity and quality? Are you efficiently leveraging an on-demand workforce and automation?
 - Have you identified areas in your business where automation is most relevant? Have you assessed the likely impact of robots and artificial intelligence on the traditional workforce?
 - Have you developed strategies and frameworks that take into account all the functions and tasks in your enterprise where you can leverage and benefit from the on-demand workforce?
- **Establish the right digital traction metrics.**
 - Have you established the right behavioral KPIs to measure the traction of your digital business models (e.g., user engagement) or do you solely rely on financial metrics?
 - To what extent are capabilities and mechanisms to track metrics in real-time in place and do you take the appropriate decisions and initiatives to benefit from the insights you gathered?
- **Convince your investors about your digital transformation journey.**
 - Which steps have been taken to convince your investors about your digital vision and the long-term value-creation impact (top and bottom line) of your digital transformation journey?

Leaders across all industries are writing the next chapter of the digital economy. It is time to either become part of the story or just another footnote in the history of disruption.

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8. Endnotes

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