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INDUSTRY X.0

COMBINE AND CONQUER

UNLOCKING THE POWER OF DIGITAL

FOREWORD

Dave Abood and Aidan Quilligan

Most of the business leaders we work with understand the power of digital. They see the potential for digital technologies to bring about transformation and growth. And many are making big investments in a wide variety of cutting-edge technologies.

But many simply aren't getting the most out of their digital investments. That is, they're not transforming their core businesses while growing into new ones—what we call "Leading in the new."

What's the evidence? We talked to executives at more than 900 large companies around the world, in the 21 biggest industrial countries. Only 13% said they were getting greater efficiency, cost savings *and* business growth from their digital investments. That's a low number, but the good news is that companies can seize the opportunity, now, to improve on both.

It turns out that too many businesses are still deploying digital technologies in a piecemeal fashion, with the resulting benefits flowing (naturally) to only one part of the organization. The honest answer to this problem? Combination. Our research team unearthed valuable technological combinations to help companies significantly reduce their cost per employee and grow their market cap.

We fully recognize that combining digital technologies isn't a simple game of mix-and-match. Companies must do more than just change themselves into digital businesses; they must completely reinvent their operating models, production and value chains to create more value with digital. But our research yields a concrete solution: what we call Industry X.0. It's an action plan for becoming more adept at embracing technological change and profiting from it.

We hope you'll consider sharing this journey with us. This report is a good place to start.

INTRODUCTION

Companies the world over recognize that to drive down costs or forge new revenue streams, digital technologies are imperative. Most, indeed, want to be digital leaders.

Many, however, aren't getting the value they expect from their digital investments. According to a recent Accenture survey of executives, only 13% of companies are exploiting digital for greater efficiency as well as new growth. "Leading in the new," as Accenture defines it, plainly isn't easy.

Why? Because most companies are still investing in digital in a piecemeal fashion. They simply aren't realizing the full value impact of taking a combined approach.

To help companies understand better what this means for their stock-market value and costs, we evaluated a set of 10 critical technologies and determined the impact that can be achieved by combining them. We used econometric analysis to identify the technology mix with the most significant impact on financial performance (See 'About the Research').

ONLY 13%

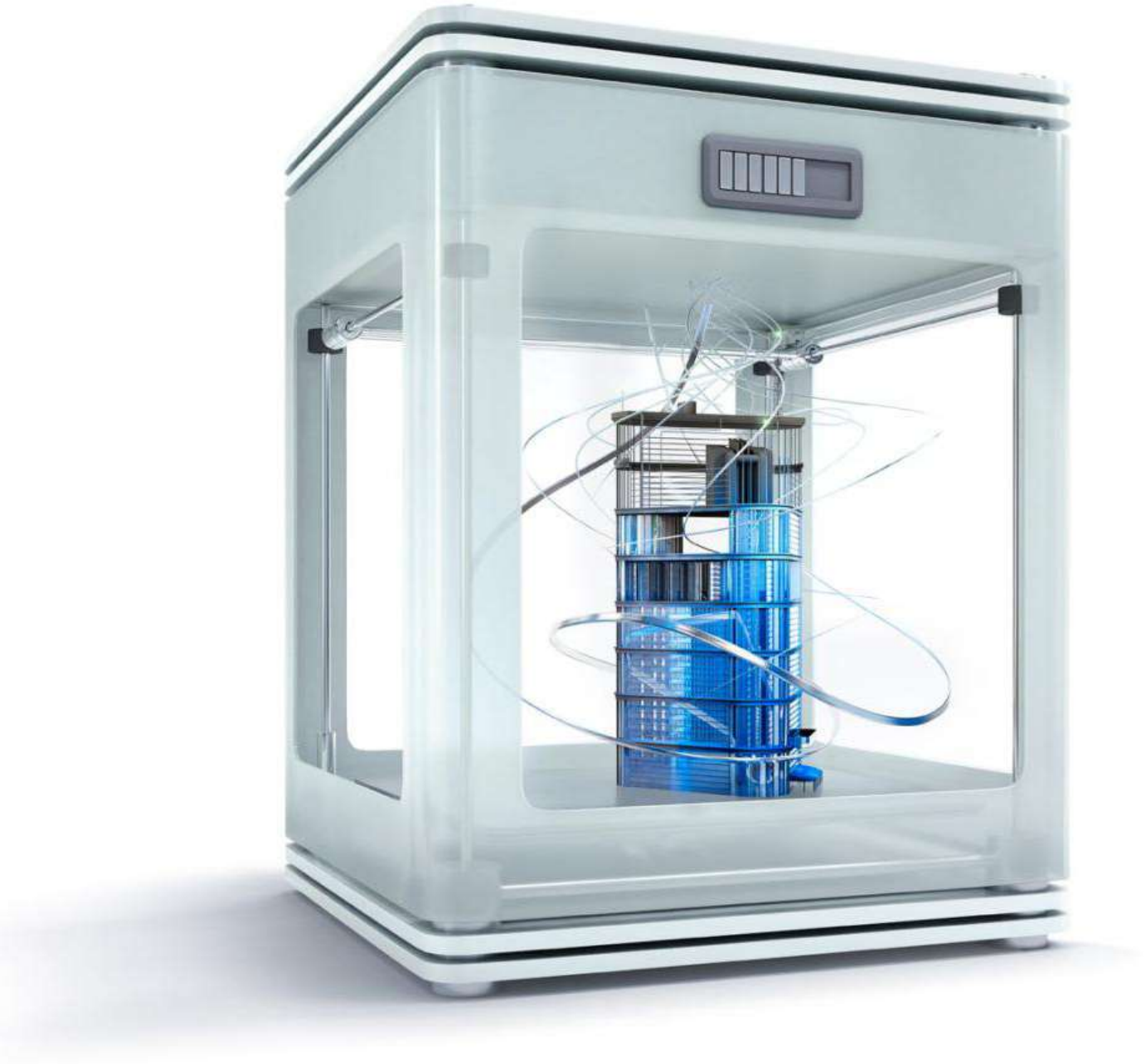
of companies are exploiting digital for greater efficiency as well as new growth

THE RIGHT MIX

Understandably, the technology mix for lowering costs differs from the mix best suited to drive top-line growth.

Our research reveals that combining five digital technologies in particular—autonomous vehicles, augmented and virtual reality, big data, machine learning and mobile computing—could help companies achieve additional savings of over US$85,000 per employee on average. And a slightly different mix of autonomous robots, mobile computing, autonomous vehicles, 3D printing and machine learning—could help companies gain additional market capitalization of just over US$6 billion on average.

How technologies should be combined will, of course, vary across industries; it will also most certainly change over time. But the impact on cost savings will prove significant, regardless of industry. For instance, companies in the industrial-equipment sector could realize additional cost savings of over US$43,000 per employee if they combined autonomous robots, AI, blockchain, big data and 3D printing. Since industrial-equipment companies surveyed have an average employee base of just over 37,000, that could translate into total savings of over US$1.6 billion on average. Oil & Gas companies, meanwhile, could gain over US$16 billion in market capitalization if they combined technologies such as virtual reality, big data and AI (see 'It's all in the combination').



US$85k

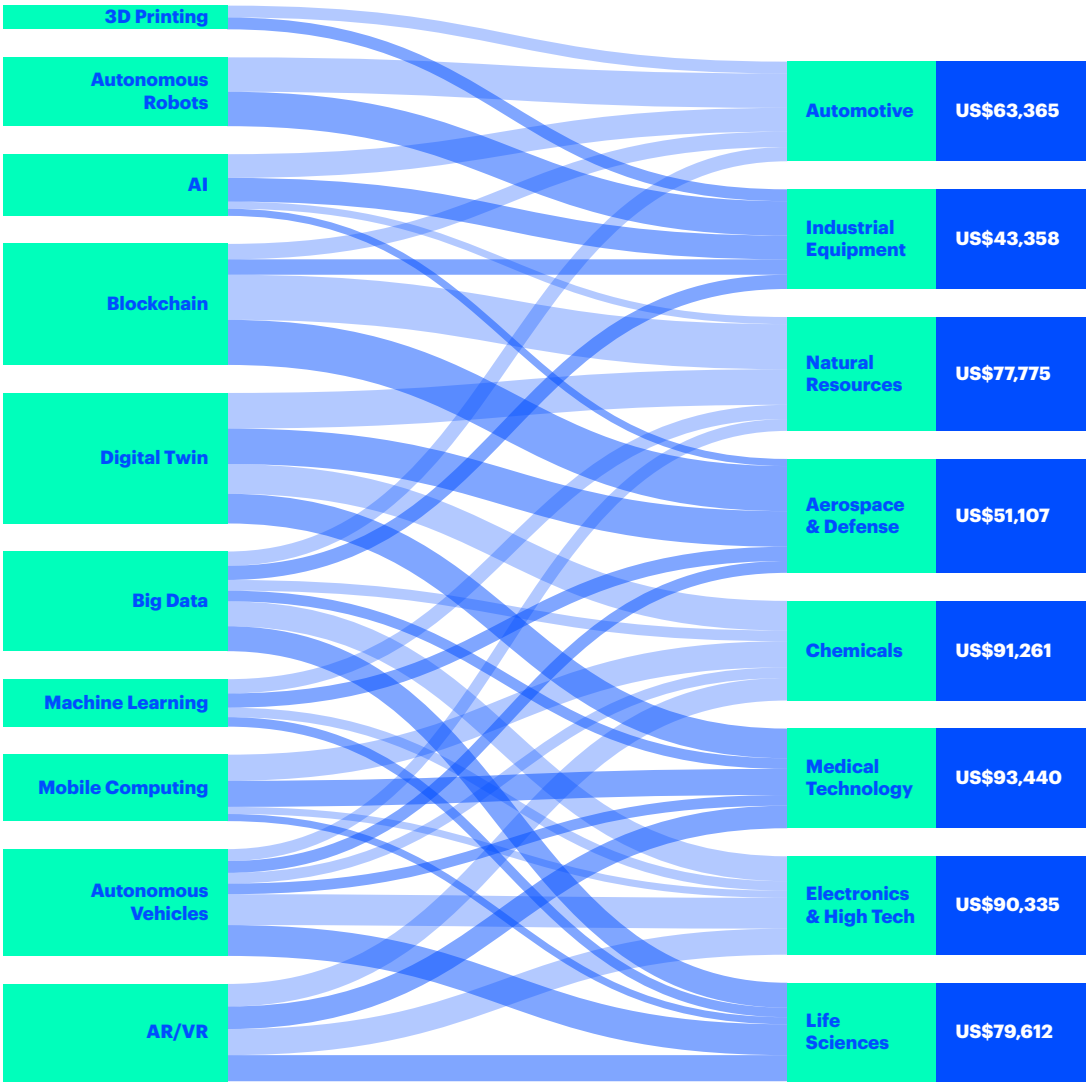
average company savings per employee if five digital technologies in particular—autonomous vehicles, augmented and virtual reality, big data, machine learning and mobile computing are combined

US$1.6bn

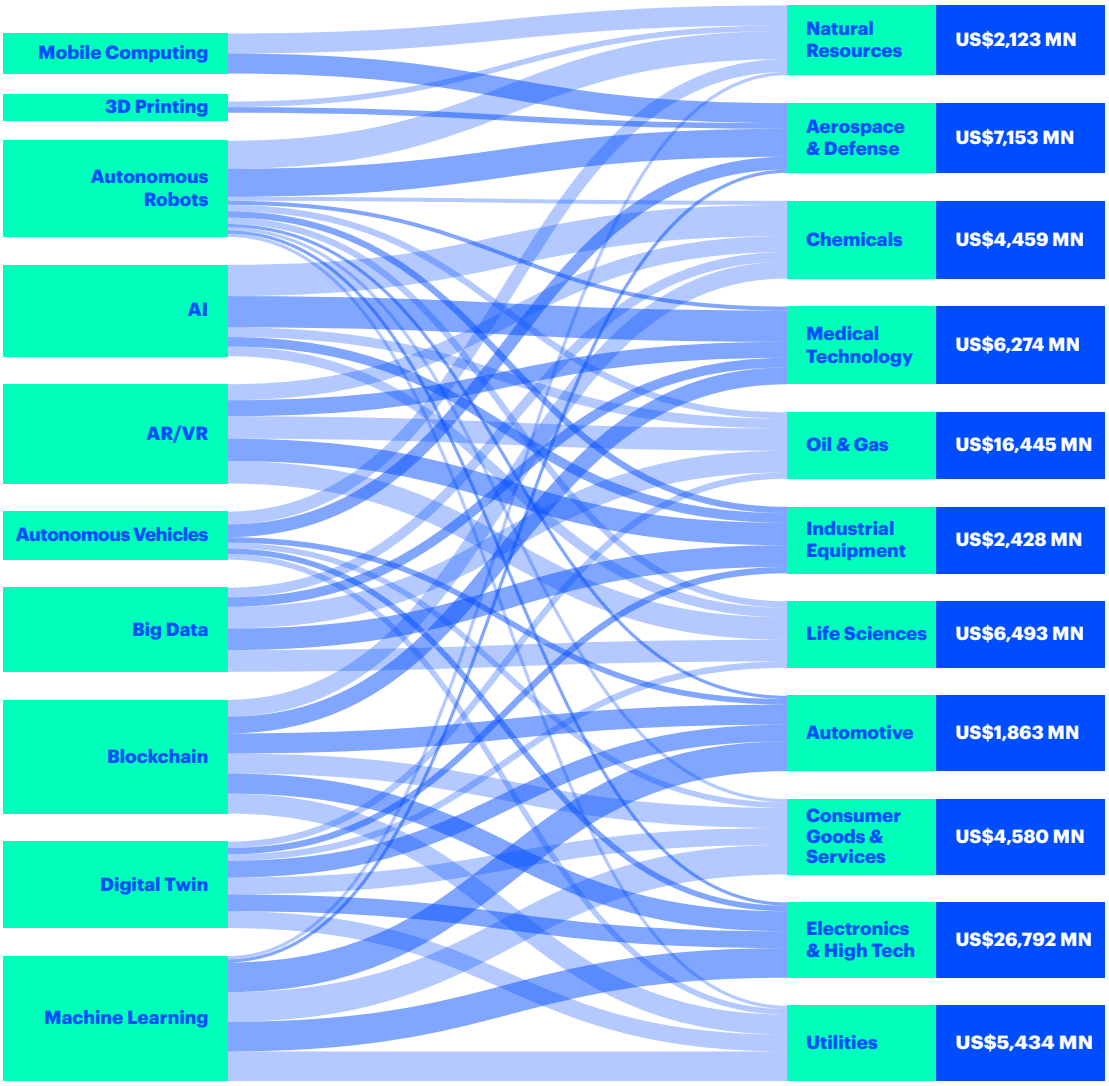
average total savings for companies in the industrial-equipment sector if they combined autonomous robots, AI, blockchain, big data and 3D printing

It's all in the combination

Incremental savings in cost per employee by combining:



Additional gains in market cap by combining:



Industry X.0: the key to successful combinations

Creating value with digital isn't just a simple game of mixing and matching digital technologies, however. Companies also need to completely reinvent their operating models, production and value chains, becoming what Accenture calls Industry X.0 businesses.

WHAT IS INDUSTRY X.0?

Industry X.0 is the digital reinvention of industry.

Industry X.0 businesses embrace constant technological change—and profit from it. They move beyond experimenting with IT bundles or SMAC (social, mobile, analytics, cloud) stacks, combining digital technologies to drive both top-line and bottom-line growth. Industry X.0 businesses incorporate Industry 4.0's core operational efficiencies, but also leverage combinations of advanced digital technologies to continuously create new, hyper-personalized experiences in both a business-to-consumer and business-to-business context.

They also boast four distinct value characteristics. Industry X.0 businesses are:

Smart:
Every product and production process is self-monitoring, data-generating, and aware of its ever-evolving business context.

Connected:
Communications are end-to-end and multi directional, while data-sharing among people, products, systems, assets and machines happens in real time.

Living:
There is an enterprise-wide cultural capability to act with speed, focus, and agility, to meet needs and seize opportunities.

Learning:
Adaptive interactions help create increasingly relevant and valuable user experiences over time.

Industry X.0 businesses are significantly better than their peers at combining digital technologies.

They make almost every component of their production self-monitoring, data-generating, and aware of its industrial context. They strive to build end-to-end communications and data sharing among systems and machines in real time. And they create relevant and valuable user experiences over time by building digital architectures that enable adaptive interactions between machines, customers and workforce.

Case in point: Schneider Electric, the French energy-management multinational. Schneider generates reams of data about production, consumption and electronic-batch processing—and uses that data to closely monitor the condition of equipment and ensure that key performance metrics are met.[1] Using a proprietary algorithm—OPTICS, which includes advanced-pattern recognition and machine learning capabilities—Schneider can predict equipment failures and take appropriate action well in advance. Based on this intelligence, Schneider's equipment can adapt to its environment at speed, reducing overall downtime and improving asset utilization for its clients.[2]

BECOMING AN INDUSTRY X.0 BUSINESS

Our intensive case study research and economic-value modeling reveals six imperatives Industry X.0 businesses must address to become smarter, connected, living and learning.

1 Transform the core

Industry X.0 companies build their core engineering and production systems around digital to drive new levels of efficiency. They ensure that physical machines and software systems are synchronized to unlock previously-unseen cost efficiencies—thus driving up investment capacity.

Caterpillar, for example, makes smart use of data generated from connected machines through its Cat Connect solution.[3] The construction- and mining-equipment company can relay key data on equipment performance to mine operators,[4] who then analyze the data and make decisions on how to improve efficiency, boost productivity, and enhance job-site safety.[5] Thanks to Cat Connect, machines at the construction firm Strack Inc. now run for 48 hours straight, and the company's fuel costs have dropped by 40%.[6]

2 Focus on experiences and outcomes

Industry X.0 companies use their investment capacity to drive new, hyper-personalized experience for customers, via multiple "smart touchpoints." This helps grow core businesses by enhancing customer engagement.

Huawei, the Chinese multinational networking and telecommunications giant, is one such enterprise. The company developed an automated network traffic control system called Network Mind, which enables self-adjusting control of voice and data services in ultra-large networks. Using technologies like online deep reinforcement learning and real-time big data mining and analytics, Network Mind automatically adapts and renews its traffic control models to match changes in network conditions. Network Mind is up to 500% more efficient than existing control methods in meeting key performance indicators such as task completion and policy generation. Moreover, Network Mind is more than 50 times more efficient at analyzing large optical network paths, and can analyze typical use cases such as optical network failure prevention in just 6 minutes—a huge improvement over the 5 hours typically required.[7]

3 Innovate new business models

Industry X.0 companies ideate and create new business models to drive differentiated value for their clients and new revenue streams for themselves.

Hitachi, the Japanese multinational conglomerate, embodies this approach. In 2016, the company introduced Lumada, an Internet of Things (IoT) platform that integrates commercial technologies from Hitachi's portfolio into an open and adaptable architecture. Thanks to Lumada's heterogeneous architecture, Hitachi can support a range of IoT applications and partner technologies that can be tailored to digital ecosystems across multiple industries.[8] For instance, Hitachi's Lumada-based solutions have helped energy companies reduce their generation costs by 6%, grow operating profits by 122% and increase trading volumes by nearly 150%.[9] Similar solutions in manufacturing have driven 10% reductions in total production cost, helped companies achieve near-zero defect rates by the time of shipment, and improved product quality and worker productivity.[10] Hitachi's 2016 revenues from Lumada were 900 billion yen[11] and its market capitalization had risen by US$5.6 billion within a year of Lumada's launch.[12]

4 Build a digital-ready workforce

Industry X.0 companies source, train and retain talent with digital-ready skills and encourage active collaboration between people and machines.

Airbus, for example, equips its factory workers with industrial-grade smart glasses to determine aircraft-cabin seating design. Using contextual-marking instructions, the smart glasses display the required information for workers to mark the cabin floor quickly and accurately for seating to be installed. The glasses also let workers scan barcodes printed on the cabin parts, retrieving critical equipment information from the cloud and displaying it on the glasses through augmented reality, all with voice commands. As a result, productivity for the cabin-seat marking process has improved by 500%, and the error rate has dropped to zero.[13]

5

Re-architect new ecosystems

Industry X.0 companies create a robust ecosystem of suppliers, distributors, start-ups, and customers that allows them to rapidly scale new business models across the digital value chain.

German conglomerate Siemens built such an ecosystem for its cloud-based, open IoT operating system MindSphere by partnering with app developers, system integrators, technology partners and infrastructure providers, including companies like Accenture, Amazon, SAP and Microsoft.[14] Another planned initiative, the MindSphere Rocket Club, aims to connect leading IoT start-ups with Siemens' international partners and customers to propel further adoption of MindSphere.[15] Siemens is also developing MindConnect Lib, which will make it easier for developers to connect embedded devices to MindSphere. MindConnect Lib's "northbound" application programming interface (API) will enable rapid integration of Siemens MindApps and partner apps into Mindsphere, while its "southbound" API will simplify connection of third-party assets to MindSphere.[16]

6

Pivot wisely

Industry X.0 companies continually balance investment and resource allocation between the core business and the new business to synchronize innovation and growth.

Google's parent company Alphabet invests in multiple early-stage businesses under its Other Bets banner. The company wants to incubate successful businesses in the medium to long term.[17] So, for instance, while the Nest smart thermostat remains a top seller in its category, Nest Labs has continued to launch successful new products like the Nest Cam Outdoor. Verily, another Alphabet business, has found success in the life sciences and healthcare space, with new solutions in diabetes management and robotic surgery.[18] Revenues from Other Bets businesses jumped from US$327 million in 2014 to US$809 million in 2016[19], contributing to almost 1% of Alphabet's total revenues.[20] Though some Other Bets businesses have seen their share of losses, Alphabet continues to invest in the effort, mindful that such innovations can have significant disruptive potential for the future.

ABOUT THE RESEARCH

Step one – Conducting a sample survey:

In 2017, Accenture conducted a survey of 931 senior executives from large companies (with most of them having sales turnover exceeding US$ 1 billion) across 12 manufacturing and production industries. The survey covered companies in: Australia, Brazil, Canada, China, Denmark, Finland, France, Germany, India, Ireland, Japan, Mexico, Norway, Republic of Korea (South Korea), Singapore, South Africa, Sweden, Switzerland, The Netherlands, the UK and USA.

The survey sought to understand:

a. Digital technologies being deployed by companies to drive new-to-market efficiencies and hyper-personalized experiences;

b. Challenges being faced by businesses while deploying digital technologies;

c. Investments being made by companies in digital technologies and capabilities to deliver new efficiencies and hyper-personalized experiences;

d. Capability-maturity of companies to drive new-to-market efficiencies (New Efficiencies) and hyper-personalized experiences (New Experiences) with digital technologies.

Step two – Classifying companies:

Companies surveyed were classified into relevant industries based on industry-definitions followed by Accenture.

Step three – Building data-sets for analysis:

Consistent cross industry data-sets of key financial variables (e.g. capital investment, wage bill, sales turnover, profits, market capitalization etc.) were constructed for the period 2010-2016 based on survey inputs and information sourced from reputed financial database (S&P Capital IQ).

Step four – Defining performance dimensions:

New Experiences and New Efficiencies were designated as 'performance dimensions' to understand the combinatorial impact of technologies on the company's top-line and bottom-line respectively. Principal component analysis was utilized to determine the optimal combinations of technology to drive New Experiences and New Efficiencies.

The result of the above analysis was then used to create Technology Indices to understand the impact of various technology combinations on the two performance dimensions.

Step five – Modeling the impact:

Econometric modeling was deployed to:

a. Identify statistically significant financial indicators of top-line and bottom-line performance. We arrived at, cost-per-employee and market capitalization, as the two statistically significant financial performance indicators to capture the impact of technology combinations (technology indices from the modeling perspective) on bottom-line and the top-line.

b. Understand the relationship of the technology indexes with market capitalization and cost-per-employee of companies across 12 industries.

- Industry sample size (numbers mentioned in parentheses) towards measuring the impact of technology combinations on market capitalization while driving new experiences:
  - Electronics & Hi-Tech (47), Aerospace & Defense (55)
  - Automotive (45), Consumer Goods & Services (50), Industrial Equipment (84), Life Sciences (78), Transportation (40), Medical Technology (40)
  - Utilities (62), Natural Resources (58), Chemicals (67) and Oil & Gas (47)
- Industry sample size (numbers mentioned in parentheses) towards measuring the impact of technology combinations on cost-per-employee while driving new efficiencies:
  - Electronics & Hi-Tech (46), Aerospace & Defense (53)
  - Automotive (38), Consumer goods (43), Industrial Equipment (78), Life Sciences (75), Transportation (44), Medical Technology (43)
  - Utilities (66), Natural Resources (57), Chemicals (64) and Oil & Gas (49)

We adapted Saunders & Brynjolfsson's (2016)[21] to build an econometric model (see opposite). This model provides an estimate of the potential improvement in top and bottom-line performance (captured through increase in market capitalization and reduction in cost-per-employee) resulting from improvement in the technology combination index responsible for driving New Efficiencies and New Experiences.

$$FP_{it} = c + \beta_1 * K_{it} + \beta_2 * F_{it} + \beta_3 * IT_{it} + \beta_4 * E_{it} + \beta_5 * Tech_{it} + \epsilon_{it}$$

Where

- C= Constant
- Financial Performance indicators = Market Capitalization or Cost per Employee
- K = physical non-IT Capital (property, plant and equipment)
- F = rest of non-IT Capital represented on balance sheet
- IT = IT Spending
- E = Number of Employees
- Tech = technology combination indices to drive New Experiences or New Efficiencies

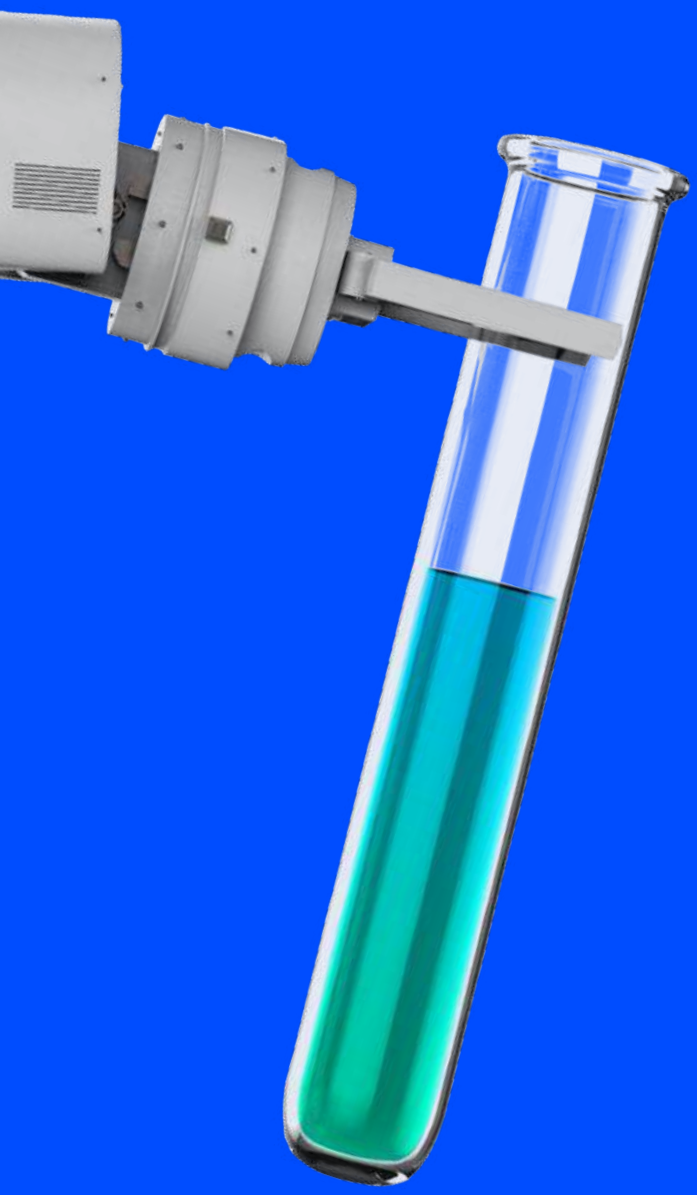
Impact

- β_1 represents the impact in Financial Performance due to increasing the physical non-IT capital by 1 unit
- β_2 represents the impact in Financial Performance due to increasing the other non-IT capital by 1 unit
- β_3 represents the impact in Financial Performance due to increasing IT spending by 1 unit
- β_4 represents the impact in Financial Performance due to increasing number of employees by 1 unit
- β_5 represents the impact in Financial Performance of enhancing Technology Combination X by 1 unit

Step six – Calculating the incremental top and bottom-line gain:

The incremental gain mapped for each industry is the financial benefit companies in respective industries can derive if they were to apply the identified optimal technology combinations (in steps four and five), to drive New Experiences and New Efficiencies in relation to their 'as is' state.

LEADING THE JOURNEY



Industry X.0 businesses are best positioned to "Lead in the new" because they are masters at combining digital technologies: the key to new levels of efficiency, new sources of growth, and new customer experiences. Becoming an Industry X.0 business is a journey. It starts by taking steps to become smart, connected, living and learning. And it culminates in the digital reinvention of industry. Companies that embark on this journey today will emerge as the digital winners of tomorrow.

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