

A hand is shown from the top left, holding a large, thick purple arrow that points downwards and to the right. The arrow is partially obscured by the text below it.

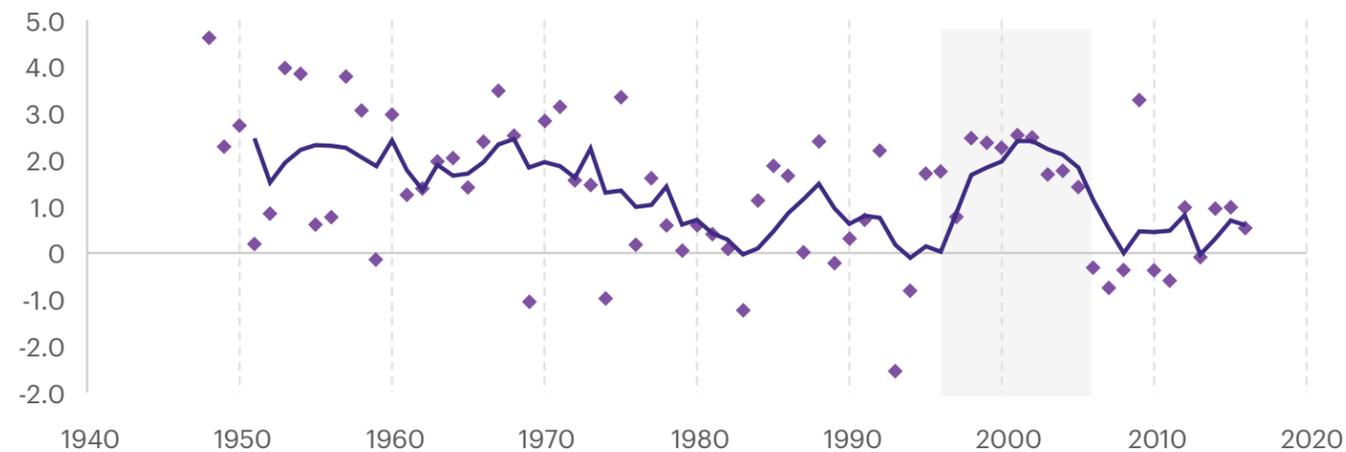
**PRODUCTIVITY,  
STALLED BUT  
NOT STOPPED**  
THE EMERGENCE OF THE  
VIRTUAL WORKFORCE

With productivity growth flagging across the developed world, a range of eminent experts have argued the IT revolution is running out of steam and the promise of future growth illusory. Technological innovation seems to be getting harder, with diminishing returns. But could a new era of technology-driven autonomy and virtualized labor change this dismal outlook? Here we explain what the technology pessimists are missing and how businesses and governments can respond to the opportunity.

Today, we live in a great paradox: Despite the breathtaking pace of technological development in the past few decades, workforce productivity increases have been miniscule—and certainly pale in comparison with the productivity impact of previous innovation cycles.

Consider what happened between 1900 and 1970. With technology powering a revolution, productivity (defined as labor productivity and total factor productivity, or TFP) grew at more than two percent per year and American lives improved markedly.<sup>i</sup> The number of weekly hours worked dropped from 60 to 40.<sup>ii</sup> Life expectancy grew from the mid-50s to 70 years. Businesses incorporated and consumers adopted the breakthroughs of the late 1800s and early 1900s. Steam engines gave us railroads. Electricity made possible modern factories, telegraphs, light and elevators. Internal combustion enabled cars and airplanes. Electronics powered radio, TVs and computers, and medicine gave us penicillin and chemotherapy.<sup>iii</sup>

However, breakthroughs in the past 50 years have had far less impact. Despite smartphones, fast Internet, and e-commerce, productivity growth has averaged around one percent. True, there was a five-year mini-productivity boom beginning in 1999 driven by the broad adoption of ERP systems, ATMs, bar code scanners, and EDI. But it didn't last. In 2016, productivity actually fell.<sup>iv</sup>

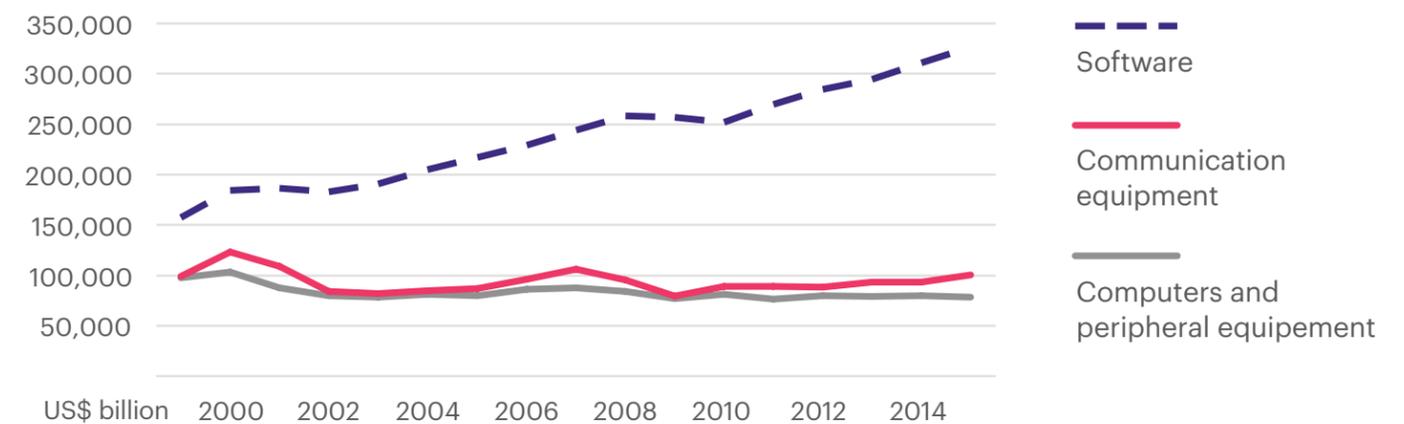


Annual percent change in U.S. total factor productivity and 4 year moving average

Source: [www.frbsf.org/economic-research/indicators-data/total-factor-productivity-tfp/](http://www.frbsf.org/economic-research/indicators-data/total-factor-productivity-tfp/)

One may wonder, “How can this be true when companies such as Google, Apple and Facebook have seemingly changed the world?” Few would dispute that Silicon Valley companies have experienced hyper-growth and have disrupted media, retail, travel and other industries. But as Robert Solow proclaimed in his 1987 productivity-paradox quip, “You can see the computer age everywhere but in the productivity statistics.”<sup>v</sup> Robert Gordon in his 2016 book, *The Rise and Fall of American Growth* also argued that in the past decade, EIT technologies don't appear to have made the overall economy or labor much more productive.

Valley economists have countered that timing, mismeasurement and or technology deflation are leading to erroneous figures in GDP, growth and productivity. Yet the evidence that mismeasurement has increased remains inconclusive at best. There's little to support the notion that economic statistics incorporated the adoption of lighting or the telephone any better than they currently account for the impacts of Google maps or wireless internet.



Private Investment in Technology

Source: U.S. Bureau of Economic Analysis

## WHAT'S BEHIND THE NUMBERS?

A few factors seem to be driving this puzzle. First, technical innovation is just harder now as we iterate existing technologies. For example, in the first 20 years of the microprocessor revolution, a chip maker could employ 10 researchers to maintain Moore's law (a doubling of computing power every two years). By 1995 it took about 20, and now it takes nearly 80. That's eight times more people to maintain constant growth rates. We see the same trends in increasing agricultural yields and pharmaceutical discoveries.<sup>vi</sup>

Second, IT spending effectiveness appears to be declining. Currently the U.S. invests more than \$500 billion in information technology—about three percent of GDP.<sup>vii</sup> And this capital expenditure is understated, as it excludes the billions of shadow CAPEX hidden in business unit operating expenses.

Most executives and industry reports would agree they get nowhere near half a trillion dollars in benefit. By some estimates,

as many as 50 percent of IT projects are not successful. While digital native companies can build innovative capabilities unhindered, CFOs from other companies are saddled with technical debt, massive integration of new applications with old ones, and an inability to pivot from legacy technology and processes. Throwing more technology dollars at problems is the definition of diminishing returns.

Third, many questions exist as to whether long-term technology investments have been allocated to sectors that drive productivity improvements. For example, since 2002 \$250 billion—or nearly 50 percent of all venture investments—have gone to Internet and telecommunications, yielding tremendous growth and profitability to a select set of firms that have upended advertising and media.<sup>viii</sup> Some of this mismatch becomes visible when you look at the wireless industry, which has spent hundreds of billions of dollars in spectrum and equipment only to see 80 percent of IP network usage being consumed by YouTube, Netflix, and other on-line video.<sup>ix</sup>

Fourth, in the past two decades many companies and industries found easier ways to drive profitability and financial returns, namely through outsourcing, offshoring, mergers and acquisitions. With trade liberalization, companies have been able to deploy global resources—be they clothing factories in China or IT delivery centers in Asia. Global supply chains have enabled companies to become more efficient by reducing labor costs and reaping the benefits of national specialization. Through extensive M&A, companies have gained scale economies in both back and front office.

## IS THE FUTURE ANY BRIGHTER FOR PRODUCTIVITY?

The short answer is yes. Despite the recent productivity data and the pessimistic outlook of many economists, Accenture sees revolutionary opportunities ahead. Our work transforming business processes and operations via technology, research in our innovation labs, and investments in emerging technologies point to a powerful trend that promises to shake productivity out of its doldrums. That trend is the emergence of a **virtual labor force**.

### Why the next round of technologies may greatly expand the capabilities of workers



## TRANSFORMATIONAL LABOR IMPACTS

Analysis of U.S. Bureau of Labor Statistics demonstrate that technologies (AI/ML/design thinking) will transform at least 25% of U.S. jobs over the next decade. Those most impacted include 2.6M analysts, 14.3M clerks, and 11.4M sales and customer service representatives as new tools and workflows allow workers to find, assess, and respond to information in near-real time.

## AUTONOMOUS VEHICLES

Mass adoption of self-driving vehicles will impact the 2.7M commercial truck, bus, and taxi drivers as these machines will be able to safely work 24x7 responding to customers and managers using natural language commands.

## PACE OF CHANGE

According to the FAA the number of commercial drones in service has eclipsed the number of helicopters by 4x and the number is expected to grow from 42,000 in 2016 to 442,000 in 2021. Drones are expected to transform and change the way people inspect, monitor, and patrol.

Whether supporting a finance analyst creating monthly reports or a home-health aide caring for a patient with dementia, AI-powered digital assistants will be at the beck and call of nearly all employees. Just as steam upended transportation, electricity the factory, and the transistor electronics, an emerging set of approaches and technologies will empower all workers – be they an analyst in a Wall Street bank, an agent in a call center, or a field technician on an off-shore oil rig. We are looking at a step function change in worker tools and capabilities—and a similar jump in productivity.

Unlike the PalmPilot of old, this assistant will interact with employees in a natural way via new interfaces such as voice and gestures; find, analyze, translate, visualize and communicate findings; and leverage machines such as drones, bots, and autonomous vehicles to interact with other people or machines in the physical world. All of this will be done at a desk, at home, or in the field.

The underpinnings of these revolutionary changes are already in place. Businesses and enterprises have broadly deployed the foundational databases, systems and tools needed to make the virtual workforce real. These technologies will

fundamentally change the way people work and interact with machines, how products are created and delivered to customers, and potentially the way companies operate. In the process, they will help reset the productivity trajectory.

## WHERE DO WE GO FROM HERE?

To achieve the gains from new and emerging technologies, executives in both business and technology must better understand the innovations that will most influence productivity in the future. Focusing on a few game-changing themes can help.

**Advanced analytics combined with autonomous machines will allow objects to fly, drive and sail themselves, or collaborate with people 24 hours a day doing useful tasks.** Police cars will patrol themselves, call centers will become specialized, and employees will have digital servants that collaborate with each other. Think

“Alexa, correlate Saturday ice cream sales with temperature and plot on a map, send to Brenda if interesting.”

Brenda doesn't even have to read the report; instead, her bot changes weekend pricing when it's expected to rain. According to recent research by Accenture's Institute for High Performance, AI technologies like computer vision, natural language processing, and expert systems hold vast potential to make capital and labor far more productive than today. In some scenarios, labor productivity could increase by 40 percent in 2035.<sup>x</sup>

**New interfaces are creating radically new ways for humans to interact with machines.** These revolutions don't come often. Think of the IBM punch card in the 1890s and the mouse and WYSIWYG in the 1970s. By the mid-2000 touch interfaces were pervasive. Now machines interact with humans via virtual and augmented reality. The ability to translate complex communications into semantics will help people like never before. Consider a battlefield medic connected to a trauma surgeon, a plant technician connected to a designer and a parts database in real time, or someone with dementia getting real-time cues of the world around them. We have the ability to fundamentally expand individuals' capabilities through technologies. We must use these technologies to address the ever-growing productivity burden of thousands of emails, hundreds of interruptions, and scores of meetings that employees navigate every month.<sup>xi</sup>

**Technology should deliver great customer experiences and streamline employee processes.** The tools to change how, when and where customers interact with companies, or how people get work done, have never been more powerful or more

available. For instance, experience design and design thinking can help companies rethink and retool and can lead to much better, more productive and satisfying solutions. In Accenture's experience, customer- and frontline-driven design can greatly reduce effort, in some cases eliminating up to 50 percent of work steps while dramatically increasing customer satisfaction. And it has genuine impact on business value: An index of design-centric companies shows outsized returns versus the S&P500.<sup>xii</sup>

**Lastly, getting more from capital investment in technology will require intense management focus on and commitment to the future.** We have wrung tremendous capability and capacity out of legacy systems and processes. Now's the time for companies to pivot hard, ring-fence the old and start driving the new. When trucks started to replace horses, no company wanted to be the last investing in horse-drawn cars. Bold investments are needed to change the dynamics of productivity.

Each senior executive should think about how to transform the business to supercharge productivity using one or more of these themes. Explore how any asset, be it capital or labor, can do three times the work it does today. Rather than thinking about how to reduce process runtime by 50 percent, strive to make it instant. Rethink what's core to the business and what another entity could do better on the company's behalf. And use data to better understand these tradeoffs. In net: Evaluate opportunities, size the prize, and get moving.

The age of the virtual workforce has begun. It's time to start thinking about how to use it to your advantage.

## FOR MORE INFORMATION, CONTACT:

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## NOTES

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## ABOUT ACCENTURE

Accenture is a leading global professional services company, providing a broad range of services and solutions in strategy, consulting, digital, technology and operations. Combining unmatched experience and specialized skills across more than 40 industries and all business functions – underpinned by the world’s largest delivery network – Accenture works at the intersection of business and technology to help clients improve their performance and create sustainable value for their stakeholders. With approximately 425,000 people serving clients in more than 120 countries, Accenture drives innovation to improve the way the world works and lives. Visit us at [www.accenture.com](http://www.accenture.com).