How IT Is Empowering the Next Generation of Entrepreneurs
The Technology CEO Council (TCC) is the information technology industry’s leading public policy advocacy organization comprised exclusively of chief executive officers from America’s top information technology companies.

Founded in 1989, and formerly known as the Computer Systems Policy Project, the Technology CEO Council is dedicated to advancing policies that promote innovation and U.S. competitiveness through technology leadership. Our CEOs meet with policy makers on issues of importance to the high-tech industry and offer insights and recommendations on ways technology can help solve global challenges.

As some of the nation’s most well-known brands and globally integrated enterprises, Technology CEO Council companies generate more than $300 billion in annual revenues and employ more than 800,000 workers. Currently, the Technology CEO Council is focused on public policy initiatives related to competitiveness, including a level playing field on tax and trade, 21st century infrastructure that enables innovation and policies that empower entrepreneurs with the technology they need to change the world.

Michael S. Dell
Chairman, TCC
Chairman and CEO
Dell Inc.

Greg Brown
Chairman and CEO
Motorola Solutions, Inc.

Ursula M. Burns
Chairman and CEO
Xerox Corporation

D. Mark Durcan
CEO and Director
Micron Technology Inc.

Dr. Paul E. Jacobs
Chairman and CEO
Qualcomm Incorporated

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President and CEO
Intel Corporation

Virginia M. Rometty
President and CEO
IBM Corporation

Michael R. Splinter
Chairman and CEO
Applied Materials, Inc.

Joseph M. Tucci
Chairman, President and CEO
EMC Corporation

This report is dedicated to our late colleague and friend Steve Appleton, a great leader whose entrepreneurial spirit and steadfast commitment to America’s future made our nation a better place.

Steven R. Appleton
Chairman and CEO
Micron Technology Inc.
1960–2012

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Executive Summary

High Impact: How IT Is Empowering the Next Generation of Entrepreneurs

10 Ways IT Turbocharges Fast-Growth Companies and Improves Entrepreneurial Competitiveness

1. Helps start-ups launch and find financing.
2. Brings down the cost of services, supplies and operations.
3. Expands the size of addressable markets.
4. Supports data-driven decision making.
5. Allows entry by new players with tools and platforms.
6. Helps entrepreneurs build global innovation teams.
7. Enables new products, services and industries.
8. Transforms what companies do and how they do it.
9. Gives manufacturers new ways to differentiate products and services.
10. Allows unprecedented levels of customization and personalization.

The Business Climate to Best Enable High-Growth Companies

Conclusion: How Policy Makers Nurture Job Creators and Advance Entrepreneurship
Out of every economic downturn, entrepreneurs have emerged to create new companies and pioneer new business models that reinvent the global economy. While policy makers rightly focus on restoring economic confidence and avoiding future crashes, creative business leaders are looking ahead, imagining the next great projects, products and platforms. Starting a business is easier than it has ever been in history, thanks to new technologies. Start-up costs are lower, addressable markets are bigger, talent is easier to find and coordinate, and the tools to innovate are more readily available.

The next generation of innovators will reach into a vastly expanded marketplace, with a rapidly growing global middle class hungry for goods and services that improve their lives. A new generation of high-growth companies—so-called “gazelles”—will rise to meet this opportunity, creating new jobs, powering economic growth and transforming our world. For entrepreneurs, investors and policy makers, the key question is: “How best to nurture these gazelles?”

Expert analyses have variously suggested that the critical companies are exclusively small businesses, young start-ups and/or venture-backed enterprises. Based on our experience as chief executive officers who work with the most inventive and energetic businesses around the world, it is clear to us that the next high-growth gazelles will be those businesses best able to use technology ... to pioneer new management techniques, capitalize on new production methods, exploit new distribution channels and maximize new organizational structures. Those who master the new platforms will thrive.

This report highlights the crucial ways information technology, or IT, helps companies start, grow, transform and compete. We conclude with recommendations for policy makers eager to enable such growth, including:

**TALENT**
- Improve K–12 STEM education.
- Increase U.S. college graduation rates, especially in STEM.
- Remove barriers to immigration by skilled workers.

**MARKETS**
- Expand trade agreements to cover exports and investments in new markets, new barriers, and new products and services.
- Enforce U.S. rights when they are violated.
- Avoid protectionist or discriminatory policies at home that could encourage barriers abroad.

**CAPITAL**
- Reform U.S. corporate tax system to be territorial, with lower rates and permanent, effective research incentives.
- Analyze costs and benefits before significant regulation.
- Impose reasonable fiscal controls on government spending.

**TOOLS & TECHNOLOGY**
- Invest in next-generation infrastructure, including telecom, energy, transportation and health care.
- Maintain robust national investments in R&D (3% of GDP).
Reports of the death of the entrepreneurial economy are greatly exaggerated. Amidst the uncertainty fueled by the real estate collapse, financial meltdown and ongoing sovereign debt crisis, many observers suggest our greatest days are behind us. Such pessimism is not new. In the 1970s, doomsayers beheld “stagflation” and forecast “the end of the American Century.” The recession of the early 1980s led some to warn that the only jobs Americans would get would be flipping hamburgers and “sweeping up around Japanese computers.” A decade later, we were told globalization would “create a giant sucking sound of all our jobs going to Mexico.” In each case “experts” found reason for fear, proclaiming “this time is different.” In each case they were wrong.

Again and again, America has risen to the challenge, creating new jobs, inventing new industries and improving the quality of life for citizens through transformative innovation. One key to this American economic resilience and rebirth has been our nation’s unique ability to create and support high-growth enterprises: so-called “gazelle” companies that upend existing markets and remake the global business environment. As significant scholarship has found:

- Gazelles represent a small fraction of enterprises but generate a majority of new jobs. Gazelles are rare, and most small businesses will not create many jobs or become gazelles. Gazelles depend heavily on, and often emerge from, established businesses.

What is less well appreciated is the vital role that technology plays in enabling gazelles’ success. From electricity to e-commerce, from assembly lines to fiber-optic lines, U.S. entrepreneurs led the world because they more successfully leveraged innovations than their global competitors. Simply put, being “better at technology” helps explain much of America’s extraordinary history of entrepreneurial excellence. Of note:

- Small, IT-intensive service firms grew jobs twice as fast, on average, than did all small firms in the economy from 2001–09.

- Companies that used IT more effectively, especially for data-driven decision making, have shown higher productivity and profitability than average companies.

- McKinsey Global Institute’s Small and Medium Enterprise (SME) survey found that “Web knowledgeable” small and medium enterprises created more than twice as many jobs as companies that are not heavy Internet users, across sectors from retail to manufacturing.

As chief executive officers of some of the most globally integrated companies, we see this clearly through our engagement...
with inventors, entrepreneurs and leaders on every continent.

New research by Catherine L. Mann of Brandeis University helps quantify the importance of IT usage to entrepreneurial job creation. Among service firms, which account for more than 80 percent of all jobs, companies that were “intensive users of IT” grew jobs at a rate of 5.1 percent from 2001–09, while overall employment shrank by 0.5 percent. As shown in Figure 1, small, IT-intensive service firms, a mere 5 to 6 percent of all employment, “punched far above their weight class” when it came to creating jobs, averaging 34 percent of new jobs created between 2002 and 2008.

Figure 1.
SMALL, IT-INTENSIVE SERVICE FIRMS’ CONTRIBUTION TO JOB GROWTH

Although small, IT-intensive service firms represent a mere 5 to 6 percent of all employment, they averaged 34 percent of new jobs created between 2002 and 2008.

While IT tools and platforms rendered some jobs obsolete, McKinsey Global Institute’s SME survey found 2.6 jobs were created for every one destroyed. In fact, McKinsey found that the Internet accounted for 21 percent of the GDP growth in mature economies over the past five years, across all sectors. Such benefits are hardly confined to tech companies alone. Indeed, 75 percent of the economic impact of the Internet accrues to traditional companies that are not pure Internet players.

In the future, technology will prove even more essential to business success and survival. The next gazelles will be those businesses best able to use technology to pioneer new management techniques, capitalize on new production methods, exploit new distribution channels and maximize new organizational structures. Those who ignore these new opportunities will get left behind.
The New Platforms for Entrepreneurial Innovation

Entrepreneurs today have greater access to more powerful technologies at more affordable prices than ever before. In particular, three breakthrough developments are poised to transform the 21st century the same way electricity and telephony transformed the 20th:

1. **On-demand supercomputing.** In 1961, it cost $1.1 trillion to compute one billion floating-point operations per second—one GFLOP. By March 2011, the cost per GFLOP had fallen to $1.80. Today Amazon Web Services offers the services of the world’s 42nd most powerful supercomputer for less than $3 per hour to anyone with a good broadband connection.

2. **Low-cost, high-capacity data storage.** In 2005, people created and stored 130 exabytes of information, or approximately one quintillion bytes. Five years later it was 1,227 exabytes. By 2015, it will be 7,910 exabytes, putting roughly 791 million times the content of the entire Library of Congress at every entrepreneur’s fingertips. A disk drive that can store all of the world’s music costs just $600 today.

3. **Ubiquitous, robust connectivity.** In 2001, the global Internet had 458 million users, with a majority on fixed-line, dial-up modems. Today more than 2.2 billion people are online, with an ever-expanding number via high-speed, mobile broadband connections. By 2015, experts predict nearly 3 billion users will employ 15 billion networked devices to transmit the equivalent of an archive of all movies ever made over the Internet every five minutes.

**Alone, each of these breakthroughs is powerful. Together, they are transformational.**

High-speed connectivity puts this overwhelming computational power equally at the fingertips of all competitors. Access to massive digital databases enables even the scrappiest start-ups to capture, search or analyze data to discover new insights or build the next great social network, at minimal cost. No longer big and small, the business world is rapidly separating into the connected and the lost.

**The Results?**

Smart manufacturing, where scientists design and create computationally engineered materials to accomplish new purposes; portable 3D printers that manufacture finished products without factories; medical science discoveries propelled by desktop genomics and metadata analysis; crowd-sourced innovations, where global R&D “teams” outcompete even the best-funded corporate labs; sensor networks whose data enable deeper understanding of our environment, economy and society.
As we look at the world in 2012, it is clear that the firm foundations for the next wave of economic growth are already taking shape. Fueled by innovative new tools, talented employees and a rapidly expanding global middle class hungry for goods and services that improve their lives, the next generation of innovators will reach into a vastly expanded global marketplace.

A tech-enabled entrepreneurial wave is coming.

For U.S. leaders, the real question is not whether our economy will ever recover. Rather, the critical questions are:

- Will America lead this coming growth or follow others?
- How can we maximize the chances for the new, fast-growth companies to emerge and thrive here?
- How do we nurture the next gazelles?

Drawing lessons both from America’s past success and emerging entrepreneurial activity around the world, we believe the answer entails four core elements. To succeed, high-growth companies need:

1. Access to **CAPITAL** to start up and expand
2. Access to **MARKETS** to grow and connect
3. Access to **TALENT** to innovate and compete
4. Access to **TECHNOLOGY** to differentiate and win

In this report we focus on the unique role that information and communication technologies play in empowering high-growth businesses. We also highlight these four aspects of the business climate that best attract and catalyze high-growth entrepreneurs, concluding with policy recommendations to give rise to the next generation of gazelles.
Effective use of IT is increasingly essential to gaining a competitive edge and sustaining strong growth. While only a small percentage of gazelles sell IT goods or services, the highest-growth companies in every sector are leveraging IT to emerge, expand and compete. Retailers use IT tools for just-in-time inventory controls that minimize waste and ensure products are available and priced properly. Advertisers use IT to better target audiences and understand their customers. Manufacturers leverage IT to increase productivity and customization. Energy producers tap IT systems to help discover, extract and supply new power, from solar to oil to natural gas.

Surveying more than 4,800 SMEs in 12 countries, McKinsey found that companies using Web technologies grew more than twice as fast as those with a minimal Web presence. To fully appreciate the unique role IT plays, it is best to examine real case studies of successful business models and growing enterprises.

**10 ways IT helps entrepreneurs start, grow and thrive**

1. **IT helps start-ups launch and find financing.** Whereas yesterday’s entrepreneurs spent months on road shows with angel investors, venture capitalists and banks to seek investment, newer start-ups are using new Internet platforms to attract funding. Companies such as Kickstarter now offer “crowd-funding” channels, over which would-be entrepreneurs explain their ideas and projects and solicit investors eager to buy in. Kickstarter reported more than $125 million pledged and more than 15,000 successfully funded projects between 2008 and early August 2011. San Francisco-based LOYAL3® offers a Web and social media platform that lets companies sell their stock directly to customers—without the brokerage fees that scare off the smallest investors—potentially reinventing the initial public offering.

2. **IT brings down the cost of services, supplies and operations.** Every company looks to reduce resources diverted to supplies, paying bills, managing payroll, procuring business travel and buying IT. Salesforce, for example, provisions software applications and on-demand computing capacity, reducing equipment costs for its customers. In Florida, CareCloud streamlines the financial, administrative and clinical functions for medical practices. Cost controls can be as simple as identifying the cheapest paper supplier or as complicated as finding the most affordable way to decode DNA.
In the case of the latter, the cost of sequencing a human genome—all three billion bases of DNA in a set of human chromosomes—plunged from $8.9 million as recently as July 2007 to $10,500 in July 2011 to $7,740 in October 2011, thanks to increasingly powerful sequencing computers available over the Internet, according to the National Human Genome Research Institute. That price should fall to $900 very soon.

As a result, the barrier to entry for genetic scientists and biotech entrepreneurs has plunged. Indeed, experts predict that we stand at the threshold of unprecedented improvements in health care as a whole, largely fueled by the digital revolution. Similarly, McKinsey Global Institute estimates that manufacturers can decrease product development and assembly costs by up to 50 percent, with an up to 7 percent reduction in working capital requirements, thanks to IT innovation.

3. **IT expands the size of addressable markets** to reach more customers. Given that the Internet already touches 2.2 billion consumers around the world, every business wants an online presence to reach new audiences, especially those who create digital media. Take the video gaming industry. Few industries have seen the transformative power of IT more thoroughly than gaming. When Atari introduced Pong in 1972, it sold 19,000 “arcade cabinets” to pizza parlors, bowling alleys and similar venues. Space Invaders sold 360,000 arcade cabinets in its launch year of 1978. Three years after San Francisco-based Zynga launched Farmville in 2007, it had more than 100 million participants. America’s video gaming industry saw employment grow at an average annual rate of 8.6 percent from 2005 to 2009, employing more than 120,000 people in 34 states.

4. **IT supports data-driven decision making.** Some call it “Big Data.” Others, “analytics.” By any name, the capacity to collect, store and analyze massive quantities of data is transforming all aspects of our society and economy. From community policing to disease research, fraud prevention to national security, data-driven decision making is rapidly emerging as a critical business of the future, as well as high-value tool for organizations that know how to marshal it.

Data-driven decisions make companies more productive and competitive. Companies that use IT more effectively, especially for data-driven decision making, show higher productivity and profitability than average companies. Across the economy the impact is potentially enormous: reducing national health expenditures by about 8 percent, for example, and delivering more than $300 billion in value every year to the U.S. healthcare sector. Retailers using these tools could increase operating margins by more than 60 percent, according to a McKinsey Global Institute estimate.
Making the Smart Grid Smart

For decades suburban streets have been lined with sturdy telephone poles conveying overhead power lines. Reliable, inert, inefficient. Based on nearly 100-year-old designs, this energy distribution system has served us well as our cities expanded, but it has failed to keep up with many new possibilities and challenges.

Entrepreneurs, energy efficiency experts and urban planners see new opportunities to apply digital processing, sensors, wireless technology and other IT innovations to our power grid, using advanced information management techniques to increase reliability and enhance efficiency. For example, California-based Silver Spring Networks is a leading smart grid networking platform technology and solutions provider. Silver Spring has connected more than 10 million homes and businesses throughout the world with products that enable utilities to gain efficiencies, integrate renewable energy sources and empower customers to monitor and manage energy consumption.

In addition to greater reliability and efficiency, a smart grid helps consumers better understand and control their energy costs and expenditures as utilities offer smart meters and peak usage-based pricing. A smart grid enables decentralized, home-based power generation, a critical factor encouraging a market-based expansion of solar power installations in homes and businesses.

Those who develop the best smart grid technologies and solutions have huge global opportunities. Nations around the world see the great possibilities. Already, China has announced plans to invest $90 billion in smart grid infrastructure upgrades by 2020.

The analytics industry is generating significant new employment opportunities as well. McKinsey Global Institute projected that the United States needs between 140,000 and 190,000 more workers with “deep analytical” expertise and 1.5 million more data-literate managers.

5. **IT tools and platforms can upend traditional business models and allow entry by new players.** The publishing industry is entering its third wave of digital transformation in less than two decades. First, online retailers proved the superiority of the Internet over bricks-and-mortar bookstores for diversifying inventory, reducing rents and overhead, and reaching customers. Next, a variety of booksellers introduced e-books, which in 2011 surpassed print editions in sales on Amazon’s site. Now a new success story is beginning to emerge: that of the “indie writer.”

While independent writers certainly aren’t new to the publishing world, the relative ease and lower cost of e-publishing have created exciting new opportunities for budding authors. Author John Locke exemplifies the opportunities...
here, as the first self-published author to sell more than 1 million e-books.\textsuperscript{37} Although Locke’s achievement isn’t typical, the number of independent writers is growing, leading to the success of digital distribution companies such as Smashwords. Based in Los Gatos, Smashwords has helped more than 17,000 authors produce and distribute 43,000 titles since its creation in 2008.\textsuperscript{38}

\textbf{6. IT helps entrepreneurs build global innovation teams.} In their 2011 book, \textit{That Used to Be Us}, Thomas L. Friedman and Michael Mandelbaum describe how some start-ups are “born global.” Highlighting EndoStim, a medical device maker marketing a pacemaker-like device to control acid reflux, they observe:

“EndoStim was inspired by Cuban and Indian immigrants to America and funded by St. Louis venture capitalists. Its device is being manufactured in Uruguay, with the help of Israeli engineers and with constant feedback from doctors in India, the United States, Europe and Chile. Oh, and the CEO is a South African who was educated at the Sorbonne but lives in Missouri and California. His head office is an iPad.”\textsuperscript{39}

Entrepreneurs’ innovation assets no longer need to reside in-house. When fast-growing video-on-demand provider Netflix looked to improve its algorithm for recommending movies, it offered a $1-million challenge prize and anonymized information about how people rate films. More than 51,000 people in 186 countries offered potential solutions; the winning team included scientists who worked at AT&T Labs during the day. New companies such as Kaggle aggregate problem solvers for companies across all sectors to tap into, boasting thousands of PhD participants and nearly 25,000 contributors in all.\textsuperscript{40}

\textbf{7. IT enables new products, services and industries.} Never before in human history have billions of global citizens been so connected, creating extraordinary social change and business opportunities. Nearly two decades ago, eBay leveraged the Internet to create a platform for hundreds of thousands of would-be entrepreneurs to launch, scale and operate their businesses. Now, we see it happening again as companies, large and small, use the power of social networking to amplify their brands. In fact, Palo Alto-based Facebook has created a new type of job: developer consultants who build apps for others. Facebook provides a list of dozens of developers with more than 100 offices in the United States. This new industry generated almost $20 billion in revenue in 2011, according to a recent University of Maryland study.\textsuperscript{41} As America’s economic narrative has taught us, gazelles often breed more gazelles.
IT enables transformation of what companies do and how they do it. Take agriculture. Organized agriculture is as old as civilization. From fertilizer to plows to genetically modified seeds, this industry has seen tremendous innovation. With the development of satellites, remote sensing and an explosion of computing, agriculture is again witnessing revolution. For example, geographic information systems (GIS) software allows the creation of detailed models of geographic reference information and ecosystems. Farmers use these models to better understand the potential of their fields and make adjustments to maximize their yields and reduce input costs for resources, such as fertilizer and water. Such technology has helped make American farmers the most productive in the world, enabling them to increase their exports by two-and-a-half times over the last decade to feed growing populations around the world.42

GIS has empowered companies to grow as well. Esri, for example, began in the 1970s overlaying maps with Mylar sheets delineating different geographical attributes. By the early 1980s, Esri started using computer technology to create GIS models. As computing power exploded and costs dropped, the company saw massive growth in the 1990s. Based in Redlands, CA, Esri today has more than 2,700 employees in the United States—with 10 regional offices, 80 international distributors, customers in 150 countries and more than 2,000 partner companies.43

8. Jobs: There’s an app for that

America’s economic leadership has been built on industry’s ability to continually reinvent itself. In the midst of the economic downturn, it happened again, as businesses leveraged the explosion of mobile smartphones, tablets and social media to create an “App Economy” that has created hundreds of thousands of jobs and made nearly every industry more productive and responsive to customers. Apps equal jobs. According to a 2012 study by Michael Mandel, the “App Economy” has created 466,000 jobs since 2007—44—from pure-play apps firms such as Halfbrick Studios to apps-related jobs at Electronic Arts, Research in Motion and T-Mobile. Apps are dynamic. They mean jobs for programmers, designers and marketers, and they spur innovation that leads to new services and additional job creation.

There are almost one million apps for the iPhone, iPad, BlackBerry and Android alone, creating jobs all across the United States—with more than two-thirds of the apps jobs outside of California and New York. Among the thousands of apps providers, some will rise, some will fail—and among them may well be the next high-impact company that enriches America and reshapes the global economy.
9. **IT gives manufacturers new ways to differentiate products and services.** A century ago, the automobile changed the world. Today, modern technology is changing the automobile. The same growth in computing power that has enabled smartphones and the Internet is making cars cleaner, safer and smarter. Honda, for example, has developed sophisticated engine management systems that use sensors and powerful computer software to maximize fuel efficiency, while minimizing emissions. Further, overall emission levels from Honda engines have declined 32 percent since 1995.

But it’s inside the car where technology is reshaping the landscape the most. Twenty years ago the state-of-the-art car came with a CD player or a cassette deck. Today’s state-of-the-art car can help you find a restaurant, make dinner reservations, get turn-by-turn directions and receive real-time traffic updates on your way there—all without ever taking your hands off the wheel. And companies like NAVTEQ are riding this auto technology wave. Founded in Silicon Valley, NAVTEQ provides real-time information on traffic and navigational criteria to help you get where you’re going.

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**POWERING THE ENERGY BOOM**

Once upon a time, energy exploration involved digging deep holes in the ground and hoping you’d hit pay dirt. It was a low-percentage, environmentally unsound, economically inefficient endeavor. Even as techniques for exploration and extraction improved, America’s demands for energy far exceeded our domestic supplies. By 2010, the Congressional Research Service reports total cost of energy imports rose to $323 billion and accounted for 41 percent of the annual trade deficit.45

That’s starting to change. Led by revolutionary advances in sensing capability, precision controls and computing power, we are witnessing a renaissance in domestic energy generation and rapid expansion in domestic energy jobs. One estimate predicted the shale gas boom would create 870,000 new U.S. jobs by 2015.

At the heart of this success story is IT. Drillers need a clear understanding of the geometry or “map” of the subterranean gas deposits to maximize output and minimize risk. Companies increasingly are using microseismic monitoring to develop those maps, deploying an array of geophones that record tiny seismic events. This data is then fed into sophisticated software, which combines it with billions of other geological and geographical data points to create a multidimensional picture of the below-ground deposit.

Many IT-intensive energy services firms are growing and expanding to meet this opportunity. Houston-based MicroSeismic, Inc., is pioneering this technology. Formed in 2003, MicroSeismic has grown to more than 60 employees in multiple locations with many years of triple-digit revenue growth. Texas-based Geotrace similarly offers the world’s most comprehensive reservoir seismic processing, reservoir development services and reservoir data management, from reconnaissance to brownfield recovery.
The growing "maker movement"

Just as the personal printer revolutionized desktop publishing, reduced business costs and gave rise to countless new design companies, so too is additive manufacturing—also known as 3D printing—promising to change the face of global manufacturing.

3D printers take digital models and print them out as three-dimensional objects by adding one layer at a time using thermoplastic or other materials extruded from a nozzle. Online services and design software make it easy to develop and share digital blueprints. New York-based MakerBot Industries sells such machines for $1,300, while hardware makers sold an estimated 200,000 Arduino open-source, single-board microcontrollers in 2011.

As with computers in the 1970s, many users of this technology today are just hobbyists, sharing hardware designs, digital blueprints and software enhancements. Yet the technology also is being used for jewelry, footwear, industrial design, architecture, engineering, aerospace, dental and medical industries. Wharton economist Jeremy Rifkin suggests the Maker Movement will prove "as significant as the shift from agriculture to the early industrial era."

10. It allows unprecedented levels of customization and personalization. In San Francisco, Streetline uses the latest sensor technology to help drivers find inexpensive parking quickly, while helping cities manage their parking resources more efficiently. Companies such as Groupon and Living Social give businesses new tools to connect with the customers most likely to want their services, radically improving return on advertising investment. Real-time updates now connect airlines with travelers to minimize inconveniences or give the adventurous great spontaneous deals. IT enables NetJets’ fractional ownership model, Progressive Insurance’s pay-per-use “TripSense” offering, Priceline.com’s real-time marketing of excess capacity and the build-to-order mass customization, increasingly available for people who want to express their individuality.

Customization and personalization are especially possible as we deploy “smarter” infrastructure—transportation, energy, health care, government and telecommunications systems that collect and analyze data, cutting costs and improving quality. The McKinsey Global Institute estimates that global personal location data will generate more than $100 billion in additional revenue opportunities for service providers and more than $700 billion in new value to end users, such as high-growth companies creating new offerings leveraging this data.

Valley in the mid-1980s, NAVTEQ develops digital map data for car navigation systems. Now headquartered in Chicago, NAVTEQ has more than 5,500 employees worldwide, and 202 offices in 53 countries.

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While being “good at technology” is clearly more important than ever for business success, there are additional critical factors. Over the past three decades, significant scholarship has examined the question: “What causes high-growth start-up companies to form, thrive and succeed?” The Ewing Marion Kaufmann Foundation has done extensive research on these issues, as have the Council on Competitiveness, Harvard Business School and, more recently, the Start-Up America Partnership, among others. Summarizing much of this work, experts find three critical factors needed for high-growth start-ups, in addition to access to cutting-edge technology:

1. **TALENT: Access to People**

   Entrepreneurial companies are only as good as their people. This usually starts with education. While different entrepreneurs have widely different educational backgrounds—some have advanced degrees from elite universities while Whole Foods’ John Mackey and Dell’s Michael Dell did not complete college—the vast majority of recent U.S. entrepreneurs are college graduates. In fact, college graduates launched 85 percent of all the high-growth businesses created in America in the past 20 years.\(^5\) Going forward, higher education will be even more critical to global success, as shown in Figure 2.

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**Figure 2.**

**PERCENTAGE OF JOBS NEEDING A COLLEGE DEGREE**

- **1973**: 28%
- **1992**: 37%
- **2007**: 42%
- **2018\(^*\)**: 45%

*Projected

Source: Georgetown University Center on Education and the Workforce, June 2010
For decades, educational attainment was an entrepreneurial advantage for the United States, enabled by policies such as the 1890 Morrill (Land-Grant College) Act and 1944 Servicemen’s Readjustment Act (GI Bill). In addition to educating a greater share of students, American universities proved uniquely effective at spawning start-ups. Effective technology transfer programs encouraged by government policies such as the 1980 Bayh–Dole Act created incentives for commercialization efforts by university faculty and students. Cisco, Dell, FedEx, Google and Time magazine are a few of the many high-growth employers that started on college campuses.

Immigration, moreover, has long been one of America’s most powerful entrepreneurial engines. Start-ups are disproportionately founded and supported by immigrants. This is perhaps not surprising, as the act of immigration itself requires gumption and high tolerance for risk. Fifty-two percent of Silicon Valley start-ups were founded by immigrants, up from a quarter of all start-ups in that hotbed of entrepreneurship and innovation 10 years ago, as shown in Figure 3.\(^{52}\)

**Figure 3.**

**IMMIGRANT-FOUNDED START-UPS AS A PERCENT OF TOTAL START-UPS IN TECH CENTERS**

Today’s immigrant entrepreneurs tend to be highly educated—96 percent have earned bachelor’s degrees and 74 percent have graduate or postgraduate degrees, with 75 percent of those in science, technology, engineering and mathematics (STEM) fields. While these leaders came to America for other purposes initially (52 percent to study, 40 percent to work), they typically started their companies just 13 years after arriving in the United States. Likewise, smart immigrants often raise smart children: 28 of the 40 finalists at the 2011 Intel Science Talent Search (70 percent) had parents who immigrated to America.

Entrepreneurship thrives best in a culture that celebrates success: rewarding risk, protecting intellectual property, embracing innovation and competition—even when there are losers—and accepting failure without stigma. Here the United States continues to shine. Our nation has long celebrated self-made millionaires and billionaires who rise from humble beginnings—a sentiment that is epitomized in the American Dream.

It is no surprise that other nations are reforming their policies and working to change their attitudes toward risk taking, success and bankruptcy. Australia, Canada, Singapore and Taiwan, among other nations, have made entrepreneurship a centerpiece of their economic policies. And global institutions such as the World Bank and World Economic Forum are increasingly popularizing entrepreneurship around the world.

For high-growth start-ups, the question is no longer whom to hire. It’s where to hire them. Increasingly, immigration barriers cause some of the best new jobs to emerge outside our borders.
Over the past few decades, other nations have improved both the quantity and the quality of their universities, attracting professors, students and world-class research. Today the United States trails at least a dozen countries in higher education attainment, according to a 2011 report from the Organisation for Economic Co-operation and Development (OECD), as shown in Figure 4.56

Similarly, other nations saw the great U.S. advantage of more open immigration policies, and they are working hard to attract smart, skilled and ambitious immigrants to their own shores. At the same time, ironically, the United States is becoming less welcoming to the foreign-born, both in political rhetoric and government policies. Would-be immigrants to the United States, especially those with high-tech degrees, face an increasingly difficult backlog for green cards, while foreign nations aggressively woo them away.57 Talented foreign-born professionals who are returning to their home countries from the United States—both from our universities and our companies—are fueling emerging economies’ spectacular growth.

Source: OECD Fact Book 2011.
2. MARKETS: Access to Customers and Suppliers

Coming up with an innovative product or great new way of doing things is essential to any start-up’s success. Finding customers to pay for these goods and services is even more vital. One reason entrepreneurs thrive in the United States is our large, competitive, open market. All by itself, the United States has accounted for more than 25 percent of the world’s GDP, giving American companies a huge addressable market relatively devoid of tariffs, interstate barriers or protected national champions.

Of course, more than 95 percent of the world’s population lives outside the United States. And the International Monetary Fund (IMF) projects that 85 percent of the “next $21 trillion” in global GDP—30 percent growth over today’s $70 trillion global GDP—will be created beyond our borders, as shown in Figure 5.58

Online, the data are equally stark: roughly 245 million of the 2.2 billion Internet users in 2011 were American,59 with less than 6 percent of the next billion likely to live in the United States. Thus today’s most successful entrepreneurs must be global from the start, looking for customers, partners, suppliers, workers and materials from all around the world.

Figure 5.
WHERE WILL THE NEXT $21 TRILLION OF GLOBAL GDP COME FROM?

Worldwide GDP Growth Forecast

85% of growth is outside the United States

Source: International Monetary Fund.
Here again, American policies have advantaged high-growth start-ups. By championing efforts to open global markets, U.S. leaders ensured our entrepreneurs could reach new customers and emerging economies. Of equal, if not even greater importance, America’s gazelles have had extraordinary access to global inputs—the best ideas and products from around the world. Whereas some nations still limit domestic firms’ access to foreign goods, services and investments, America’s innovation prowess and historic openness to trade contributed massively to our economy—$1 trillion more in GDP during the 2000s thanks to ready availability of information and communications technologies alone.\(^6^0\)

**IMPORT BARRIERS UNDERMINE ARGENTINE ENTREPRENEURSHIP**

Technology has the greatest impact across an economy when it is ubiquitous—widely diffused and affordable to as many businesses as possible. In fact, the use, diffusion and adoption of technology is four to five times more beneficial to the U.S. economy than the production of IT itself. And sectors that use IT more intensively employ more than nine times as many workers as the IT-producing sector.\(^6^1\) This explains why barriers to import—domestic content restrictions, indigenous innovation policies, rejection of international standards—actually undermine the entrepreneurial competitiveness of nations that implement them.\(^6^2\)

One example: as a result of Argentina’s protectionist policies demanding equality of imports and exports as a condition for granting import licenses,\(^6^3\) no Apple or RIM smartphones have been imported into that country for nearly one year.\(^6^4\) While the Argentine government believes its policy will force foreign investment and thus lead to the creation of assembly jobs, it is denying far more potential entrepreneurs access to powerful competitive tools needed to invent their own great brands, innovations and companies.

Some U.S. policies limit our own companies’ access to markets. Domestically, many states still have regulations protecting incumbent businesses, particularly in professions that limit entrepreneurs with new business models.\(^6^5\) And nationally, restrictions are at work as well. For example, when lawmakers put restrictive export controls on commercial satellites by moving them to the U.S. Munitions List in 1999, our worldwide share of satellite exports fell from 73 percent in 1995 to 25 percent by 2005, as shown in Figure 6.\(^6^6\) Such policies have consistently failed to serve national interests, undermining both economic and security interests.
America also has historically offered far lower barriers to starting a business, hiring or firing and fewer hurdles to entering markets. The World Bank’s 2012 “Doing Business” rankings find the United States 13th best for “starting a business out of 183 countries evaluated.” Yet concern has been growing that the regulatory environment and “red tape” limit economic freedom and start-up opportunities. Figure 7 shows that pending regulations are on the rise in the United States.

The U.S. Small Business Administration found that total regulatory costs amount to $1.75 trillion annually. Nearly half of small businesses polled by Gallup (46 percent) identified federal regulations as a reason for not hiring new workers. And in a landmark 2012 analysis of more than 10,000 Harvard Business School graduates, Michael Porter and Jan Rivkin found that “regulations” were the most commonly mentioned impediments to investing and creating jobs in the United States, followed by “talent” and “taxes.”
3. CAPITAL: Access to Financing

While advances in IT are radically reducing the costs required for starting new businesses, all entrepreneurs still need capital. Whether to open, expand, hire or build, the mantra is the same: no bucks, no business.

Entrepreneurs traditionally finance early-stage start-ups with home equity loans, credit card debt, family loans, bank loans, or angel or venture capital funding. Yet over the last three years, start-ups have had a far harder time accessing credit and resources. For example, Mark Zandi of Moody’s Analytics estimates that while small-business owners extracted around $75 billion from their homes to fund their businesses in 2006, that figure fell to as little as $20 billion by 2011. Likewise, a recent study from Pepperdine University showed that 64 percent of start-ups were turned down by banks when seeking loans.

Initial public offerings (IPOs) have long been a source of expansion capital for true gazelles. Indeed, 92 percent of the people hired by companies that went public between 1970 and 2010 came on after the IPO, according to the National Venture Capital
Association. But the U.S. IPO job engine has stalled, with fewer venture-backed IPOs in 2008 and 2009 than at any year since 1985, largely due to economic conditions and regulatory uncertainty. Meanwhile, America’s share of IPOs fell from 67 percent in 2002 (when Sarbanes-Oxley was passed) to 16 percent last year. And the number of American companies listing on foreign exchanges increased from an average of 1.3 percent from 1996 to 2006 to 3 percent in 2009, 5.2 percent in 2010 and 8.5 percent last year, as shown in Figure 8.

**Figure 8.**
**INCREASING PERCENTAGE OF AMERICAN COMPANIES LISTING ON FOREIGN EXCHANGES**

<table>
<thead>
<tr>
<th>Year</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996-2006*</td>
<td>1.3%</td>
</tr>
<tr>
<td>2009</td>
<td>3%</td>
</tr>
<tr>
<td>2010</td>
<td>5.2%</td>
</tr>
<tr>
<td>2011</td>
<td>8.5%</td>
</tr>
</tbody>
</table>

* Average for this 10-year period
Source: Committee on Capital Markets Research, 2012.

Tax rates directly impact the rate and energy of entrepreneurial activity in many ways. Capital gains tax rates impact start-ups’ ability to attract investment, especially venture capital. While most start-ups (and more than 90 percent of all businesses in America) begin as so-called pass-through entities, the majority of gazelles register as C corporations, subjecting their business income to multiple layers of taxation (business and then personal or capital gains). This designation is in part due to tax regulations that fundamentally require “C Corp” status to access public markets. The U.S. corporate tax rate is the second highest in the developed world and soon could be the highest. Even after all
deductions and credits are considered, American gazelles pay significantly higher effective tax rates than fast-growth companies from most other countries, as shown in Figure 9.

Recent OECD empirical analysis found that corporate income taxes are the most harmful type of tax for economic growth, followed by personal income taxes and then consumption taxes, with recurrent taxes on immovable property being the least harmful. Higher effective domestic business tax rates discourage investment and job creation and make the United States less competitive, a conclusion shared by multiple studies and commissions over the past decade.

Figure 9.

**COMBINED CORPORATE TAX RATES IN 34 OECD COUNTRIES, 2011**

Australia
Austria
Belgium
Canada
Chile
Czech Republic
Denmark
Estonia
Finland
France
Germany
Greece
Hungary
Iceland
Ireland
Israel
Italy
Japan
Korea
Luxembourg
Mexico
Netherlands
New Zealand
Norway
Poland
Portugal
Slovak Republic
Slovenia
Spain
Sweden
Switzerland
Turkey
United Kingdom
**UNITED STATES**

Note: Estonia tax rate shown for distributed income (retained income is exempt).

Source: OECD Tax Database and PwC Worldwide Tax Summaries.
CONCLUSION

HOW POLICY MAKERS NURTURE JOB CREATORS AND ADVANCE ENTREPRENEURSHIP

There may never be a better time to be an entrepreneur than over the next decade. Starting a business is easier than it has ever been, thanks to new technologies. Start-up costs are lower, addressable markets are bigger, talent is easier to find and coordinate, and the tools needed to innovate are more readily available. While current economic conditions remain challenging, it is worth recalling that more than half of the companies on the 2009 Fortune 500 list, along with nearly half of the firms on the 2008 Inc. list of America’s fastest-growing companies, were launched during a recession or bear market.79

The world’s “innovation-driven” economies saw an increase of 22 percent in early-stage entrepreneurship in 2011 after a lull in 2010, according to the 2011 Global Entrepreneurship Monitor report.80 Looking ahead, recent advances in IT are likely to provide the “rocket fuel” for the next great entrepreneurial enterprises.

Around the world, every effective policy maker aims to encourage job creation and foster a favorable economic climate for growth, innovation and competitiveness. Some prop up national champions with subsidies and biased competition policies; others work to force local investment through protectionist barriers or discriminatory regulation; and still others aim to use the power of the state to catalyze industries and direct growth.

In the end the nations most likely to nurture the next great gazelles will be those that attract, retain and invest in the best and brightest talent; open their markets to ideas, inputs and investment from around the world; ease access to capital while allowing robust reward; and ensure all businesses have ready access to the most powerful tools and technology from around the world.
For U.S. policy makers, there is much that can be done today to help American entrepreneurs compete globally, with access to the world’s best technology, talent and investment

To improve access to TALENT:

- Improve the quality of K–12 STEM teaching and engage more students in STEM learning, especially in high school.
- Increase American students’ college graduation rates, especially in STEM fields.
- Remove barriers to immigration by skilled workers:
  - End the per-country limit on green cards.
  - Expand green cards available to graduates of U.S. universities with STEM degrees.

To improve access to MARKETS:

- Reduce barriers to U.S. entry in high-growth global markets:
  - Reform outdated U.S. export controls.
  - Expand existing agreements (such as the Information Technology Agreement) to cover more goods, services and countries.
  - Negotiate new agreements (such as the Trans-Pacific Partnership Agreement) that cover new issues (such as cross-border data flows) and barriers.
- Increase enforcement efforts:
  - Coordinate international pressure to roll back specific discriminatory policies in targeted countries.
  - Aggressively enforce U.S. rights when violated.
  - Avoid protectionist or discriminatory policies at home that could encourage barriers abroad.
To improve access to capital:

- Reform America’s corporate tax system to be globally competitive:
  - Broaden the tax base.
  - Lower the rate to equal or below the developed economy average.
  - Adopt a territorial tax system.
- Codify the requirement to perform cost–benefit analyses before imposing economically significant regulations, including at independent agencies.
- Impose reasonable fiscal controls on government spending:
  - Revisit the Simpson–Bowles recommendations.
  - Improve government efficiency.

To improve access to technology:

- Invest in next-generation infrastructure:
  - Maximize spectrum for high-speed wireless Internet.
  - Embed digital intelligence into transportation, energy and healthcare systems, using captured data to improve efficiency and reliability.
  - Enact cybersecurity policies that encourage and empower information sharing and public–private cooperation.
- Maintain robust national investments in R&D
  - Aim for annual investments of 3 percent of GDP into national R&D by government, universities and business.
  - Maintain the Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs and similar efforts to encourage commercialization of federal technologies.
  - Enhance the R&D tax credit in line with global leaders and make it permanent.


47. Manyika et al., 2011, p. 8.


60. Mann, 2012 forthcoming.


77. Internal Revenue Code, Section 7704. Internal Revenue Service.


79. HP, Revlon, Texas Instruments and United Technologies all were started during the Great Depression. Microsoft, Genentech and Gap were started during recessions. See also Stangler, Dane. (June 9, 2009). The Economic Future Just Happened. Ewing Marion Kauffman Foundation. http://www.kauffman.org/uploadedFiles/the-economic-future-just-happened.pdf
