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## **“March Madness, iPhones and Robots”**

**By Frederick W. Smith**

The world turns on innovation. From using fire to cook meat a million years ago to ordering grass-fed burgers on your mobile phone today, innovation has sparked changes that, overall, have made our lives more convenient, prosperous and hopeful.

Why is innovation important? Because things are always changing. In this click-driven world, new becomes old very fast. Traditional solutions won't work in new circumstances, but recombining existing ideas often can. In fact, big ideas such as computers or space travel are made up of existing ideas combined in new ways.

Think of familiar combinations in everyday life:

- Someone put wheels on a suitcase and created luggage you didn't have to carry.
- Someone embedded a sensor into a wristband to create a Fitbit.
- Someone combined Google maps with a beloved animated character to create Pokémon GO.

FedEx was built on a new combination of existing ideas that turned us into the original logistics disruptor.

- When we began operations in 1973, our innovative hub-and-spoke system was uniquely developed to deliver overnight express packages to any and all points on our network by a certain time. It was a combination of the need for speed and a hub-and-spoke model used in other areas.
- FedEx also created an integrated air-ground express network, the first in the air cargo industry—a new combo of flying and driving.
- We revolutionized inventory management when FedEx originated the first real-time, package-tracking system to help people keep tabs on their shipments, something that's standard operating procedure today and done billions of times a day now. We developed this innovation because we knew that information about the package was as important as the package itself. And when we combined that concept with the internet and put tracking information online, we changed the logistics capabilities of the world.

Now, over 40 years later, FedEx stands at the nexus of the virtual and physical world and is still building on the benefits that innovation and technology bring. Our purpose as a company is to connect people with possibilities, and we know technology helps us do that in a big way.

Let me share with you some technology innovations we're working on that will further change the way we do business and the way we serve our customers. These are topics you see every day in the news: big data, artificial intelligence, autonomous vehicles, and robotics.

Let's start with big data, which can be traditional or unstructured. Traditional is

what companies and researchers have been doing for a long time. Think spreadsheets or demographic information based on age or income—essentially information slotted into defined categories. Untraditional data, on the other hand, doesn't follow a specific format. Think web site content, text messages, tweets, satellite images, or mobile data. It's been estimated that 20% of data is structured and 80% is unstructured.

According to an online article in *Entrepreneur* last year, by 2020 every person online will create roughly 1.7 megabytes of new data every second of every day. That's on top of the 44 trillion gigabytes of data that will exist in the digital universe by that time.

The question for organizations is how to mine big data in real time to discover patterns useful in making decisions about, let's say, a new product or the best location to put a store.

The answer is artificial intelligence or AI—the simulation of human logic by computers, based on so-called machine learning. In essence, AI makes big data smarter.

Computers are programmed to recognize all manner of input, whether it's faces, words, voices, maps or millions of other things. The more data the computer reviews, the more patterns or trends are discerned, and the computer quote "learns." As computers develop such artificial intelligence, the machine can eventually appear smarter than people. One of the most famous examples of

that is IBM's Watson computer. In 2011, Watson went on Jeopardy to play two of the show's most successful winners. Watson handily defeated them!

FedEx is on an exciting journey with AI. One of our most common examples is our online virtual assistant. Go to [fedex.com](https://www.fedex.com), click on Ask FedEx, and type in any FedEx-based question. Our virtual assistant will answer you right away. And of course the more that people use it, the smarter it becomes.

The day is coming when you'll be able to initiate a FedEx shipment by talking to your digital personal assistant. You'll be able to talk your way through the process, hands-free and paper-free, with the digital assistant asking the right questions to help you complete the job. Then one of our couriers zips to your home or office and picks up your shipment.

Probably one of the biggest tech trends in the news today is autonomous vehicles, a combination of big data and AI. It's an important area in terms of safety since 90% of all accidents are caused by human error. We all know that cars are getting smarter through such features as automatic braking and parallel parking. But researchers are just in the early stages of testing a broad range of autonomous features. We're several years away from completely autonomous vehicles, though the technology is evolving quickly.

Let's look at one feature related to trucks since industrial fleets will likely lead the way in autonomous technology due to financial and safety considerations.

- One is platooning. Trucks, in this case with drivers, line up behind a lead

truck on the highway, much like bicyclists form a peloton and draft off the cyclists in front of them. This formation is much more fuel-efficient than normal traffic patterns. In fact, a leading company in this space is Peloton Technology of Mountain View, California.

- In the brave new internet of things, these trucks would communicate with each other, the driver, and a company headquarters about location, road conditions, traffic patterns, or weather—and then make driving adjustments based on what they “learn” from the data.
- Tests are being conducted in the U.S., Europe and other areas, and the technologies in this space are developing quickly.

Since FedEx operates about 150,000 vehicles on the roads every day, we’re reviewing autonomous technology of all kinds for our driving operations, particularly for heavy, long-haul trucks. We believe it will have big implications for us in terms of safety and efficiency.

If **AI** makes **big data** smarter, then **robotics** represents the combination of **both** of those elements into a machine or device.

For many years, the idea of robots has fascinated people and been the stuff of science fiction, with the most common plot line of robots taking over the world. Today, of course, robots are becoming more common—in offices, warehouses, hospitals, homes, the military, and thousands of other settings, with no uprisings in sight. Here’s one that’s a crossing guard in Japan.

FedEx is enthusiastically embracing robotics (*Lil' Rico starts out across the stage, making sounds*) across the company in many ways. In fact, I'd like to introduce you to the first robot FedEx began using in its TechConnect repair center in Memphis. Ladies and gentlemen, please meet Lil' Rico, one of seven robots there; some of his co-workers are named Falcon and Area 51. He's delivering an item we made in our 3-D printing department to hold various parts and their paperwork. Right now these robots deliver parts in less than a minute to our technicians fixing phones, computers, and other electronics. (*Rico starts back.*) Once the repair is done, they quickly deliver the item to our Quality Assurance department for further checks.

A couple of weeks ago we put our first public-facing robot, Sam, into a FedEx Office location in Manhattan. Now a customer gives her broken Samsung device to Sam, which takes it back to the technician while the front office person finishes the customer transaction. One time we put a step ladder in one of the aisles Sam needed to travel in order to retrieve an item. After a couple of encounters with the step ladder, the robot learned *as it was operating* to take another route.

Robotics has begun to permeate FedEx operations:

- We're introducing mobile robots in our supply chain warehouses to move customer products to assigned locations to save time and lower costs.
- We're testing sensors on our airport tugs and yard mules to help drivers avoid collisions during heavy operations.
- We are testing robotic automation that can unload shipments off our trucks and put them onto conveyor belts for further sorting.

<https://vimeo.com/user58291889/review/211004420/64add44f28>

Just a final note on robotics:

<https://vimeo.com/user58291889/review/210489368/e20c489e79>

FedEx partners with an organization called FIRST, which stands for “**F**or **I**nspiration and **R**ecognition of **S**cience and **T**echnology.” It was founded by our friend, noted inventor Dean Kamen, to inspire young people to be science and technology leaders by engaging them in programs that build science, engineering, and technology skills.

- FIRST offers an international competition to high school students in robot building. Each year we transport hundreds of robot starter kits and completed robots to the final showdowns, this year in Houston and St. Louis later this month.
- We also sponsor an innovation challenge for the teams and provide more than \$50,000 in grant money they can apply for. FedEx is proud to be a part of this exciting endeavor to spark students’ interest in technology, engineering and math.

Despite the many benefits of new technologies, some people these days worry that these new inventions and innovations will take away more jobs than they create. “Will you be replaced by a robot?” said a recent LA Times headline. Bill Gates, of all people, suggested a tax on robots to counteract the loss of jobs they’re replacing. That’s ironic since his Microsoft Office programs have eliminated such jobs as secretaries, typesetters and tax accountants over the years, as cited in a *Wall Street Journal* article last month.

The fact is that technology is making many existing jobs more efficient and adding jobs to the economy, even as other ones go away. This is the clear lesson of history.

For example, if I were giving this speech in 1917 instead of 2017, we would hear people lamenting the fact that farmers were going to be out of work because of mechanization. New equipment such as tractors and harvesters could more efficiently accomplish tasks farmers had been doing with plows and horses.

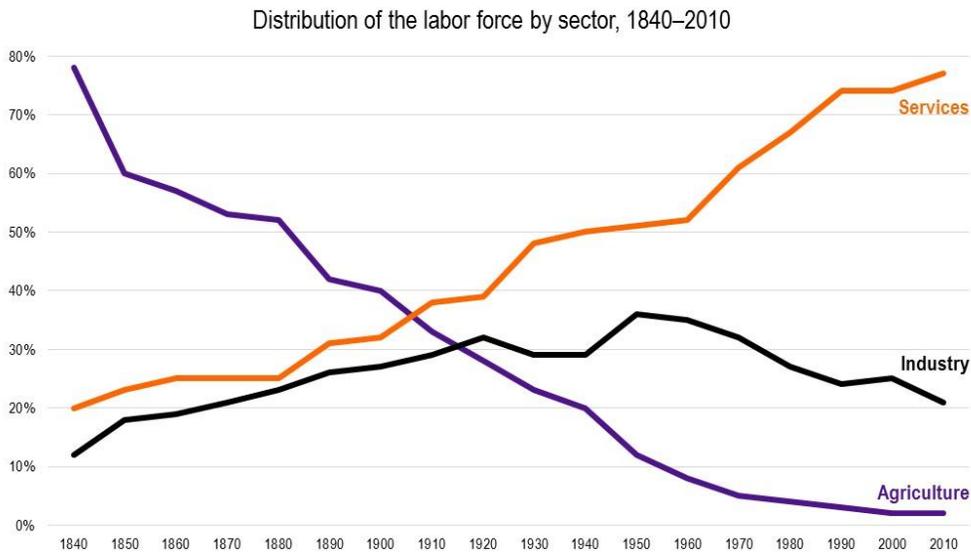
So what did these displaced farmers and many others do? They migrated to Northern factories and got jobs assembling automobiles for Henry Ford, making farm equipment, or joining in the massive industrialization triggered by World War I.

Take a look at this chart. It shows distribution of jobs by sector over 70 years.

You'll see

- From 1840 to present day, a gradual decline in agricultural jobs from 78% to 3%;
- the growth of industrial work peaking in the 50s-60s then declining thereafter; and

- a surge in service jobs that continues to spiral upward today.



So as factories—the industrial sector-- became more automated and efficient last century, those workers began to take other jobs in new sectors of the economy. For example, during the mid-20<sup>th</sup> century, we saw the rise of television in homes across America. Many former factory workers took jobs in that sector working with cameras or sound equipment.

Television brought a host of entertainment into homes, a favorite being sports events. Americans watched Mickey Mantle setting baseball records in the early 60s, Joe Namath doing the same in football in the 70s and so on. Think about what March Madness has become, due to television. CBS first *partially* televised the NCAA tournament in 1969. Today it's shown in full game coverage on 4 TV

channels and streaming on a host of online sites. In addition, women's NCAA games have been televised since the 80s and have also garnered a huge following.

Of course the TV industry has been changing dramatically, as people rely on their mobile devices more and more. Through iPhones, iPads, Androids or laptops, they've begun consuming programming from streaming sources such as Netflix and Amazon Prime, often watching shows through apps and rarely turning on a TV. Now cable and streaming companies are introducing innovative niche programming to attract new and younger audiences like you. As older TV jobs decline, new jobs are being added due to evolving technologies. Consider the growth of whole new fields such as app creation and game development.

The point is that new technologies simultaneously create new jobs, enhance existing ones while often making many traditional occupations obsolete. That's the cycle of innovation that's been going on for centuries. Well-known 20<sup>th</sup> century economist Milton Friedman once visited a canal-building site in China where thousands of people were digging with shovels to complete the project. Friedman asked the foreman why they didn't bring in heavy equipment to get the job done better and faster. The foreman told him that would put a lot of people out of work. "In that case," said Friedman, "Why not have them dig with spoons?"

In a sense we have too many people today who want jobs, but only know how to dig with spoons. They are desperate for training in a variety of fields.

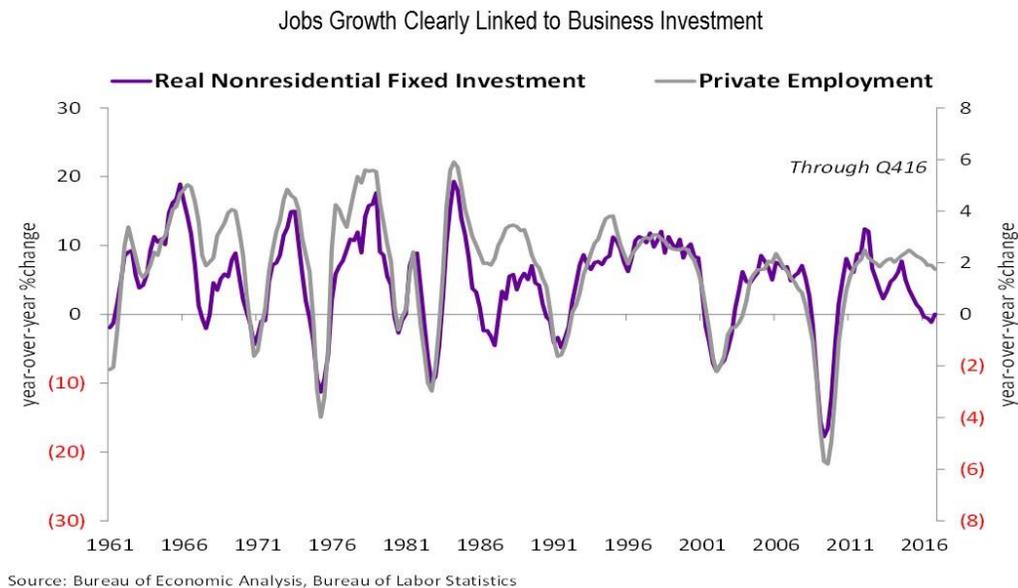
Unfortunately, in the United States at least, our K-12 educational system is not preparing young people for some 5.6 million (*Bureau of Labor Statistics*) jobs that are going unfilled today...some of which may not warrant a college degree but require specific training nonetheless.

As a result, companies, universities, and government organizations are taking it upon themselves to create training for the jobs they need to fill.

- At FedEx we have a program called Employment Pathways. It's focused on building a stronger workforce by creating pathways to meaningful employment for underserved populations.
- For some young people, that path could be training for in-demand jobs, especially in technology and logistics. For instance, we support a program at a nearby community college that provides aircraft mechanic training because we and other airlines have a need for those technicians.
- Others may have the training, but don't know how to find the opportunities. That's why we support programs that help connect both veterans and young people to employers seeking talent.
- I'm also proud to say that the state of Tennessee was the first to provide tuition-free community college education to high school graduates, so that people who want good non-degreed jobs can get the training they need. Oregon has a similar policy, and New York and Kentucky are considering versions of it.

In addition to education, we need to overhaul the U.S. corporate tax rate. Our 35% federal corporate tax rate is one of the highest in the world and is

inconsistently applied across industries. A lower rate would mean companies will have more revenue to invest in equipment, software, and training that will keep America competitive and deliver more better-paying jobs to American workers. If you look at recent history, you'll see that as business investment rises, so does the number of jobs.



Besides tax reform, another essential catalyst to innovation and economic growth is trade. You hear a lot of naysayers about trade these days, but much of the discussion is inaccurate. In reality, trade is a powerful stimulant to innovation, jobs, and the American economy.

- Today about 27% of all U.S. economic activity is due to imports and exports.
- And did you know that 40 million U.S. jobs—or one in five—are connected to trade—and that these are higher paying? At FedEx, we consider *all* our jobs to be trade jobs.

- By the way, in terms of transactions per day, the largest customs clearance port of entry in the U.S. is right here in Memphis, where our FedEx Superhub is located.
- Trade has added more than \$13,000 a year in purchasing power for the average American household.
- Since NAFTA—the North American Free Trade Agreement—began in 1994, U.S private-sector jobs have increased by more than 29 million (32%).
- Of course trade can displace workers, who should have available robust government-sponsored retraining. But it is technology that's responsible for 85% of job obsolescence. Think thousands of Blockbusters and bookstores that went out of business due to streaming and Kindles.
- Did you *also* know that even though we're the world's largest economy, 80% of the world's purchasing power and 95% of its consumers lie outside the U.S.?
- At FedEx we know that trade equals greater opportunities for U.S. companies, especially small and medium businesses, which comprise about 97% of U.S. exporters. If you develop a new robot, you'll definitely make more money if you can sell it in Asia and Europe as well as the United States.
- Trade enables people to access ideas, technology and products from around the world. It allows them improve on all three--remember our principle of combining existing ideas into new ones? This process is constantly energizing the innovation cycle and giving all of us better products at lower prices.

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Finally, besides innovative technology, FedEx is intent on innovating for good. We believe we're responsible for creating not only business value for our stakeholders but societal value for our world. We do that by applying FedEx competencies to real-world issues, and by empowering others to create innovative solutions as well. Let me explain with some examples.

- In the field of health care, the technologies I just mentioned are changing things fast. Robots help surgeons in operations. Researchers mine vast quantities of data to better understand what causes diseases and how to treat them. And medicines can be precisely tailored to the needs of certain patients.
- Many medicines and life-saving human organs must be transported quickly and reliably to where they're urgently needed. Temperatures and other shipping conditions must be strictly regulated.
- FedEx developed a device called SenseAware® that provides near-real time monitoring from inside the shipping package itself, alerting shippers whether their precious cargo is staying within prescribed temperature limits or has been exposed to excessive light or other factors that might compromise shipment quality. It's been a boon not only to health care but also to shippers of food, fresh flowers and other perishables.

Beyond providing technology to medical customers, FedEx has a long history of bringing the latest medical technology to those in need.

- For more than 30 years, FedEx has supported ORBIS, a non-profit operating a Flying Eye Hospital that treats patients, especially children, for sight-robbing diseases. FedEx pilots volunteer to fly the ORBIS aircraft around

the world on its missions, and FedEx mechanics maintain the plane. To date ORBIS has performed more than 23 million medical and optical treatments.

FedEx's expertise in developing innovative networks is important to saving lives after natural disasters.

- To prepare for emergencies, each year we set aside at least four million pounds of disaster-related charitable shipping capacity.
- Tornadoes, tsunamis, hurricanes, and earthquakes—natural disasters of all kinds—can hamper normal supply lines. FedEx uses its logistical networks and technologies to quickly gather what's needed from numerous sources, consolidate it, and transport it as quickly as possible to save more lives.

Besides applying our expertise directly to societal issues in innovative ways, FedEx also enables **other innovators** to bring their solutions forward.

Three years ago a brother-and-sister team founded a company called ArtLifting. Through e-commerce propelled by FedEx, the small Boston business sells paintings and prints from more than 100 homeless and disabled artists to buyers throughout the U.S. and around the world. These artists receive income from their work, not to mention a big boost in pride and confidence. It's a brilliant business strategy that also betters the lives of underserved people.

FedEx now has a formal way of recognizing innovation in a variety of fields through our 2017 FedEx Young Innovators List. Actually, the list includes not only

people but also cities such as Eden, Utah; countries such as Israel; big concepts such as space, trade and re-use; and even a car. Just search FedEx Young Innovators List, and I think you'll be surprised at the breadth of innovation there. Who knows...maybe we'll see you or your ideas on it one day.



To sum up, we live in marvelous times in the sense that every day new marvels of technology and ideas flow out into society and change our way of thinking, learning, doing and connecting. We are lucky to witness such a profound rate of innovation in the world today.

FedEx is proud to be recognized as an innovation leader, and we know that continuous innovation is the key to delighting our customers and improving communities worldwide. We believe that education, corporate tax reform, and vigorous support of global trade will help innovation continue to flourish for the overall benefit of humankind.

On behalf of more than 400,000 FedEx team members around the globe, Lil' Rico, the other robots and myself, thanks for your attention today. I wish all of you a productive conference and look forward to the innovative ideas you'll be giving to the world in the years to come.