

Stearns Financial Group

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Financial Trends is a newsletter for our clients, allied professionals, and friends of the firm. We provide information from our extensive research network that helps better inform our readers on a variety of current and future investment, financial, and business planning areas.

SFG believes in being a strong consumer advocate for our clients, being pro-active, transparent and well-informed. Our research-driven team is constantly on the outlook for threats and opportunities for our clients that will impact them as they move toward their financial goals.

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Artificial Intelligence and Machine Learning:

Bigger Than Electricity? Bigger Than the Internet?



The convergence of powerful Super Trends, especially Globalization, Technology Accelerators and Demographics/Global Age Wave, is birthing entirely new industries, creating changes to the way economic bust and boom cycles develop, creating tailwinds and headwinds for specific companies and has had an enormous impact on political contests here and overseas. One of the Super Trend questions Stearns Financial gets from our clients, professional advisors, reporters and friends of the firm on a weekly basis is some version of “**will artificial intelligence help or hurt mankind?**” Conventional thinking is artificial intelligence and robots will take away many of the jobs that humans do today.

Dimensional thinking, combining logic and creative intuition, has led some industry experts to believe that as many or more jobs will be created than destroyed, at least in the next 10 years. This has always been true in prior industrial revolutions.

Once it was inconceivable that eliminating agricultural jobs would be good for the world. Today the U.S. produces three times the food it did a century ago with only 3% of the workforce. The “loss” of these agricultural jobs didn’t crash the economy – the U.S. now has more people employed than at any time in history.

Artificial Intelligence is an overall term for computer systems that can sense their environment, think, learn and take action in response to what they’re sensing and their objectives. Forms of AI in use today include digital assistants, chatbots and machine learning.

In this special SFG *Financial Trends* report on Artificial Intelligence and Machine Learning, we will try to outline areas of potential opportunity or gain in the future and areas of potential loss or threat. As you’ll read, it is entirely possible that we will look back just 10 or 20 years from now and believe that AI and Machine Learning impacted the planet as much, perhaps even more, than electricity or the internet. We’ll see if it can surpass indoor plumbing which, according to many of our grandmothers, was better than sliced bread and clearly a higher hurdle than other innovations of that time.

We hope you enjoy this SFG special *Financial Trends* report!

Glenn Joyce, CFA, CFP®, *SFG Partner, Co-Chief Investment Officer*

Artificial Intelligence and Machine Learning

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EXECUTIVE SUMMARY

1 The estimated future economic impact of Artificial Intelligence (AI) is enormous.

PriceWaterhouseCoopers published a report in 2017 estimating the impact in just 12 years from now in 2030 at a positive \$15.7 trillion (with a “T”) **boost to the global economy, 14% more than baseline economic projections, with roughly 40% of the increase coming from the increase in worker productivity.** This has profound future implications for investors as well as careers and businesses.

2 The future positive impact on society will also be enormous.

Health care could be the biggest beneficiary, curing and detecting diseases (earlier, when they are easier to treat) much more rapidly than today.

Worried about future food shortages as the population of the earth increases? Imagine if the 50% of food wasted in the world today was better controlled to help areas where starvation is the norm. AI research is already being directed toward better food production and utilization.

3 Future dangers are also enormous.

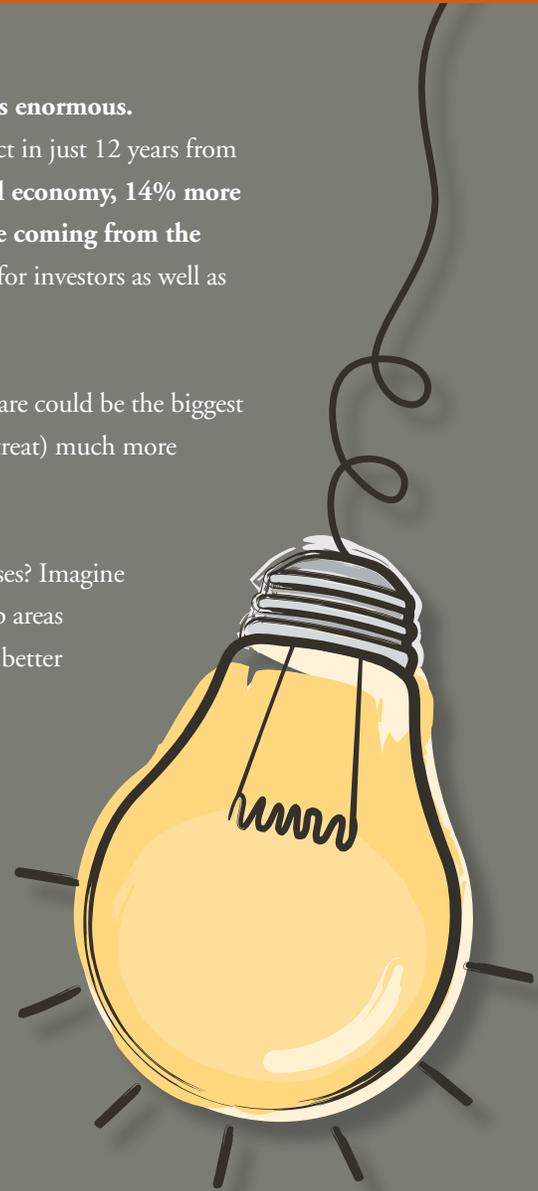
Elon Musk and the late Stephen Hawking are among the innovators who believe AI poses as much of a threat as a benefit to humanity. The dangers don't have to be Hollywood movie disaster themes of killer robots or nano-weapons – they can be extensions of trends we already see today like the increasing distractedness and mental health problems resulting from addiction to smartphones and gaming.

4 There is no one “AI.”

Every AI and Machine Learning application has its own strengths and weaknesses. A major health research center is using Google's AI in conjunction with IBM's Watson (IBM's own AI) to enhance their human efforts in targeted gene cancer research, sometimes called “personalized medicine,” another important future Mega-Trend under the Technology Accelerator Super Trend.

5 Future AI predictions may be way off.

We feature an interview in this special report that we did with our friend Dr. James Canton, author of *FutureSmart*, a TEDx speaker on AI, expert on robotics and blockchain and considered by many to be today's leading global futurist. We also summarize cautions about future AI predictions by another good thinker in the space, AI luminary Rodney Brooks.



Have you asked Alexa, Amazon's Artificial Intelligence helper, to look up something, order something online, dim the lights or make a reservation for you at your favorite restaurant?

You're using the early generation of Artificial Intelligence technology that will increasingly become important and critical, as well as vilified and dangerous.

Google/Alphabet's Artificial Intelligence has now beaten masters at the game of Go, thought to be an even harder feat than IBM's Big Blue computers beating the world champion at chess. But AI still doesn't have what we would call common sense. If you asked Alexa to make a reservation for dinner at the Mayo Clinic, it would try. A key question is whether future versions of Alexa will know when you're asking the impossible, or pulling its leg – in the not-so-distant future, it will have these capabilities. **More important are the opportunities and threats posed by this emerging field of study that has been called by industry leaders "as important as the harnessing of electricity."**



BROAD AI CATEGORIES INCLUDE:

- **Automated intelligence:** Automation of manual/ cognitive and routine/nonroutine tasks.
- **Assisted intelligence:** Helping people to perform tasks faster and better.
- **Augmented intelligence:** Helping people to make better decisions.

These last two applications, assisted and augmented intelligence, mirror Tom Friedman's concept of **Artificial Intelligence = Intelligent Assistant**, highlighted in his 2017 book *Thank You for Being Late*, previously profiled by SFG as recommended reading for real life Super Trend

stories. Surprisingly, these trends are given little media attention compared to the potential loss of jobs (the first intelligence category) and driverless cars (the last intelligence category below).

SFG believes assisted intelligence and augmented intelligence will be the major game changers for workers and their companies across many industries in the next 5-10 years.

- **Autonomous intelligence:** Automating decision-making processes without human intervention.

Using SFG's scenario learning expertise is important here, since many of the breakthroughs happening (every week around the world) in each of these four "intelligence" areas create a different direction for investment opportunities and threats, innovation and future breakthroughs. **In scenario learning, prediction (which is always hard) takes a back seat to having a deeper understanding of the predictable, semi-predictable and random trends that will influence the future.**

Being able to use "adaptive decision making," and then being able to pivot more rapidly after the true trend is more recognizable, is often what's needed in a fast-changing world.

For example, we knew – from our SFG research, clients in the industry and network friends of the firm – in 2008 that

disruptive technology was changing the energy sector. This was predictable given the increasing effectiveness and efficiency of fracking, invented decades earlier. It was semi-predictable which energy companies would benefit or lose in the disrupted future. Many energy companies were pivoting or diversifying, but would their moves be fast enough, and smart enough, to adapt to the radical new world of enhanced energy savings (already taking hold two years earlier)?

Less predictable was the demand side of energy, which many believed back then would grow to the sky. When the economic threats in early 2008 became more pronounced, combining these trends together to predict lower oil prices (and take profits in our energy stocks) wasn't an act of prescience, it was simply pattern recognition or GOFAI – good, old fashioned artificial intelligence.

ECONOMIC IMPACTS of AI and Machine Learning

Investing

There is an old joke about the factory of the future that we now regularly use to describe potential benefits to shareholders of the smart use of technology accelerators, like artificial intelligence and blockchain. Inside this factory there is one guy and a dog. The guy is there to feed the dog and the dog is there to keep the guy from touching any of the buttons. This has become a frightening possible future for millions, perhaps even billions, of workers around the world. If you own the factory, this future is very positive from the viewpoint of your ability to maximize profits with less overhead. If you're a shareholder of a company benefiting from this future, and sell something the world wants or needs, you can enjoy increasing profits and dividends even if sales are not growing by significant amounts.

Companies today have a host of new tools to enhance profits, and the toolkit will become even bigger in the near future. S&P 500 companies will be boosting earnings using AI and machine learning, predictive global supply chains, big data analytics, automation/robots, blockchain, advanced application tools like GitHub and innovation boosters like Chematica and CRISPR, a game changing genetic engineering technique.

Leadership of these companies must be smarter than ever about the impact of **external** Super Trends on their company. **It's important, but not sufficient, to create a powerful tech-enabled enterprise.** If the factory with the guy and the dog are efficiently producing something few consumers want to buy, and the factory can't easily be retooled and pivot towards

changing consumer tastes, failure is predictable. We've seen numerous recent examples of this, including General Electric's fall from grace with investors over not pivoting fast enough, especially in power generation equipment. This is despite GE's major investments in technology accelerators, including potentially game changing moves like GE's partnership with one of the explosive "new economy" companies, Nvidia, to accelerate AI in healthcare applications.

Multibillionaire tech investor Jim Breyer, the founder and CEO of Silicon Valley-based Breyer Capital, believes that there will be a CEO and/or investors steeped in AI who will far outpace the wealth of Bill Gates (over \$80 billion) or Mark Zuckerberg (\$68 billion).

Breyer states that there will be: *"a type of individual or set of individuals that understand that the self-learning capabilities applied to healthcare and finance will look extraordinary over the next decade, because it is so different and fundamental."*

Breyer continues, *"I think opportunities from an investment standpoint will be five to 10 [times] – in terms of market cap around AI – what social [media] currently is. For sure the market capitalization will be that much bigger than Facebook, Twitter, Snap (sic) and the like. Take a decade, go a decade forward. But absolutely positively."*



SFG's AI Investment Themes

In the investment area, SFG has been monitoring these Mega-Trends under the Technology Accelerator Super Trend for some time. Dennis Stearns recently attended the MIT Artificial Intelligence conference in San Francisco attempting to gain clarity with several investment, financial and business planning questions. A key question: Will AI and machine learning, along with other technology accelerators, have more impact on boosting company earnings in the future, or will big company innovation or disruptive start-ups potentially level or decrease specific company earnings, also known as the “Kodak/Blockbuster effect”?

Here are a few of the investment areas that are being studied and are interesting to SFG:

- **Companies that are leaders in artificial intelligence that are enabling traditional companies to be “tech enabled”** – examples include Amazon, Facebook, Microsoft and Google, or Exchange Traded Funds (ETFs) focused on these companies. There are also international companies in this space, like Baidu and Alibaba, that are likely to do well in the future, but may be overhyped from time to time at unattractive stock valuations.

This leads us to the tech-enabled blue-chip companies which are quietly benefiting from these trends:

- **Tech-enabled companies** – investing in traditional and new disruptive industries being turbocharged by technology accelerators, including AI. Examples include 3M, Johnson & Johnson and ETFs/mutual funds focused on companies with a growing technology infrastructure. Netflix is a great example of early-on utilizing primitive AI to analyze big data from its customer interactions via its website, in order to create a more customized experience that led to more business and customer satisfaction. Blockbuster thought a fancy-looking website was all that Netflix was offering and did not understand the powerful engine under the hood that was driving Netflix. Blockbuster is now out of business – traditional companies of the future must avoid being left behind and ending up like Kodak or Blockbuster.
- **Focused AI companies or sectors, including international investing options (generally for aggressive investors only!)** – investing in smaller, emerging companies or ETFs with AI themes. In this category are emerging companies in countries like China that could benefit in an outsized way from the technology revolution. Upside here is enormous, as are the risks.

- **Direct venture capital investment (aggressive growth, accredited investors only)** – early stage companies in AI or using AI as a tech enabler in health care and other industries. We believe we have found some good options in this area which are only suitable for more aggressive investors.

SFG's Take: At this stage of technology development and normal investment market cycles, SFG believes that the massive change being caused by the techno-industrial revolution will create equal parts **investment danger** (“Kodak/Blockbuster effect”) and **opportunity** (better earnings growth through targeted capital expenditures).

Many leaders in the AI and machine learning field interviewed by Dennis at the MIT AI conference stated that picking the winners and losers in this area will be as difficult as picking the future winners of biotechnology was in the 1990s. **The best answer today?** Broad diversification across these technology providers and tech-enabled companies, consistent with each client's future goals and tolerance for risk. Elevated price-to-earnings ratios for several years and the potential for rising interest rates to create downward pressure on P/E ratios have placed some of the FAANG stocks (Facebook, Amazon, Apple, Netflix and Google, now Alphabet) in rich valuation territory. We will continue to monitor their ability to grow earnings fast enough to justify their valuations.



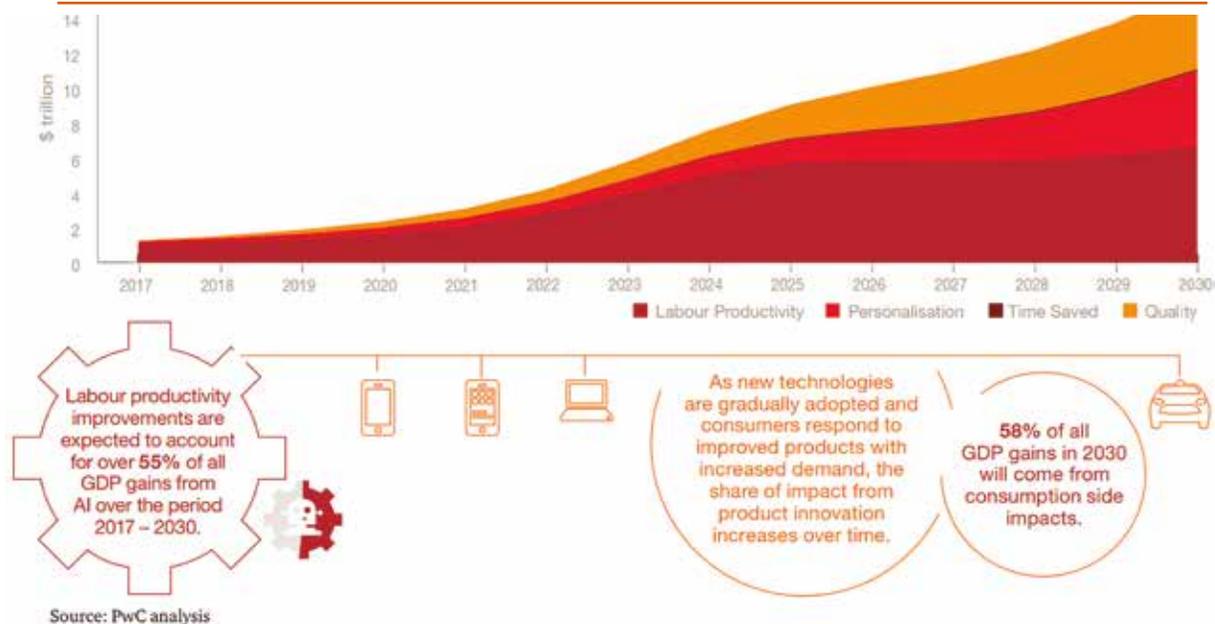
Economics

PriceWaterhouseCoopers conducted a major analysis in 2017 culminating in startling upside projections of the impact of AI. From the PwC report:

What comes through strongly from all the analysis we've carried out for this report is just how big a game changer AI is likely to be, and how much value potential is up for grabs. AI could contribute up to \$15.7 trillion (14% higher than it would be otherwise) to the global economy in 2030, more than the current output of China and India combined.

Of this, \$6.6 trillion is likely to come from increased productivity and \$9.1 trillion is likely to come from consumption side effects. While some markets, sectors and individual businesses are more advanced than others, AI is still at a very early stage of development overall. From a macroeconomic point of view, there are therefore opportunities for emerging markets to leapfrog more developed counterparts. And within your business sector, one of today's start-ups or a business that hasn't even been founded yet could be the market leader in 10 years' time.

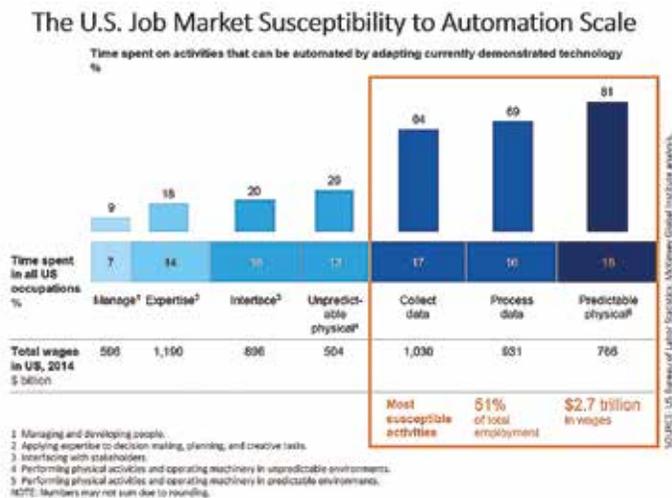
Where will the value gains come from with AI?



Creative Destruction of Jobs

As SFG outlined in our *Future of Jobs Financial Trends* report in 2014 and Dennis Stearns' TEDx talk of the same name, the “creative destruction” of jobs has always been a hallmark of the U.S. economy. It means that technological revolutions from the cotton gin to the railroad to the combustion engine to the internet to AI have always marginalized or destroyed some jobs but created entirely new job categories, often creating more jobs than those destroyed. It is by no means clear that the next 5-10 years will result in fewer jobs overall compared to new job categories being created, although this time may be different in that net new jobs, at least high-quality jobs, may decline over time as a result of AI, robotics and automation.

Here are the jobs considered most at risk:



Businesses and workers take these trends seriously and figure out ways to increase their ability to be indispensable to customers.

GLOBAL ECONOMY IN THE THIRD STAGE OF TECHNOLOGY DISRUPTION

- 1 Frenzy**
Speculation goes crazy – think early railroads or dot.com boom.
- 2 Consolidation (Bust)**
Coming back down to earth, usually with a bang! The last major period of this stage was the dot-com bust.
- 3 Deployment**
Where we are now. In this stage, big disruptions are the norm, outsized profits can be made and risks of being disrupted increase. This stage often lasts for decades.
- 4 Maturity**
The Future is more evenly distributed, margins compress.

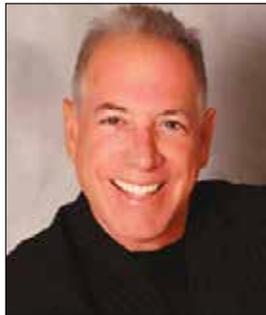
Currently another Super Trend, demographics, is impacting the question of whether everyone who wants a job will be able to get a job. The retiring trends of baby boomers have created a declining supply of trained workers even as the larger millennial group begins to impact the workforce. Tom Friedman says, “average is over,” meaning that all workers have to up their game and be better at what they do to survive in the future jobs market.

As this special *Financial Trends* edition goes to press, a historic moment has arrived – there are as many unfilled jobs in the U.S. as there are people who are unemployed.

What happens in 10 years when AI becomes super powerful and has the potential to replace even more workers? This is a medium- and long-term danger, especially if health care advances have lowered mortality rates and keep more workers in the workforce for longer periods than expected. No one can predict how this balance will work out, but this is yet another example of how scenario learning, watching the trends closely, can help create better adaptive decision making to avoid risks or capture opportunities.

INTERVIEW with Dr. James Canton

Dr. James Canton visited with us recently for a day. He is a friend of SFG and involved in projects with several of our clients and network friends. He was an executive hire of Steve Jobs as part of Apple's Macintosh team and has been involved in many major technological leaps forward in the past, including an important part of the reason that Singapore has risen as an educational leader and an innovation powerhouse. He is a bold thinker, an author, entrepreneur, social scientist, TEDx speaker and a consultant to many current AI projects by leading companies and scientists.



Canton is considered one of the leading global futurists. He is not just an ivory tower predictor – he works with major companies and governments around the world “making the future happen.”

**An excerpt from Dr. Canton's latest book,
*Future Smart: Managing the Game-Changing
Trends That Will Transform Your World:***

“...We are living through a massive number of transformations in medicine, manufacturing, finance, security, business, climate and energy that are ALL fundamentally changing the future we encounter every day. The next 10 years will be mind-blowing, and no one is ready...the reason to prepare is that the future is coming faster, with more impact, more destructive and constructive force, and if you are not ready, you will be swept aside.”

SFG: Jayme, thank you for being with us today to help us understand the opportunities and risks of the Artificial Intelligence and Machine Learning movement. What is your overall take of this emotionally charged topic?

Canton: It's one of the biggest game changing technology

trends, perhaps of our lifetime. The Artificial Intelligence = Intelligent Assistant trend coined by Tom Friedman will perhaps have the most impact near term. In the next decade, I'm more positive about the productivity benefits that “tech enabled” humans will enjoy rather than the wholesale loss of jobs to machines.

In perhaps 10 years, the ability of machines to learn and themselves create new, faster, smarter machines will create great leaps forward in health care, energy production and food production and distribution. It will also create greater risks to existing jobs, job creation, financial markets and society in general.

SFG: Give our readers an idea of the positive upside.

Canton: Health care in general will be revolutionized. Regenerative medicine, growing organs being the simplest element, will extend life and health. Personalized medicine means that smarter drugs and treatments will become more focused to each of our own unique DNA and physiology. Many of today's most dangerous diseases, including cancer, dementia and heart disease, will become treatable ailments. Today's 60-year-old feels on average about as healthy as the previous generation's 50-year-old. Imagine extending both longevity AND the quality of life, mentally and physically.

In Dennis' new book *Fourth Quarter Fumbles*, he also pointed out the potential risks to this exciting future that we all need to be tuned into for ourselves, our families and our finances.

SFG: Since health is the greatest asset that any of us have, this is an exciting future, assuming we can mitigate the risks of living longer and healthier, including boredom and financial pressures. What are other positive areas beyond health care?

Canton: I forecast in *Future Smart* that digital entrepreneurs will make up over 70% of the global economy by 2030. I love being an entrepreneur and hanging around other entrepreneurs – they have been the primary engine of job growth, innovate like crazy and are generally optimistic and energetic, but know they have to operate with a healthy dose of paranoia. Being around Steve Jobs took all of those areas to a new level I had never experienced before.

I also believe that mobile commerce will transform economies around the world and lift massive numbers of people out of poverty. It's already happening. This prediction is not a risky one! And with rising prosperity, disaffected individuals, especially young males, will be less likely to embrace terrorism.

SFG: So you think we'll have more haves, less have-nots, with all having a greater quality of life?

Canton: Yes, and again just compare the strides made in this area since World War II. They will pale in comparison to the leaps forward in the next 12 years.

SFG: The opportunities for the have-nots will surprise some of our readers. What triggers this benefit?

Canton: Technology is becoming easier to use. The intelligent assistant, coming from the growth of artificial intelligence, will allow a person with less education to augment their knowledge and do things previous under-educated generations could not have imagined. A person with good common sense and creativity, but without a traditional college degree, may do things or invent things or innovate at levels that will astound us.

These individuals will have the opportunity to do focused learning in areas that make them more productive, with less waste of time and energy. The cost will be less than traditional universities, and may even be provided by those same higher education institutions. Or Salman Kahn at Kahn Academy, who has already ignited a revolution in education.

SFG: That's a much more positive future than the 24/7 "worst case scenario" media portrays. What else?

Canton: The connected globalization of markets, assets, technologies, knowledge, talent and industries is creating something new we have not seen before. This will open doors to education, commerce, health care and business in entirely new ways. Connectivity could bring a world of ample resources and smarter solutions. But it can also bring strife as countries and politicians attempt to protect their citizens from the forces of creation and destruction. This sub-trend is already unfolding – it will be a golden age, but a messy future.

Here are a few benefits of connectivity and the Internet of Things, all turbocharged by the theme of your SFG *Financial Trends* newsletter, Artificial Intelligence:

- Connected transportation will be safer.
- Connected networks will find patterns and solutions to problems.
- Connected energy grids will save energy even as connected energy sources create more energy at lower cost to our pocketbook and to the planet.
- Connected innovation ecosystems, where leaders bring together talent, technology, collaboration and markets at new levels, will create competitive advantage.
- Connected governments will be more transparent.
- Connected supply chains will speed production and raise quality.
- Connected health care will enable more effective care.

We all have to understand this new connected planet if we're going to thrive in the future, which means being more adaptive, agile and predictive. **Paradoxically, the benefits of this new world to the older generation may be greater than to the younger generation.**

SFG: Interesting, how so?

Canton: The older generation will have more opportunities to stop diseases earlier that would have debilitated or killed them in the past. On average, since every individual is unique, they will have more opportunities for a longer period of time to enjoy their golden years.

SFG: You highlight five breakthrough technologies in many of your talks – what are they?

Canton: I believe that five future technologies, nano-tech, bio-tech, neuro-tech, info-tech and quantum computing will create breakthroughs in all the areas we've discussed. Combining several of these together will create incredible solutions to difficult problems.

One trend that involves these tech-trends I'm particularly excited about is the reason the older generation has something to cheer – "health enhancement" – not just eliminating disease, but pushing us toward true wellness. Health enhancement includes the growing body of work to repair our genetic code, effectively erasing bad family health history. To an extent that has been happening already – far fewer people with bad family heart history are dying at young

Interview with Dr. Canton

ages of heart disease. This emerging trend has the potential to expand dramatically and increase our happiness as a society.

If you're truly well, you feel more confident about the future. You have more energy to do things and try new adventures. And you have a much lower probability of developing debilitating illnesses later in life, like dementia, type-2 diabetes, heart disease, cancer or depression. All of which, as Dennis would say, often lead to other fumbles later in life.

SFG: In your TEDxMarin talk on **Machines That Think: The Good, Bad and Scary of A.I.**, you highlight the double-edged sword of AI, even though you believe the AI prosperity dividend may be enormous. Tell us about the “mashup” of two technologies you highlight in your TEDx talk that could leap into our lives in the next 10 years: Neuromorphic Computing, based on the way the human brain works and Quantum Computing, creating speeds and capabilities thousands of times more powerful than today's computers.

Canton: These two technologies, integrated together, can create solutions to intractable problems around the globe. They come closer to creating smart, human-like artificial intelligence, rather than many of the not-so-smart, low common-sense AIs we have today.

The prosperity dividend I talk about is well larger than most can even conceive. But the “bad and scary” of the AI trends may create negative costs in money and human anxiety that offset the dividend.

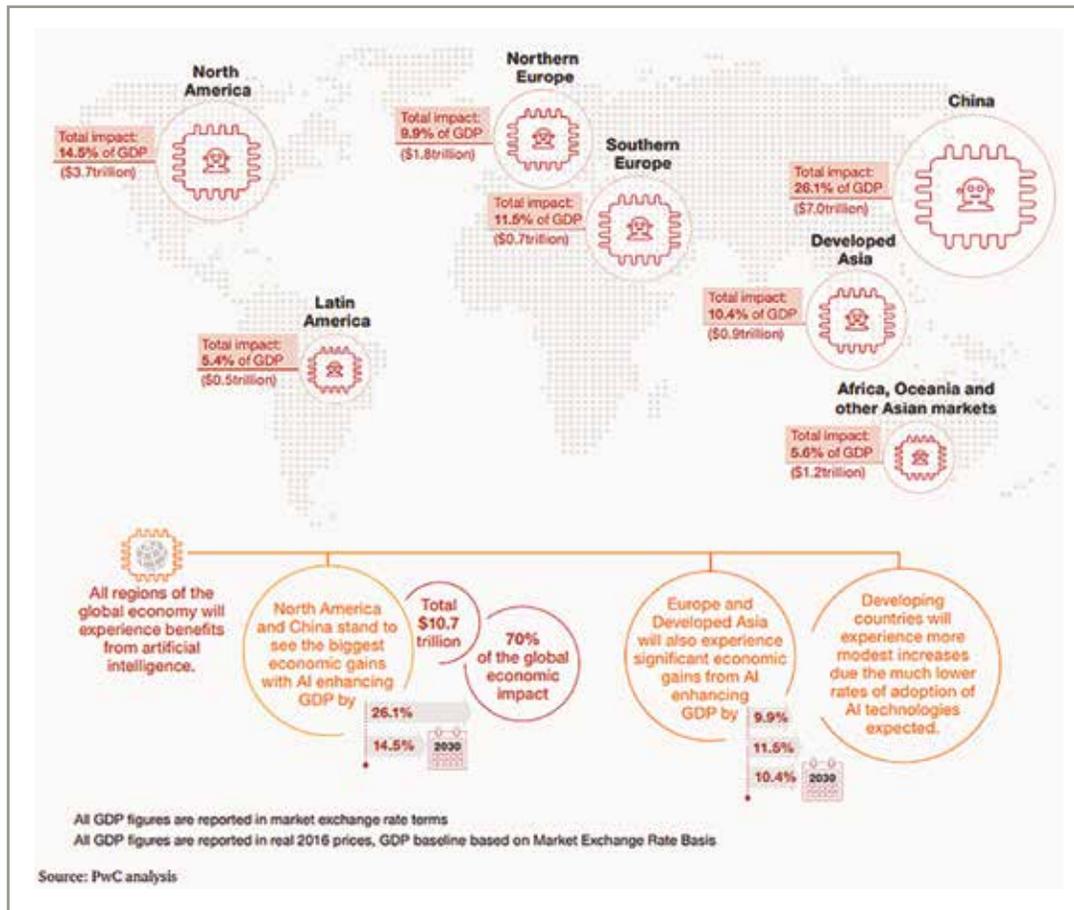
SFG: Let's shift to the bad and scary side of AI. You say we could have AI wars and dangerous scenarios that include bad actors, countries or lone wolves harnessing AI for nefarious purposes. How concerned should we be about these risks?

Canton: Very concerned, but I'm not as negative as some, nor am I predicting that the Terminator movies will become a reality. We have to control AI before AI controls us. Ethical boundaries will be breached even by well-meaning people and corporations striving to compete with ever-more-powerful competitors. I was happy to see Elon Musk, who believes that AI is more dangerous than nuclear weapons, contribute \$10 million to the Future of Life foundation that focuses on the ethical uses of AI and other technologies, striving to convince individuals, companies and governments to create appropriate boundaries.

SFG: Thank you, Jayme. We look forward to future discussions as AI continues to advance.



Which Regions Will Gain the Most From Ai?



THE AI DOCTOR IS IN

The *Wall Street Journal* ran a story on May 21, 2018 about a woman named Kimberly Bari who started having seizures at age 26. Her surgery and drug-resistant condition led her to have a computer implanted in her brain. NeuroPace's engineers had this computer pattern match two million recordings from the brains of other patients. Using AI and machine learning, the system helps Kimberly's brain interrupt a seizure at its onset.

Edwards Lifesciences has a hypotension index recently approved by the FDA which has been incorporated into an AI device that

is already used on thousands of patients in Europe to monitor for potential rapid blood pressure declines.

These and hundreds of other stories suggest a very positive future for Artificial Intelligence and the field of medicine. As in every other area of human endeavor, AI and medicine will come with challenges. Apart from the important debates going on right now about privacy, what about over diagnosis? It's not hard to see a generation of hypochondriacs sent to the doctor when an overzealous AI diagnoses a small chance of a rare disease.

What to Be Cautious About in Future AI Predictions

Rodney Brooks is the former director of the Computer Science and Artificial Intelligence Laboratory at MIT and is a founder of Rethink Robotics and iRobot. Here are three of his seven forecasting mistakes currently being made about Artificial Intelligence in the near future, the next 10-20 years.

#1 – Overestimating and Underestimating

Roy Amara, co-founder of the Institute for the Future in Palo Alto, sums this forecasting mistake up like this:

We tend to overestimate the effect of a technology in the short run and underestimate the effect in the long run.

This is a good description of the evolution of fracking. Slow to get going, now making the U.S. another Saudi Arabia and creating energy surpluses around the world. Future fracking technologies will likely include little or no water (already being developed) and create very little environmental impact.

The Global Positioning System (GPS) is another good example. Starting in 1978, 24 satellites were put in orbit – there are now 31 which include spares in case of problems. It was designed to allow the military to more precisely hit their targets. The project was almost canceled several times in the 80s. It didn't really get traction until the 1990s and Operation Desert Storm.

Today, most of us would be lost (literally) without GPS in our cars and smartphones. GPS technology synchronizes the U.S. electrical grid. It tracks fleets of trucks and reports on driver performance. Future adaptive uses are, as Einstein would have said, only limited by our imagination.

Artificial Intelligence had been overestimated in the 1960s, then again in the 1980s, and perhaps again today, although the promise of smart helpers (Tom Friedman's Intelligent Assistants) is now closer and represented by the early versions of Apple's Siri, Google's Assistant and Amazon's Alexa.

#2 – Imagining Magic

Science fiction writer and inventor Arthur Clarke has his own set of three "laws" that have been found to be sound time and again as science and technology bound along at increasingly faster rates.

1. When a distinguished, but elderly scientist states that something is possible, he is most certainly right. When he states that something is impossible, he is very probably wrong.
2. The only way of discovering the limits of the possible is to venture a little way past them into the impossible.
3. Any sufficiently-advanced technology is undisguisable from magic.

Imagine we had a time machine and we could transport Isaac Newton from the late 17th century to today, setting him down in a place that would be familiar to him: Trinity College Chapel at the University of Cambridge.

Now show Newton an Apple iPhone. Turn it on so that the screen is glowing and full of icons, and hand it to him. Newton, who revealed how white light is made from components of different-colored light by pulling apart sunlight with a prism and then putting it back together, would no doubt be surprised at such a small object producing such vivid colors in the darkness of the chapel. Now play a movie of an English country scene, and then some church music that he would have heard. And then show him a Web page with the 500-plus pages of his personally annotated copy of his masterpiece *Principia*, teaching him how to use the pinch gesture to zoom in on details.

Could Newton begin to explain how this small device did all that? Although he invented calculus and explained both optics and gravity, he was never able to sort out chemistry from alchemy. He would be flummoxed, and unable to come up with even the barest coherent outline of what this device was. It would be no different to him from an embodiment of the occult – something that was of great interest to him. It would be indistinguishable from magic. And remember, Newton was a very smart person.

If something is magic, it is hard to know its limitations. Suppose we further show Newton how the device can illuminate the dark, how it can take photos and movies and record sound, how it can be used as a magnifying glass and as a mirror. Then we show him how it can be used to carry out arithmetical computations at incredible speed and to many decimal places. We show it counting the steps he has taken as he carries it, and show him that he can use it to talk to people anywhere in the world, immediately, from right there in the chapel.

What else might Newton conjecture that the device could do? Prisms work forever. Would he conjecture that the iPhone would work forever just as it is, neglecting to understand that it needs to be recharged? Recall that we nabbed him from a time, 100 years before the birth of Michael Faraday, so he lacked a scientific understanding of electricity. If the iPhone can be a source of light without fire, could it perhaps also transmute lead into gold?

This is a problem we all have with imagined future technology. If it is far enough away from the technology we have and understand today, then we do not know its limitations. And if it becomes indistinguishable from magic, anything one says about it is no longer falsifiable.

#3 – Performance versus Competence

We all use cues about how people perform some particular task to estimate how well they might perform some different task. In a foreign city we ask a stranger on the street for directions, and she replies with confidence and with directions that seem to make sense, so we figure we can also ask her about the local system for paying when you want to take a bus.

Now suppose a person tells us that a particular photo shows people playing Frisbee in the park. We naturally assume that this person can answer questions like, *What is the shape of a Frisbee? Roughly how far can a person throw a Frisbee? Can*

a person eat a Frisbee? Roughly how many people play Frisbee at once? Can a three-month-old person play Frisbee? Is today's weather suitable for playing Frisbee?

Computers that can label images like “people playing Frisbee in a park” have no chance of answering those questions. Besides the fact that they can only label more images and cannot answer questions at all, they have no idea what a person is, that parks are usually outside, that people have ages, that weather is anything more than how it makes a photo look, etc.

This does not mean that these systems are useless; they are of great value to search engines. But here is what goes wrong. People hear that some robot or some AI system has performed some task. They then generalize from that performance to a competence that a person performing the same task could be expected to have. And they apply that generalization to the robot or AI system.

Today's robots and AI systems are incredibly narrow in what they can do. Human-style generalizations do not apply.

Want to Know More About AI and Machine Learning?

ARTICLES:

1. Digital Trends. A brief history of AI. <https://www.digitaltrends.com/cool-tech/history-of-ai-milestones/>
2. South China Morning Post, October 18, 2017. China is planning to outspend the world in Artificial Intelligence, and Xi Jinping just approved the plan. www.scmp.com/business/china-business/article/2115935/chinas-xi-jinping-highlights-ai-big-data-and-shared-economy
3. TechCrunch.com, November 28, 2017. <https://techcrunch.com/2017/11/27/mit-and-harvard-create-cheap-artificial-muscles-with-super-strength/>
4. Science. Science News Staff. July 5, 2017. AI is changing how we do science. Get a glimpse. <http://www.sciencemag.org/news/2017/07/ai-changing-how-we-do-science-get-glimpse>
5. Inverse.com. Nathaniel Mott. September 21, 2016. How Microsoft Is Using Artificial Intelligence to “Solve” Cancer. <https://www.inverse.com/article/21232-microsoft-using-artificial-intelligence-solve-cancer>
6. Science. Paul Voosen. July 6, 2017. How AI detectives are cracking open the black box of deep learning. <http://www.sciencemag.org/news/2017/07/how-ai-detectives-are-cracking-open-black-box-deep-learning>

7. May 8, 2018. How Google Duplex Artificial Intelligence assistant makes appointments for you with a hair salon and a restaurant and deals with very human frustrations: <https://www.youtube.com/watch?v=D5VN56jQMWM>

TED TALKS:

- **Dr. James Canton – TEDx: Machines That Think: The Good, Bad and Scary of A.I.**
- **TED has specially curated nine AI TED talks** they believe are the most interesting – put into your search engine: **TED Artificial Intelligence playlist**

BOOKS:

- Microsoft cofounder and philanthropist Bill Gates is focused on the future of AI – he recommends Nick Bostrom's *Superintelligence* and Pedro Domingos' *The Master Algorithm*.
- *Common Sense, the Turing Test and the Quest for Real AI* by Hector Levesque
- *Future Smart* by Dr. James Canton
- *Life 3.0: Being Human in the Age of Artificial Intelligence* by Max Tegmark
- *Thank You for Being Late* by Thomas Friedman

ARTIFICIAL INTELLIGENCE *Risk Management*

If a risk has a huge potential downside, but a small probability of happening, what steps should you take to lessen the impact if the risk does happen? This question has plagued investors, families, military leaders, politicians and businesses well before artificial intelligence was even considered a possibility.

SFG believes that having some prudent disaster planning in place makes sense, and hedges the risk of a variety of possible negative scenarios. **Often a few precautions can lessen the impact of multiple risks**, including wildfires and related flash floods, hurricanes or tornados, and more severe events like artificial intelligence used maliciously, a pandemic (still a threat as our more mobile society is crowded into denser urban areas), energy or food supply disruption (including cyber-threats) or some future disaster that we may not even be able to imagine or anticipate.

We highly recommend the www.Ready.Gov website which suggests these steps to be better prepared:

MAKE A PLAN

Make a plan today. Your family may not be together if a disaster strikes, so it is important to know which **types of disasters** could affect your area. Know how you'll contact one another and reconnect if separated. Establish a family meeting place that's familiar and easy to find.

Step 1: Put together a plan by discussing these four questions with your family, friends, or household to start your emergency plan.

1. How will I receive **emergency alerts and warnings**?
2. What is my **shelter** plan?
3. What is my **evacuation** route?
4. What is my **family/household communication plan**?

Step 2: Consider specific needs in your household.

As you prepare your plan, tailor your plans and supplies to your specific daily living needs and responsibilities. Discuss your needs and responsibilities and how people in the network can assist each other with communication, care of children, business, pets, or specific needs like the operation of durable medical equipment. Create your own personal network for specific areas where you need assistance. Keep in mind some of these factors when developing your plan:

- Different ages of members within your household
- Responsibilities for assisting others
- Locations frequented
- Dietary needs
- Medical needs including prescriptions and equipment

- Disabilities or access and functional needs including devices and equipment
- Languages spoken
- Cultural and religious considerations
- Pets or service animals
- Households with school-aged children

Step 3: Fill out a Family Emergency Plan.

Download and fill out a family emergency plan or use them as a guide to create your own.

- [Emergency Plan for Parents](#) (PDF)

Step 4: Practice your plan with your family/household.

Shareables

- [Wallet Sized Emergency Communication Plan](#) (PDF)
- [Family Emergency Communication Guide](#) (PDF)
- [Emergency Plan for Parents](#) (PDF)
- [Emergency Plan for Kids](#) (PDF)
- [Emergency Plan for Commuters](#) (PDF)
- [Pet Owners](#) (PDF)
- [Steps to Make a Plan](#) (PDF)
- [Tips on Emergency Alerts and Warnings](#) (PDF)
- [Protect Critical Documents and Valuables](#) (PDF)
- [Document and Insure Your Property](#) (PDF)
- [Emergency Financial First Aid Kit](#) (PDF)
- [Make A Plan](#) (Video)

Risk Management Idea: Due to the risk that normal smartphones won't work during a real emergency (think Hurricane Katrina) as traditional cell coverage is overwhelmed by calls, some of SFG's clients have invested in satellite phones. Satellite phones have been around for decades, but until the launch of the Iridium network, they were unaffordable for many people. The Iridium constellation is a fully meshed network of 66 low-earth orbiting (LEO) cross-linked satellites that ensure coverage over the entire globe. That's more satellites than any other network.

In addition to being the only network that offers 100% global communications coverage, an independent study also found Iridium's network had the best call quality compared with similar competitive networks. This is one reason that the U.S. military relies on the Iridium network.

Unlike cell phones, satellite phones require line-of-sight with the sky to receive a signal for service. Don't expect your satellite phone to ring in the lobby of your hotel or inside a stateroom while at sea. However, you might be able to receive a signal if you are by a large window. Hardened structures, buildings, mountains and heavy tree cover can all negatively affect your signal.

While voice calls to a satellite phone incur a significant international calling surcharge, texting is often treated much like texting on a cell phone. The cell phone subscriber with an international SMS feature can text to a satellite phone at about the same cost to say, texting a cell phone in Mexico or other international numbers. Inmarsat and Iridium satellite phones can send and receive text messages (SMS) or short emails. Currently, Globalstar phones can only receive messages up to 35 characters, but cannot reply.

Again, consider the cost, which is changing all the time as technology improves. Talk time is still rather expensive, generally \$4-6 per minute. Use sparingly in non-emergency situations. You can get a fairly rugged satellite phone for less than \$1,000. If you want to hedge the risk of a greater disaster affecting your family wherever they may be, you would need to equip each person with a satellite phone that you wanted to stay in contact with – assuming the odds of catastrophe are small, consider the cost and whether there are unique family circumstances (including health issues) making it vital that you communicate in any eventuality.

Time Investment: If the sum total of all of the potential local, regional or national disasters have a 1% chance of happening to you and your family, would it make sense to invest 1% of your waking hours every month (about five hours) developing and maintaining a good disaster recovery plan? Invest less and you may not be well prepared. Invest more and you may become a doomsday prepper, too consumed in the downside and not investing your time and focus in appreciating the positive wonders in the people and world around you.



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any specific securities and should not be considered investment advice of any kind. In making an investment decision, individuals should utilize other information sources and the advice of their investment advisor. Information was obtained from third party sources which we believe to be reliable but are not guaranteed as to their accuracy or completeness. Stearns Financial Group is a registered investment advisor. SEC registration does not constitute an endorsement of the firm by the Commission nor does it indicate that the adviser has attained a particular level of skill or ability. More information about the advisor, including its investment strategies and objectives, are fully described in the firm's Form ADV Part 2, which is available by calling (336) 230-1811, or can be found by visiting stearnsfinancial.com. SFG-18-45

Stearns Financial NEWS OF INTEREST

SFG's clients and allied professionals education series included two workshops recently. SFG has always believed that an educated consumer can make better decisions about their economic future.

The first workshop was **Financial Wellness Through the Generations**, which focused on ways to plan better for early-career, mid-career, late-career and the fourth quarter of life. Paula McMillan, CFP®, CPA/PFS, CGMA, Sherry McKinney, CFP®, CPA, MBA and Dennis Stearns, CFP® each took a different segment of life and highlighted ways to maximize success and avoid potential problems.

The second presentation was for a major regional CPA firm on **Savvy Social Security Planning: What CPAs Need to Know About Social Security Claiming Strategies**. Paula McMillan, CFP®, CPA/PFS, CGMA and Tara Maxwell, CFP®, MBA led this workshop.

Looking for an interesting educational workshop for your Book Club, Investment Club, Rotary or Kiwanis Club or your professional association? A "wow" Lunch & Learn that has consistently been highly-rated in participant surveys?

In addition to **Financial Wellness Through the Generations** and **Savvy Social Security Planning**, other 2018 SFG education series programs that are available for group settings for clients and allied professionals include:

■ Five Things That Can Derail a Financial Plan – Past and Future

What you'll learn:

The top five financial planning mistakes that can derail your future plans, and how to mitigate the risks.

- How to balance "old school" and "new school" investing strategies at various career stages
- Changing long-term care planning strategies for you and for loved ones
- Career risk reduction strategies

■ Demystifying "Old School" versus "New Age" Investing Options

What you'll learn:

Threats and opportunities for traditional stocks and bonds.

- Six Mega-Trends that threaten indexing strategies
- Changing risks in the real estate market
- The five percent of alternative investments that have good risk/reward prospects going forward
- Various future scenarios that would suggest having multiple pivot strategies pre-planned

■ Avoiding Fourth Quarter Fumbles: How Successful People Avoid Critical Mistakes Later in Life

What you'll learn:

How a new generation of seniors is breaking the historical "decline and die" fourth quarter model.

- Fumbles to avoid
- The five keys to going from just getting by to wellness and prolonged happiness
- Access to SFG's Fumblecity™ tools

■ Closely-Held Business Planning in the Age of Acceleration

What you'll learn:

Seven key areas that closely-held business owners should focus on to prevent a "Kodak moment."

- How disruption and dislocation may affect succession or exit plans
- Ways to "surf the wave," rather than being crushed by it

■ Business Exit Planning: Balancing the Personal and Company Planning

What you'll learn:

Ten things a business owner needs to consider as they are positioning the business for sale or succession.

- Resources to consider to increase the business sale price, or avoid surprise negative results
- How personal planning and business planning should be coordinated to arrive at the best result for everyone
- Assessing the company's "moat," their ability to survive and thrive in the age of acceleration

■ Gray Divorce: The Growing Divorce Crisis for Couples Over 50

What you'll learn:

Why gray divorce is growing rapidly and how to consider the risks in your planning.

- Ways to head off late-in-life marital problems
- Planning strategies for those contemplating or going through a gray divorce

Contact Libby Stafford at 800-881-7374 or lstafford@stearnsfinancial.com for more information on any of these educational programs for SFG clients and allied professionals.