

In 2016, using various main stream news sources, I began capturing interesting technology developments that I thought would be important drivers of the ongoing demand for electronic components. My objective was to build out some material to share during the TTI Breakfast Briefing at EDS to support my optimistic projections for the electronics industry. I wasn't far into the project when some common themes became obvious. There is a lot going on in the world that will significantly change how we live in the world tomorrow. For instance, the next wave of automation has its sights set on jobs well beyond the manual, highly repetitive manufacturing jobs that the last wave crashed over. The observations that follow are delivered as a tenured individual working in the electronic component supply chain, not as an employee of TTI, the component supply chain company I work for.

Mainstream media is full of news on tech advancements clumped under a couple of mega, overlapping categories: the advance of automation, the proliferation of medtech and the emergence of artificial intelligence. Countless articles on these topics can be found in obvious places like Wired Magazine, Scientific American and Popular Science Magazine. But they are just as common occurrences in the pages of Forbes, Fortune, Newsweek and Vanity Fair. This is equally true for virtually every newspaper. All are full of arresting images of robots that look and move like people, and robots that are performing intricate surgeries on peoples' hearts, joints, eyes and even brains.

Automation deployment

In many ways, robotics is the ultimate physical manifestation of automation. As mentioned, robots in manufacturing are nothing new. Nor are robots in service industries ... think ATM machines, which do the work of bank tellers, kiosks that do the work of airline ticket counter people, or self-serve gas pumps that arrived in the '60s to replace millions of gas station attendants. What is in the news is the accelerated deployment of automation that displaces human workers in grocery stores, fast food restaurants, bars, hotels and many other people-intensive, service-oriented businesses.

Self-driving cars are another modern-day news staple. A self-driving car is simply a robot with wheels. They are among us already, and the big auto companies are firmly committed to the concept. Leading the charge are the new

app-based companies that are revolutionizing the industry — like Uber and Lyft — who see the technology as a way to remove the half million-plus people who drive for them from their business models. At this point, it is safe to say that the not too distant future of ground-based, personal transportation is going to be autonomous, electric and shared.

But even these companies are likely to suffer some disruption in the process as autonomous flying cars are racing to market in parallel with their earthbound counterparts. Right now, a trial is being run in Dubai of an autonomous flying taxi service using vehicles manufactured by a Chinese company. Whether it rolls or flies, both forms of vehicles have the same obstacles and requirements before becoming the de facto way we move around — the accumulation of enough safety data to satisfy the government bodies that need to rewrite the related rules, regulations, standards and laws that are necessary to integrate these people-moving-robots into the public space. Today, only California, Michigan

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About Michael Knight

Michael Knight is a senior vice president of TTI Americas, a Berkshire Hathaway subsidiary, and is responsible for product management, corporate marketing and sales for key vertical markets. Michael has worked in the electronic components industry since the mid-1980s. Prior to TTI Americas, he worked for a number of distributors and component manufacturers, including a manufacturers' rep firm in Northern California. He has held a variety of national and global leadership roles in sales, marketing, operations and general management. In the late 90s, Michael launched a successful tech start-up in the semiconductor materials space.

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and Florida have proposals in motion to legalize the use of fully driverless vehicles for transportation of passengers.

Alongside this is an effort to bring autonomous trucks and ships to our roads and waterways. The technical and regulatory challenges are probably going to be more quickly overcome than those for cars, so chances are we'll have self-driving long-haul and delivery trucks among us even sooner.

Impact on employment

The unemployment ramifications of the self-driving vehicles are staggering. For example, there are more than 3.5 million people in the U.S. who drive a truck of some sort for a living, according to the American Trucking Association. It is the number one full-time occupation in most states in our nation. The average

annual salary of a truck driver per the Bureau of Labor Statistics is \$40,000, which is higher than almost half of all tax filers. Beyond the drivers themselves, there is an infrastructure of businesses built to support the industry that is going to be squashed. A prime example is the nationwide network of truck stops. These businesses employ an estimated additional 5.2 million people. And beyond truckers, there are millions of more people driving taxis, limos, shuttle buses and ambulances, with infrastructure businesses behind them employing millions more, all of whom face the same future.

What about all the people in the auto insurance business? One of the core promises of self-driving vehicles is that they are inherently safer than human driven vehicles. They are immune to the four major causes of accidents: distraction, drowsiness, drunkenness and driver error. In fact, the future may very well be accident and death-by-vehicle free (a concept widely promoted by both Toyota and Volvo), in which case insurance will no longer be required. Even if there remains some need for it, if all the vehicles are owned by the vehicle manufacturers or transportation companies, which is exactly what is predicted, then the insurance will be carried by them, and the cost is certain to be a fraction of what it is today. In the U.S. alone, this will be very disruptive for the \$150-plus billion insurance industry, according to the Insurance Industry Institute.

How likely is this to happen? The technology and regulatory piece of the puzzle aside, the personal math will make us ready and willing, and industry will make us able. Our cars are not in use 95 percent of the time. Assuming an average new car cost of \$33,560 (per Kelley Blue Book), which will lose 60 percent of its total value in the first five years, some simple math shows the following:

During five years, a typical car is used 91 days or a total of 2,190 hours at an upfront, out-of-pocket cost of \$20,136 (60 percent of the \$33,560 assuming that cash was paid, a lot more if the car was financed), which works out to a baseline cost of \$9.19 per hour. Add to that the average annual operating cost of a car (gas, maintenance, insurance, etc.) of \$8,698 (per AAA), which works out to be \$19.85 per hour used. Add it up, and we are on average spending at least \$29 an hour to own, operate and garage our personal vehicles. The new transportation paradigm is centered on the idea of paying only

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for what we use, and the cost per use being a lot less than the cost to own and use.

Humanoid robots

Just as common in the news are articles about advances in the development of robots with legs and arms, instead of wheels and wings. There are so many consumer-oriented advertisements featuring lifelike robots that one can only conclude that these constructions have grabbed hold of our collective imagination and tapped into some sort of deep societal desire. Google for one has been investing heavily in companies that are developing self-learning and self-replicating robots for use in manufacturing and in companies that build robots that lift, walk, run and even jump like humans. In Japan, there are many examples of big, well-known companies investing heavily in humanoid robots that are designed to take care of an aging population.

Robots that look like, and move like humans, are intended to do one thing ... take on the work that historically only human beings with their wide range-of-motion joints and manually dexterous hands could do. The early versions of these “helpers” are already among us, vacuuming floors, cutting grass and delivering food. It won't be long before human shaped machines are among us as well. Core technology advances in ultra-low power, superfast semiconductors, lightweight, high-energy density batteries, haptic sensors, skin-like materials and artificial intelligence will evolve the machines to the point that we begin to refer to them as “creatures.” In fact, discussions that include really smart, well connected people about robots' rights have already begun as have discussions about what happens to our culture and our economy if tens of millions of us lose our jobs to robots in a relatively short time.

In prior cycles of industrialization, largely centered on new waves of automation, we've had time to redeploy people into the new jobs that were needed to build, maintain and operate the new automation technology that our companies created. I read a striking analogy that the coming wave of automation will be like compressing the time line for that last period of the industrial revolution into the lifespan of a beagle. And to add to the strain, the related new job creation is likely to be a lot smaller, as much of the technology is designed to be self-maintaining and even self-replicating. So, the threat to widespread employment, including the so-called white collar jobs (even selling), is greater and more pervasive than in past cycles.

The same really smart people are talking about how to deal with the disruptive nature of extensive job loss created by technology. One concept that seems to be growing in popularity is the idea of a guaranteed basic level of income for those who are displaced. This would be funded by collecting a tax on robots that is equivalent to the tax that workers would have paid on their income if they had not been displaced by robots.

Personally, I am troubled by this as I think welfare can have really harmful, long-term effects on a person's view of self and one's psyche. Much of my thinking on this is heavily influenced by the writings of Thomas Sowell, and in particular his book, “The Vision of the Anointed,” which is a researched-based dissection on the impact of social programs on our citizens and our economy. People find meaning, purpose and a sense of worth in the act of working to sustain themselves and their families. A society of people who no longer work for a living, in my opinion, will be dysfunctional and not utopic as many who write on this subject envision.

But in the end, a couple of things are likely to slow down this big wave that is building. One, is the simple fact that new technologies historically mainstream at a slower rate than any of those whom are close to it, and/or would derive the most immediate benefit from it, expect. The underlying reasons for that (which it would take another article to explore) have not changed.

Another source of drag is the fact companies invest in automation in order to improve their products and their productivity, and in doing so they (often by design) eliminate jobs for people. Those jobs are the source of money which people spend on the products and services that are often produced and/or supported by these very same companies. If those workers aren't reemployed, in a very real way, those companies are

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killing off some portion of their customer base. As that realization sets in, that too will take a little energy out of the wave.

For those of us in the electronic component supply chain, in the near term this future is full of new customers and business expansion. We need to be aware of it, thinking about it, and prepared to service it in new ways as it will emerge in nontraditional places, and may not come to market in traditional ways, but in strange new ways. As citizens of the world, we need to be aware of the tech-based things coming, thinking about them, and factoring those thoughts into our expectations of our governments. The societal ramifications are vast, and we will need really smart, really informed people in government and advising government if we are to have any hope of surfing this wave in a way that moves us closer to utopia, versus being drowned. ■

Note: The audio and PowerPoint file of Michael Knight's presentation at the ERA Conference (on which this article is based) is available to ERA members and conference attendees on ERA's website at era.org.

TECH TOOLS AND TIPS: Successful people

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will have them in life), and view it as part of going to school in this game of life.

Help others

There are multiple reasons why you should help others. First of all, you are helping another person to overcome his or her challenge. Also, I am a strong believer in the free market and living your life your way. I have found that you can achieve your goals by helping others to achieve theirs. Often, the payback of helping others doesn't come from the person who you helped. When helping others, somehow the Karma of life smiles, and the payback for your actions comes from an unknown source in the future. This is uncanny, but many people see it happen over and over. As you exercise your "helping others muscle," you perfect those skills that are important for your own success in life.

Embrace 'new'

In contrast, people who are not successful are often longing for some imagined period of bliss in the past. The reality is that this time in the past also had its challenges. The human mind tends to forget about the disadvantages of the past and instead only remembers what it perceived as good. The best way to live life is to have a fresh, youthful vision for new opportunities surrounded by new challenges. This is the way life works. Make it your practice to embrace new, and keep learning with a childlike sense of wonder.

So there you have it. Make it your goal in life to embrace these principles of successful people. Keep learning and keep growing so that you embrace new opportunities as they become available.

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