Planning for the Sudden

Christopher Emmanuel

"Gradually, then suddenly." That's the answer that Ernest Hemingway's character in "The Sun Also Rises" gives in response to a question about how he went bankrupt. That curt reply could also easily describe how so many smart and established policies are being challenged and changed by rapid technological innovation. I have seen firsthand how emerging technologies have shifted the conversation around Florida's infrastructure, particularly when planning for autonomous and connected vehicles.

These transportation technologies have the exciting potential to change our society for the better, and each of them has already been proven reliable in certain cases around certain uses. Over the next few years, we should expect the market to grow, the technology to mature, and the business use case to strengthen. During this "gradually" phase, it is imperative for policymakers and

commentators to understand the broad trends of technology in order to properly plan for the future. It is even more important for Florida because of the commanding leadership position our state has taken in accepting and encouraging innovation.

The three technological trends most important to take into consideration are the rise of big data, the continuation of Moore's Law, and machine learning. Big data is the easiest to understand and the most commonly understood; essentially it is just the accumulation of a massive amount of information that may be (but many times is not) helpful for making decisions. Moore's Law describes the exponential growth in computer processing power as measured by transistor capacity, which has reliably doubled about every 18 months for nearly 50 years. Such incredibly fast growth means that a computer three years from now will be roughly four times as powerful, and in six years, sixteen times as powerful.

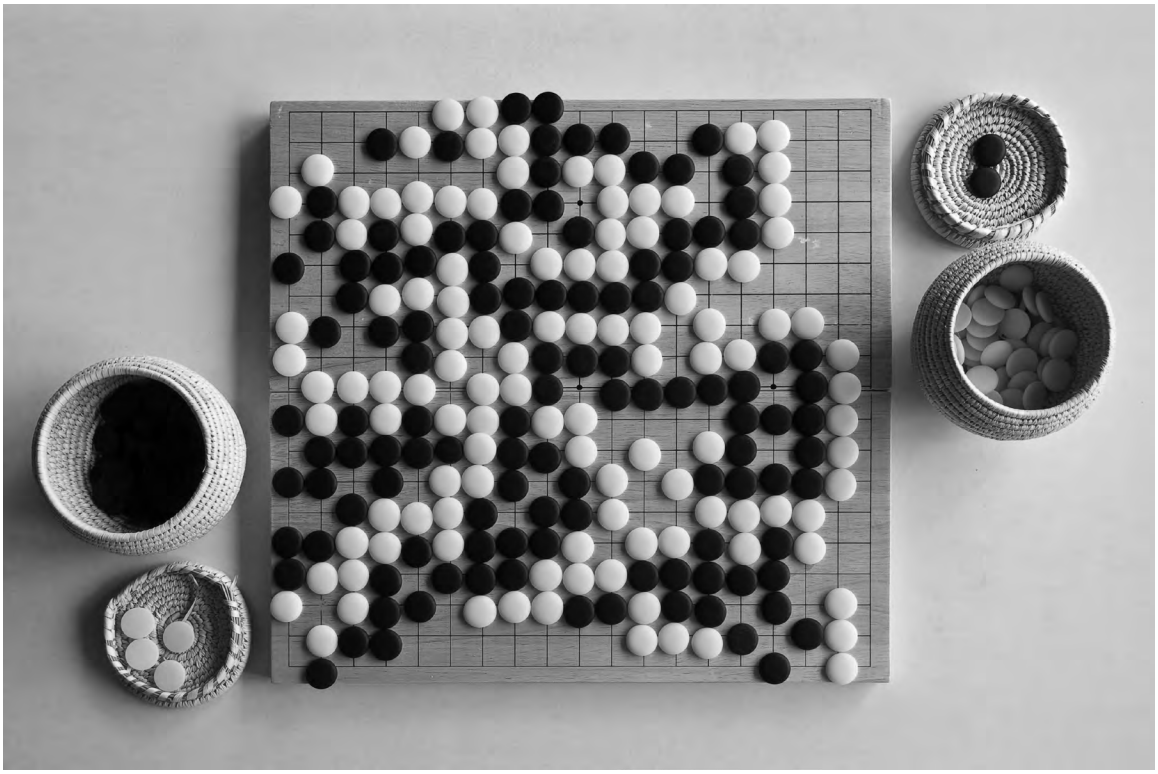
So, we have massive amounts of both data and computing power, with both increasing rapidly. The last trend, machine learning, can make the other two much more useful. Machine learning is the use of large computing power to create statistical analyses that gradually improve without being programmed. To better understand how this works, any good paper on the topic takes this next detour into the ancient Chinese board game, Go.

While Go has been considered the Eastern equivalent of chess, that metaphor is not quite right. Chess is a closed system, with only 64 squares and a limited amount of possible moves. Go, on the other hand, has almost an infinite number of possibilities. Some have calculated that there are more feasible Go combinations than there are atoms in the observable universe. It is nearly impossible to have the same game twice.

Perhaps naively, I was not too worried when the computer program Deep Blue beat the world champion Gary Kasprov in Chess. After all, I was a nerd who spent my childhood playing chess and the computer program routinely beat me game after game. But the computer programmers who wrote those engines had the ability to study the notation of famous games played in the centuries beforehand to adjust their coding. Deep Blue, in a way, stood on the shoulders of nerdy, but human, giants.[1]

When Google's machine learning algorithm Alpha Go played the world champion Lee Sedol, it was different. The program was left alone with the rules of the road and then rapidly taught itself the basics, then the strategy by essentially playing itself billions of times with minor adjustments. After the first few hours of this statistical reasoning, it played at roughly the same level as a child, with remarkably similar strategies. Then, after a few hours, it went through the variations that modern Go players study. Finally, Alpha Go surpassed the grandmasters completely, playing combinations that we cannot completely explain. These combinations were more statistically correct than anything a human could ever play. Alpha Go proved it by consistently beating Mr. Li, the greatest player ever, in these exposition matches.

These are interesting facts, but why are these three trends important to robot-driven cars? For starters, they point to the conclusion that the underlying



technological capacity is not a question of if it will be reached, but when. Secondly, our society has already made numerous decisions around human-driven cars which will need to be revisited when robots take the wheel. Take liability for example. Generally speaking, negligence, especially when we are talking within the automotive context, is based on the reasonable person standard. That means that an individual's actions are compared against what a reasonable person would do under similar circumstances. Product liability is strict liability; our legal system does not care how something broke or how it got to where it is, but only if it happened and if someone was injured. Ipso locator, the thing speaks for itself.

This works fairly well when there's a clear divide between those things that are controlled by humans and those things that are, well, just things. For most of legal history, humans did not compete with synthetic objects over the exact same task. But for autonomous vehicles, the product is doing the same thing that the driver is doing, and today is doing so at a level comparable to, and in some cases better than, a typical driver. Our regulatory and judicial systems may soon be laying down the wrong incentives. Once autonomous vehicles are demonstratively safer than human-operated ones, shouldn't it be a policy preference to encourage automation in this context when it could save so many lives? To be clear, I am not suggesting that we are at that point yet. But either way, with rapidly increasing automotive data, a doubling of capacity every 18 months,

and computer programs that can do increasingly more complicated analyses, we are going to get there soon. Perhaps it is time to consider something else, maybe something like a reasonable robot standard where computers are not judged against the perfect but the possible.[2]

What I do know for certain is that we need to be planning for these future developments now, and Florida is leading the way. The Florida Chamber of Commerce has started down this path with its program Autonomous Florida, with the goal of making Florida the autonomous capital of North America. Governor Ron DeSantis is embracing transportation technology while focusing on safety across our roadways, signing important legislation like House Bill 311 which is arguably one of the most pro-business regulations in the country. Florida can now proudly boast six public autonomous vehicle deployments. If we continue down this path, Florida can expect many more in the years to come. With this kind of forethought and responsible planning, changes can move from gradual to sudden, but not take us by surprise.

Chris Emmanuel is a Policy Director with the Florida Chamber of Commerce.

References

1 Larry Greenemeier, "20 Years after Deep Blue: How AI Has Advanced Since Conquering Chess." Scientific American. (June 2, 2017) available at https://www.scientificamerican.com/article/20-years-after-deep-blue-how-ai-has-advanced-since-conquering-chess/

2 See Ryan Abbott, "The Reasonable Computer: Disrupting the Paradigm of Tort Liability." George Washington Law Review, Vol. 86, No. 1, 2018