New Disruptive Technologies Assembly

We seem to be living in a world which has the index finger firmly pressed on the fast-forward button - and yet more change is promised. In the next few years, there are many emerging technologies that have the potential to transform our world. They will create opportunities that are ripe for the picking for young men like you.

In the years ahead, things around us are going to operate independently of humans, powered by artificial intelligence. Notwithstanding the brilliant Terry Pratchett's comment that "Real stupidity beats artificial intelligence every time", AI is set to change all our lives. As more and more autonomous things appear, we can expect them to shift from working as stand-alone intelligent things to a swarm of collaborative intelligent things. For example, a self-driving car (about which more later) could operate perfectly well on its own, but if it worked with others in a swarm, then traffic lights and stop signs could be dispensed with, making traffic flows much more smooth.

We have been designing new ways for us to *interact* with the digital world. But there are now new technologies that will change how we perceive it. Virtual reality and augmented reality will soon provide a completely immersive experience for those using technology. At the moment we live in the 'real world', and use computers to manipulate information. Soon, wearing the next generation of Google glass or equivalent, you won't be able to distinguish between the real world and the computer, as the computer will be providing you with a significant number of elements that you will perceive as being part of the world. In effect the 'real world' *is* the computer. In addition to having objects and symbols added to the world you see around you, you will even be able to gain new senses.

Very soon, expect us to be using 3D printing more and more innovatively. Imagine a world in which we could create anything simply by printing it. We can already, or will soon be able to, print buildings, cars, furniture, clothes, games, food and a long list of other things simply by downloading the instructions from the internet to a 3D printer.

3D printing could also have a powerful effect on space travel. Imagine sending a suitably programmed 3D printer ahead of any planned mission to another planet or asteroid. Working on its own and without interruption, the 3D printer could make preparations for a team of astronauts, who might arrive to find that their base has already been built for them and is ready for occupation. We are running out of some valuable rare earths and other materials on Earth – there are plenty to be mined in the solar system, and with the rise of AI, we may not even need to send up any miners.

All of that may seem mind-blowing, but the full impact of even one of those technologies is almost impossible to conceive. Let's take a technology that most of us will have heard of, and think in detail about what it might do to society and our lives. Let's use driverless cars as an example, and develop the thoughts in that short clip earlier.

By only making reasonable extrapolations, we can predict that within as little as 20 years, a combination of technological advances will create a whole new world of self-driving electric vehicles organised into a complex network. In that world, no-one will actually own a car, and cars that use petrol will have been abandoned. It sounds impossible, but huge changes have

already happened in transportation – for example how quickly cars replaced horses at the turn of the 20th Century. Here is a picture of 5th Avenue in New York in 1900. Can you spot the car?

Now look at this picture from 1913. This time, where is the horse?

In 1908 the first Model T Ford rolled off the production line; twenty years later the age of the horse was over - and all thanks to the disruptive power of a technological innovation - the internal combustion engine.

So what will drive the next transportation revolution? I imagine many people here will have used an Uber. Uber drivers are efficient and charge less than established taxis. Let's imagine you book a trip that will cost £10. Now imagine the taxi is self-driving. Without the driver, costs have probably been cut by at least 50%. Uber are actively pursuing driverless cars. So your car ride now costs £5.

When will this revolution begin in earnest? When self-driving vehicle technology is available and is legal. The UK has said it will authorise the first fully autonomous cars in 2021, in a year and a half. Some are already on the streets of London. But we aren't finished yet. Now imagine the driverless taxi is an electric car. At the moment, electric vehicles are more expensive than petrol cars, but they offer significantly lower lifetime costs. They are much more reliable because the typical electric car has around 20 moving parts compared to the 2,000 or so in an internal combustion engine. So electric vehicles last much longer – they will keep on going for at least 500,000 miles. This quickly racks up rewards for companies that are aiming to use vehicles like self-driving taxis continuously. And the cost of electric vehicles is likely to fall rapidly as they become mainstream. Add in the low cost of recharging batteries compared to refuelling and you have got a further dramatic reduction in costs. Fully autonomous electric taxi networks could offer rides at 10% of current rates. That original £10 fare is now £1.

These benefits are likely to be reinforcing. The more vehicles in the network, the better and cheaper the service offered to consumers. Self-driving cars will be far safer than ones driven by you and me - they won't get regulatory approval if they are not. That means tens of thousands of lives - perhaps hundreds of thousands - will be saved as accident rates plummet. That gives us yet another cost saving for our robo-taxis. The price of insurance will tumble, while at the same time those who insist on continuing to drive our own vehicles will face higher charges. And since having your own car is hugely wasteful - the average driver in England does less than 10,000 miles a year and our cars are parked 95% of the time - how long before human drivers just give up?

Some think that within 10 years of the appearance of self-driving cars 95% of passenger miles will be in these electric robo-taxis. That will also mean that the number of cars on the road will plummet. 10 years later, the number of vehicles on roads may have fallen by as much as 80%. That will free up huge amounts of space in our towns and cities. And we haven't even mentioned the enormous environmental benefits of converting the world's cars to electricity.

All of this change can seem disorientating, but it is also tremendously exciting. Yours is the generation that has to design and build and adopt these technologies. The world you hand on to your children will be very different from the world today. But one thing will remain true and will even gain power and significance. The world of the future is one that will value a good education more and more. Flexibility of thought, complex problem solving, critical thinking, people skills, the capacity to reason closely, being technologically savvy and – above all - being creative are the skills that will unlock success. The currency of the future is brainpower and you are well-placed to enjoy the benefits. That is exactly what we are aiming to equip you with here at Merchant Taylors'. Embrace the change!