



Sustainability Impacts of Autonomous Vehicles

Once the stuff of science fiction, self-driving vehicles are road testing in the marketplace today. This emergent technology will radically change transportation and many other aspects of our society. With forecasts of mainstream introduction for some applications in certain markets as early as 2018, certain businesses are already making serious investments to take advantage of this technology.

General Motors is investing \$500 million in the ride sharing company Lyft, creating an autonomous on-demand network of driverless vehicles. Driverless cars have already been unveiled by Google, FAW, Toyota, Tesla, Mercedes and Audi, with many already road testing. Chinese manufacturer Yutong, has announced that their self-driving bus has been road tested, handling traffic signals, lane changes, and passing manoeuvres during a 20mile drive from Zhengzhou to Kaifeng. Autonomous heavy duty trucks are already in use in mining operations. Daimler and Peterbilt autonomous 18 wheelers are licensed for road testing in Nevada.

Autonomous vehicles will ultimately operate at higher speeds, some powered by the roadways they are driving on. Road capacity will increase significantly and many parking lots will become redundant over time. Interruptions, injuries, mortalities and damages due to traffic accidents will reduce significantly. Business will flow at a more efficient rate and operations will persist on a continuous schedule, instead of being held back by the constraints of human limitations and error. Shipping a full truckload from LA to New York currently costs around US\$4,500, with labour making up 75% of that cost. By employing autonomous trucks, freight companies will save substantially on labour costs and improve their service as trucks will not remain idle for legislated driver breaks.

In America approximately 1% of the workforce is employed in trucking. This poses significant new issues to workers, unions, tax dependant communities and on consumer spending. It stretches well beyond trucking into public transportation, taxi, courier delivery and essentially any driving related profession. There will also be significant impacts to vehicle manufacturing, marketing and servicing as well as the insurance industry. Most countries do not have proper legislation relating to autonomous vehicles. So far, only five states in the US, and one province in Canada allow driverless vehicle road testing. Signs and signals long-developed for manual driving are not yet adapted to autonomous vehicles. Computer and sensor reliability and security has also been called into question. Road infrastructure may also need to adapt to autonomous vehicles. As of the writing of this article two deaths related to autonomous vehicles are under investigation in the US.

A timeline suggested by KPMG to the insurance industry in 2015, is that by 2020 there will be many more vehicles with partial driver substitution. By 2025 there will be an acceleration in all speed, fully autonomous vehicles which operate completely independent of human control, and that by 2040 all new vehicles will be autonomous. **Google estimates a 90% reduction in US vehicles, accidents, wasted energy and time, saving the US economy \$2 trillion annually.** Autonomous vehicles are very likely here to stay. Leading businesses and communities will anticipate the arrival of this technology and adapt their plans accordingly. While the transformation may be rocky, impacting the sustainability of many business and community models, the overall benefits to the economy, society and the environment should inevitably be favourable.

We help business plan for the future and profit naturally

All Sustainable Business Bulletins are available on line at www.biocentric.ca

What About Humans in the Workplace?



The end of the need for humans in the workplace is an incomprehensible idea for most people. In 1930, the economist John Maynard Keynes predicted that, perhaps by as soon as 2030, humans would only work three hours a day, mainly for their own satisfaction. The implications of this, on our economic, social, environmental and human condition will be transformative. Our transition into this new paradigm will pose many new opportunities and challenges.

In 2014 sales of industrial robots increased by 29%. 25% of the total robot stock is in China, which is the fastest growing and largest market. Japan is the second largest market followed by the US, Korea and Germany. In total there were 1.5 million industrial robots employed in 2014, primarily by the automotive and electronics industries. **The industrial robot industry is forecasting that 1.3 million new robots will be installed between 2015 and 2018.** Expect linking of the real life factory with virtual reality leading to human robot collaboration. With simplification, robot use will expand in medium and small sized companies. Modernization incorporating new technology and new materials will improve energy efficiency, flexibility, product quality and reduce costs. (International Federation of Robotics (IFR), 2016)

In 2014 sales of professional service robots increased by 11% with a total of 172,000 sold since 1998. Approximately 45% of sales were to defence, with the remainder employed in logistics systems, agriculture, medicine and construction. Sales are forecast to almost double the number of robots in professional service by the end of 2018. In 2014 personal use robot sales increased by 28% with 4.7 million being sold for domestic tasks. Of these, 1.3 million were sold for entertainment, human companionship and assistance. IFR forecasts sales of 35 million personal service robots between 2015 and 2018. Robots are just one segment of automation

tools. By 2020, more than 50 billion smart devices will be employed globally, while 7.1 million jobs will be eliminated across 15 leading economies (Business in Vancouver, 2016)

Eric Brynjolfsson, an MIT professor at the Sloan School of Management, believes that productivity while at an all-time high, is a sign of technology's advancement, not humans. Fewer people work in manufacturing today due to the increasing use of industrial robots which is expanding exponentially. The opportunities and challenges posed by increasing workforce automatization are many. Two challenges stand out for humans. For those that want to work, what will they do? For those that don't work, how will they live?

Economist Henry Siu from the University of British Columbia, suggests that the human ability to adapt is the only way we can find work in this new environment. This requires early education of young people in skills using creativity and human ingenuity. The inherent spontaneity of human beings that is part of the creative ethos is something machines cannot currently replicate. Skills that become increasingly more important to employers will be creativity, critical thinking and complex problem solving. Machines have learned how to mimic human appearances of caring, but we actually know how to empathize with our fellow man. Human emotional quotient is helpful in customer service and other roles that require direct person to person interaction.

Humans are living longer due to advancements in sciences, technology, and medicine. Switzerland just rejected a guaranteed annual income for all residents. This concept, like robot taxes may yet see the light of day globally, as the workplace transforms technologically, and larger segments of society seek new models for living sustainably.

We help business plan for the future and profit naturally

When we can be of service, please contact Chris at **604-328-7253** or at chris@biocentric.ca