

AUTOMATED VEHICLES

Disrupting the traditional city



In 1894, the *Times of London* sounded the alarm about the great urban crisis of the day, predicting that "... in 50 years, every street in London will be buried under nine feet of manure." Four years later, the world's first international urban planning conference was convened in New York City, as delegates desperately tried to come up with some solutions. It ended in failure.

By 1917, New York City's last horse-drawn trolley was out of operation, as motorized vehicles quickly became the main source of carriage and transportation. By 1944, 50 years after the *Times of London's* dire warning, automobiles had already begun to fundamentally alter the nature and shape of North American cities. In the coming decades, the ubiquity of the family car would fuel the spread of suburbs, leading to today's sprawling megacities and "greater urban areas." Today's cities are fundamentally shaped by and inextricably linked with the automobile, as is the regulation of cities. Development standards mandate certain road widths and parking requirements; large retail centres cluster in the suburbs, relying on automobile traffic to sustain them; and planning documents design arterial roads to accommodate growth. For at least the last 70 years, urban development in Canada has been built around a relatively constant model of motor vehicle use and ownership. Cities have

developed as "automobile cities," rather than "pedestrian cities," or even for mass transit or bicycles.

What happens as this model changes? Automated vehicle (AV) technology is rapidly improving, in both the area of personal transportation, as well as carriage and delivery of goods. AVs will represent the greatest disruption to the model of the traditional, personally-driven automobile city since the inception of the motor vehicle. Across North America, cities are not prepared.

Liability

For the most part, current laws regarding liability rely on some degree of human involvement in the incident giving rise to the liability. AVs will challenge this model, and the question of who is at fault for collisions involving AVs remains uncertain. Issues of liability are further complicated if there is a capacity for manual override of the AV, as liability could differ depending on whether the automation was being overridden at the time of the collision. Under current laws, AV collisions could give rise to a long chain of potentially liable parties, including: the manufacturers of individual components; the software engineers who wrote the program code; and the designer, builder, and owner (the municipality) of an "intelligent road."

This last category should give cities particular pause. Already, several American cities have started to develop capabilities to sync traffic infrastructure to AVs. While there are obvious benefits to this capability, it likely gives rise to liability on the part of the municipality, should the municipal infrastructure be determined to be at fault for an AV collision. Even if the collision occurs on a "dumb road," there is potential municipal liability if signage or lanes are not properly maintained, leading AVs to incorrectly process markers. In addition, to the extent that roads differ from how they are represented in plans, there may well be a question – is the AV manufacturer at fault, or is it the city? Where roads are rebuilt to accommodate bicycle lanes, what will the responsibility of the city

MICHAEL POLOWIN is one of Ontario's leading lawyers in municipal and real property law. An Ottawa-based Gowling WLG Partner with more than 30 years of experience, he has acted for some of the largest developers in Canada and has been involved in developments throughout Ontario, appearing in court and at the Ontario Municipal Board. He can be reached at <Michael.Polowin@gowlingwlg.com>.

JACOB POLOWIN is an Associate and member of the Business Law Group in Gowling WLG's Ottawa office, with a practice focusing on development, municipal, and planning law, and other development issues. Jacob completed his JD at Osgoode Hall Law School. He can be reached at <jacob.polowin@gowlingwlg.com>.

be to make certain that those changes on the ground are quickly reflected in AV software?

Liability is similarly uncertain for standard traffic infractions, such as red light violations, speeding, and illegal lane changes. Once again, current laws rely on human agency in the course of the infraction. It is unlikely that these laws would be able to properly capture a situation in which a vehicle autonomously violated traffic codes, or indeed where there is some form of human override to the systems.

Last Mile Delivery

Beyond personal transportation, AVs will transform the carriage and delivery of commercial goods. In particular, AVs will allow for substantial efficiencies in terms of “last mile” delivery – the final leg of delivery that takes a product to its ultimate destination. Companies like Amazon are investing massive resources in a wide variety of technologies to make use of small AVs – both aerial and land based – for last mile delivery. Picture this: a truck pulls up to the corner of King Street and Bay Street in the heart of Toronto’s financial district. The sides of the truck open up, disgorging dozens of small AVs, each with a unique destination and a small complement of packages. Autonomously, the AVs navigate the busy streets and sidewalks, delivering their packages to individual destinations, before returning to the truck to be refitted.

Sidewalk-based delivery robots are already on the move in San Francisco and Washington DC, prompting push-back along the lines of “sidewalks are for people.”

While certainly efficient, this delivery model potentially runs afoul of municipal by-laws, which generally prohibit both encroachment onto sidewalks, as well as their use by motorized vehicles – at least, they are intended to. The issue is that AVs likely do not run afoul of the letter of these prohibitions in many by-laws, even if they violate their spirit. By way of example, Toronto’s Municipal Code describes encroachments as: “anything installed, constructed, or planted within the public road allowance that

was not installed, constructed, or planted by the city.” This likely doesn’t include AVs. Similarly, the City of Ottawa has specific provisions dealing with various types of encroachment, none of which include AVs.

In terms of the prohibition on the use of municipal sidewalks by vehicles, the by-laws likewise come up short. Ottawa’s by-law 2003-530 states, “no person shall drive a vehicle on or over a sidewalk except for the purpose of directly crossing the sidewalk.” Mirroring this language, Chapter 950 of Toronto’s Municipal Code provides “no person shall drive a motor vehicle upon a sidewalk or footpath on a highway except for the purpose of directly crossing the sidewalk or footpath.” Both provisions use the term “no person” and therefore rely on human agency to establish a violation. If a vehicle is truly automated, it is not being driven by a person. Use of municipal sidewalks by AVs for last mile delivery clearly creates the possibility for interference with pedestrians, or with traffic if the AVs are forced onto the roads. In order to accommodate this technology, cities may have to establish separate sidewalks or lanes for AVs, akin to a bike lane.

The use of unmanned aerial vehicles (UAVs) – colloquially known as “drones” – similarly threatens to outstrip the pace of regulation. UAVs will be integral to last-mile delivery, particularly in cities with a dense and built-up urban core. They are also at the core of many of the more futuristic delivery schemes – Amazon was recently awarded a U.S. patent for an “airborne distribution centre” that would hover at 45,000 feet, and use UAVs to make deliveries within minutes. However, UAVs are federally regulated. Although Transport Canada is currently developing new regulations for UAVs, at the moment, they cannot be flown higher than 90 metres above ground, must be in line of sight, and may be flown no closer than 75 metres from people, animals, buildings, structures, or vehicles. Obviously, these regulations serve to prevent the use of UAVs for delivery. Going forward, cities will require discretion to tailor UAV regulation based on local urban landscape and needs; this is a likely source of friction based on division of powers.

Disrupting the Configuration of the City

Beyond challenging existing legal frameworks, the rise of AVs will disrupt the very configuration of the city, to a degree unseen since the development of the motor vehicle a century ago. To begin with, AV delivery will exacerbate the decline of brick-and-mortar retail already in process. As a result, zoning practices based on the traditional assumptions about the amount of retail space required will need to be re-evaluated.

In addition, development is occurring to use AVs as mobile points-of-sale or manufacture, which will challenge the traditional delineation between commercial and non-commercial zones. Amazon has applied for a patent for a truck that would carry raw materials and a large 3D printer. Instead of delivering finished goods, the goods would be finished enroute, allowing a dense cargo of raw materials. If that truck is creating products (an industrial use) in an area zoned for residential use, is that a zoning violation?

Perhaps most significantly, the decline of brick-and-mortar retail will significantly reduce municipal property tax income, depriving cities of a crucial source of revenue. Any revisions to municipal taxation must occur at the provincial level.

In terms of personal transportation, companies such as Uber are attempting to shift to a model of decreased vehicle ownership, in favour of inexpensive and easily available hiring of AVs. Such a shift could drastically reduce the need for parking spaces in the urban core, but would increase the need for road capacity, including separate lanes for AVs. This conflicts with the increasing shift toward, and investment in mass transit. If current AV trends continue, the future city could be characterized by a dense urban core, with significantly less retail and parking space, surrounded by a suburban ring of distribution centres, warehouses, and massive parking lots.

Municipalities Are Not Prepared

AVs will challenge numerous elements of local governance, including: planning, zoning, and regulation of space; revenue; transportation; and

by-law enforcement. They constitute perhaps the most significant disruption to the configuration of the city since the motor vehicle. It is impossible to predict what specific challenges will be faced by individual municipalities. Yet, as

demonstrated by the challenges faced by municipalities when dealing with technologies such as Uber and AirBnB, the law and municipal regulations are often ill-equipped to deal reactively with the challenges of new technologies.

Public officials must immediately look forward in a way they never have before, in order to prepare to incorporate AVs into the fabric of municipalities. If they don't, they will find themselves forever playing catch-up to rapid change. **MW**

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