

ITS Canada Annual Conference and General Meeting
Closing Lunch Speech

“Connectivity and Automated Driving”

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Thank you Michael [DeSantis, Chair, ITS Canada] for the kind introduction, and please let me get right to the urgent business of making surface transportation more safe and intelligent around the world.

I'm sorry I had to miss what looks to have been a fascinating meeting, but I just returned yesterday from three weeks experiencing road transportation in three large cities of the Russian Federation: Moscow, St. Petersburg, and the fifth largest city, Nizhny Novgorod, the historic heart and center of the Russian automobile industry, known as Russia's Detroit slash Windsor.

Russians remain proud that they defeated Nazi Germany with the help of trucks and tanks built in the sprawling Nizhny factory that incidentally was set up with help from Henry Ford around 1930. Ten years after the Second World War, Russian Premier Khrushchev, knowing that Sputnik and Yuri Gagarin the first human in space were on the way, famously proclaimed: “We will bury you,” meaning that Soviet communism would prevail over the free market democracies of the West.

But now I can report from field observations over three weeks in three big Russian cities what has actually happened with the fall of communism and the end of Soviet times -- we in the West have buried Russia in our way of life. On my Friendship Force tour we moved on inter-city trains, subways, and tour buses some, but most frequently in the late model SUV cross-over cars of middle class Russian citizens we stayed with. Their increasingly free people's embrace of a car-centric, metropolitan-wide employment choices, shopping-mall-enabled, sprawling way of life is startling.

And peak traffic congestion in urban Russia is simply terrible. You can see that yourself with the real-time traffic status maps available on the Internet from INRIX and others. Traffic accidents, mostly fender benders, are way more frequent than in North America. Incident management is non-existent. Even minor accidents stay put, blocking travel lanes until the cops arrive to take photos.

Speed limits are not enforced outside of cities. I have never traveled faster on a road in my life than when I was moving at 160 KM per hour with the Russian housewife who hosted us in a suburban Moscow home. Olga -- her name changed to protect the guilty -- saw some temporarily free-flowing expressway lanes and made her move between congestion to the rear and inevitable beep-and-creep just a few miles ahead. She wanted to make progress toward the dinner she was planning for us. I don't know how to say "Kinda fast, eh?" in Russian, and we were being passed on both sides by drivers in Porsches and Audis going 200 Km per hour.

What I really didn't like was her taking calls on her cell phone while driving. You all will be pleased with my Russian one-driver-at-a-time safety initiative -- I personally Googled the English language version of her Land Rover owner manual and worked in her suburban driveway to make her cell phone hands free with the available Blue Tooth and the car's internal speakers that even turned off the Western pop music from the car radio when she was talking on the phone. She used her mobile phone only when her speed was 120 KM/hour or below, or more typically crawling along stop-and-go a few meters off the bumper of the car ahead. To the car companies, I would say, thanks for electronic stability control, and please send more automatic braking to Russia. And remember this --I was there on hot, dry days in May -- what must driving be like in rain and snow?

So urban, European Russia west of the Urals is on its way to becoming the biggest car market in Europe. A rapidly growing middle class in a market economy wants what most North Americans take for granted-- which is anywhere, anytime, flexible, door-to-door personal mobility in air conditioned, surround sound, blue-tooth enabled comfort. Russia, Brazil, India, and China -- so-called BRIC countries -- are examples of the world on a growth path toward two billion or more cars despite the problems that go along with the benefits.

Like it or not, the dominant market share and ongoing world-wide interest in new cars speaks for itself-- despite the often-discussed topping out and decline in per capita driving in many advanced countries-- a decline still trivial compared to the base of driving in North America and other places.

But let's note the bad stuff. First off, cars are killing people by the millions worldwide. Cars hitting walkers, cyclists, other cars, or just running off the road, account for a million point three annually. This is a public health emergency especially for younger people. Pushing back is a high priority of the World Health Organization of the United Nations.

I'll get to pollution in a sec, but a personal story: About 60 years ago an 80 year old guy in a 1948 Plymouth saw stopped traffic in one lane of a four lane arterial in a Detroit suburb. He took the open curb lane, failing to see the school crossing guard standing on the centerline holding up a red stop sign. He also failed to see me running past her on the assumption she had made the crossing safe. This senior citizen ran me over with his left front wheel and perhaps the left rear, I don't remember. Since I'm here, you know this accident was not a fatality. Automatic low speed braking when sensing an obstacle, now available on many cars, would likely have let me not have to drop out of second grade to get patched up in hospital. This helps explain my abiding interest in vehicle technology.

Now, suprising as it sounds, air pollution from car emissions now kills as many people as car crashes in Canada, USA, and around the world, by shortening lives through illness linked to emissions. Statistically, people who live close to busy roads are sicker than the rest of us. That's one kind of air pollution. Then there are carbon dioxide emissions and other greenhouse gases that are raising the global temperature. Internal combustion vehicles are a significant source of greenhouse gas emissions, increasingly so as electric power generation is cleaned up. A key message for ITS pros -- it is important to integrate crash-proof vehicle development with the larger context of energy/emissions and the required evolution away from internal combustion engines for vehicle power.

And quite apart from hurting little children and seniors, the very existence of so many cars in an urbanizing world, vehicles going slower and slower on down to a real beep and creep level is a

visual, noisy, stinking, tiresome blight on the landscape that reduces the overall public benefit of cars.

Many say that the way to solve the problems of cars is to motivate more people to live in smart growth urban environments where driving cars is less necessary. Aspects of urban policies to influence less driving include increased proximity of residential areas to offices and shopping, more extensive and higher quality public transit, better urban design and incentives that encourage walking and biking, and higher road use, parking fees and other taxes to make driving cars more expensive. You will all have in mind cities that are experimenting with these policies as urban congestion continues to increase.

But as the U.S. National Academy of Sciences Report "Transitions to Alternative Vehicles and Fuels" stated, the impact of smart growth initiatives is not expected to be very significant on overall vehicle use¹. So what more should we be doing?

Seeking technology improvements in vehicles is clearly the best policy for reducing emissions. A reinforcing example is that central Puget Sound region around Seattle has strong smart growth policies in place, and while reductions in SOV market share are forecast, they are not significant.

In any event, a straightforward effort to make cars cleaner and safer with much less environmental impact is an important complement to efforts to reduce automobile use and promote transportation choices. Or if you like, you can tell smart growth planners that ITS and vehicle improvement efforts are a hedge against the possibility that restraining car travel will not work at a large enough scale to make a difference in trends toward personal mobility.

Making cars that will have fewer mishaps is now happening through incremental automation implementation. ABS brakes and electronic stability control are common now and required in new cars. Automatic braking that would have saved me from getting hit as a child and help keep rear enders from hosing up freeway traffic in Moscow is now available on 40 percent of North American new car models. The mechanization of human skills is an old story in general, and the

¹ "The present committee concluded that the likely changes in VMT as a result of changes in residential density would be small in the aggregate."p.144.

complex job of controlling a car in environments with multiple cars all around is particularly challenging.

Popular opinion in mass media now seems to be that we are 95% of the way to automated road transport of the variety where you can sleep in the vehicle on an intercity, door-to-door journey, or send even legally blind people off to new destinations, door-to-door, by themselves. On the contrary, from riding in a Google car and reading recent field reports closely, I would conclude that we are about 10% of the way to generalized driverless robotic chauffeur capabilities. I say this because the range of possible anomalies that must be dealt with in driving is vast. I found Google's next step announcement made within the past few days of deploying 25 MPH mini-cars without driver controls on a limited set of pre-determined suburban routes to be very telling, a ninety degree turn from over three years of pictures of Google-branded Lexus crossovers with the bucket-like rotating laser sensor cruising on the California 101. Google has learned that expressway driving on well-marked lanes is one thing; roads with traffic lights, intersections, and private driveways are quite different. In all the U.S. and European demonstrations, there is somebody in the car to take over when frequent exceptions to routine patterns arise. There is no need for new state and provincial laws as long as that configuration of a person in the drivers' position prevails.

The mobility environment - where the vehicle operates - roughly characterized by the counting the possibilities for a large metal vehicle coming directly at you - is a critical variable with a wide range of values. Don't be like Napoleon and Hitler and forget to take weather and resulting road surface conditions into account. The widely publicized four to five vehicle automation category levels of SAE and NHTSA need to be cross-matrixed with the variety of conditions in which vehicles operate in today's world.

As automated highway pioneer Steve Shladover has demonstrated with key statistics, human drivers are very skillful and safe—most of the time. Focusing on correcting the hundreds of thousands of driver errors that end with mishaps misses the vast majority of millions of decisions and actions that make driving statistically safe as a daily experience. Furthermore, the crazy-style driving I have experienced while strapped into the back seats of private vehicles in Russia, Vietnam, and Argentina on the whole illustrate a level of skill that is even higher than what is

commonly seen in North America. If you want to make up lost time by driving fast on the unpaved shoulder breakdown lane of a bumper to bumper suburban highway -- it happens -- you need to have a high level of skill. If a Mountie needs to use all three lanes of Highway One to pursue a speeding lawbreaker, he or she needs to be a very good driver to get through a multi-decade career in one piece.

To summarize, self-driving cars with no one in the drivers seat -- I mean no steering wheel and no foot pedals -- is a major challenge for common urban and rural driving situations. For the present decade, automated driving will be likely be contained to well-assisted driving on limited access freeways and in bumper-to-bumper crawling traffic.

Now I can't skip talking to you about distracted driving, the really important short-term motivator for developing automated driver assistance ASAP. With electronic connections to the world vibrating and buzzing in our pockets, distraction from the driving task is a growing problem, a double digit percentage of crashes now. As you may know, studies show that any cell phone use has the likelihood of taking a driver's head outside of the vehicle, so to speak. Smart corporate fleet managers now routinely ban all cell phone use in moving vehicles. At the same time, it is becoming increasingly unrealistic to implore the new and old digital generations to simply say "NO" to distraction. Automating driver activity is a key to making distracted driving safer. Driving is the distraction for many, and seated in a car is a comfortable place to deal with concerns of the moment that come to us via wireless communications embedded in the car or smart phone in the vehicle. Car makers insisting that hands free connectivity and voice commands are the solution is inadequate. Safely using a cell phone in a moving car requires new solutions, for example periods of the vehicle being under automated control subject to interruption.

You in this audience, the ITS profession, have been working on making driving work better for several decades. Some of us can remember when ITS was called IVHS, Intelligent Vehicle Highway Systems, and this was before the Internet was introduced to the general public. In fact the car companies and governments at all levels have been plugging away on making the existing highway system work better for decades. But because of storytelling on the Internet and via smart phones, and because of faith in technological innovation, we suddenly have journalists

getting the general public to think that driverless, robotic cars are right around the corner for roads everywhere.

The very possibility of cars moving people licensed to drive or not, impaired, blind, the non-driving elderly, children, and everybody else has frightened some environmentally conscious folks that the whole road transportation system needs to be rebuilt around shared, non-owned vehicles, a concept known as MAAS, mobility as a service. Car companies are encouraging this thinking by their executives talking about it and in some cases offering MAAS options like Car2Go, a rent-cars-by-the minute enterprise from Daimler Benz that operates in Seattle, Vancouver, and a couple dozen other cities around the world.

The growth of Internet-dispatched, loosely regulated car services have encouraged this line of thinking, especially when Uber received millions in investment capital from Google.

But there remains great potential for growth in traditional vehicle ownership models, with new types of vehicles tailored for particular environments. There are existing developments in many of the big car companies and in entrepreneurial startups, to develop road-legal, one or two person vehicles that with emerging automated capabilities could be made collision proof. And with robotic high-volume manufacturing, could be made widely affordable.

If you want to learn more, the IEEE has developed a full one-day suite of presentation dedicated to explaining automated and connected vehicles, coming on Sept 16 in Vancouver, BC at the Vehicle Tech Conference. Google for it. Speakers include internationally-known automated vehicle and connected vehicle experts and manufacturers, an automotive software developer, a university, an insurance company, a cell-phone equipment supplier, and a transit agency. They will speak on the benefits, issues, trends and the technology.

In my project with the Seattle-based Center for Advanced Transportation and Energy Solutions (CATES) we believe as others do that real world demonstration testing of new vehicle technologies is an important step that should be taken by civic-minded people and organizations. So CATES is collaborating with the Army-Air Force Joint Base Lewis-McChord base straddling Interstate 5 between Tacoma and Olympia in Washington State to set up a demonstration of how

new electric vehicles with automated capabilities meet consumer needs and peace time military requirements for efficiency and safety.

Needed from professionals like you and me is careful monitoring of the fruits of innovation – integrating proven applications -- restraint in calls for government regulation -- optimism - realism - self-education - open mindedness - and staying motivated by the realization that there are big benefits in saving human life with the innovations that are coming from North America in ITS, now embracing the dynamics of changing vehicle technology.

With the increasing pace of growth in computing power, low-cost sophisticated sensors, high resolution detailed road mapping, and faster no-lag connectivity between vehicles and real time information along with drive by wire and electric drive advances we may well have a future of cars without oil, without accidents and without congestion. But it will come only with the work of ITS professionals to help innovate, educate and demonstrate the integration of these technologies in real world environments.

Thanks for your attention and I'll stay around as needed for questioning and discussion.

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