THE FUTURE OF ITS: WHERE TECHNOLOGY WILL TAKE US NEXT

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All Traffic Solutions Chief Marketing Officer Inga Broerman recently sat down with transportation industry expert Scott Belcher to talk about the current state of transportation in the United States, how technology is changing the industry, and what transportation agencies can do now to prepare for the future.

Scott Belcher is President and CEO of SFB Consulting where he specializes in transportation, transportation technology, the Internet of Things, smart cities and the environment. Prior to SFB, Scott served as the CEO of Telecommunications Industry Association (TIA) and the President and CEO of the Intelligent Transportation Society of America (ITS America). He has more than 30 years of private and public sector experience in Washington, DC.

Scott currently serves on the US DoT ITS Program Advisory Committee, the US Department of State Advisory Committee on International Communications and Information Policy, the American Association of State Highway and Transportation Officials (AASHTO), the Connected and Automated Executive Leadership Team, and the Global Actionable Innovation Advisory Board.

Insights in **ITS**

How has technology impacted transportation over the past decade?

Technology has had a huge impact on transportation already. In the last ten or 15 years we've seen great advancements at every level of transportation, whether it's traffic signals—as we move from old digital systems that were based on algorithms and loops to systems that utilize cameras and real-time traffic management or as we've moved from individuals managing intersections to systems that do counts and change the signals dynamically—or as we've moved from vehicles that had no sensors and no cameras to vehicles that have got systems that will protect the driver, to transit operations in general.

We've seen great advances in the use of technology that are being driven by communications and computers. And cameras! Those are the things that are really changing transportation.
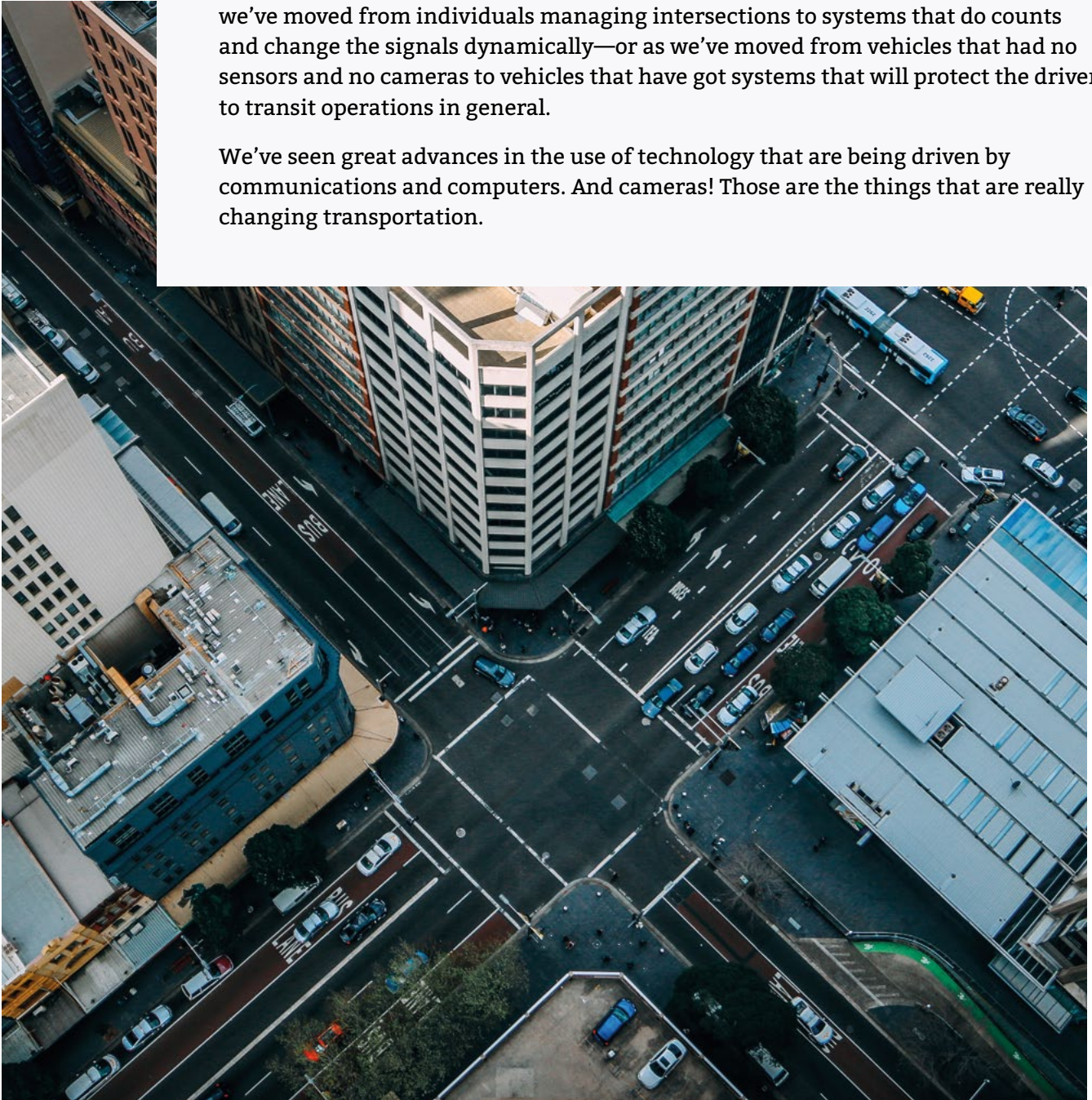
So, when you think about technology, what do you think are the biggest challenges affecting transportation, and how can that technology be used to benefit them?

I don't think it's necessarily the challenges and the technology as much as the fact that we're losing over 40 thousand people in traffic accidents every year. We've been on a super-trajectory where the number of deaths was actually declining, and that has changed in the last two years; we're now at over 40 thousand deaths every year, and 40 thousand is unacceptable. This is all happening at a time when the vehicle miles traveled continue to increase and so, when we look at those two things and then combine them with the fact that funding is continuing to decline, we face a real crisis.

If you look at funding at the national level, Congress has not increased the gas tax since 1991, and during that time inflation has continued to drive costs up. There's been no inflationary increase, and our purchasing power continues to decline. So, we are not funding the infrastructure needs that we require and there's really no solution in sight. Congress doesn't have the wherewithal at this point to address this because we're in a no-tax environment. Some states are being more progressive, like Utah, and other states that have increased state gas taxes and have

linked them to inflation. That's exactly what ought to happen. This all affects GDP, affects jobs and affects sales.

Technology can help bridge some of that gap, but not all of it. Technology can enable you to utilize your existing infrastructure in more productive ways, drive down the need for additional infrastructure, and give you a heads-up on when infrastructure needs to be replaced and repaired. It can help you optimize the existing system. We are in a crisis and we've been in a crisis.

President Trump talks about a trillion-dollar investment in infrastructure, but there are very few specifics. What we do know is that investment in infrastructure is going to be seeded with a few hundred billion dollars of federal money, but the other 800 billion dollars will come from state and local governments and from the private sector. The one limited specific we have is that the 200 billion dollars will be over a long period of time, but it's not reflected in the budget at this point. Local governments are going to have to be creative as they figure out how to fund the initiatives that they need.

What technology trends, both in the transportation industry and in other industries that are making their way into the transportation field, do you see as having an impact in transportation?

This is the most exciting part. The first is the movement into the Cloud. It no longer makes sense for private companies or public operations to operate their own data centers. There's no way they can keep up with this feed of innovation that's occurring. What I see in the communications industry is rapid movement to white boxes, rapid movement to network function virtualization (which is taking routers out), and software to find networks which create self-healing networks. Technology firms have a difficult enough time keeping up with all this, let alone individuals who are trying to operate data centers. You're going to see increasing movements of the data centers to the Cloud, and that's a huge change.

One of the great advances we've already started to see in transportation is the greater use of data, data analytics and artificial intelligence. All of these things are enabling us to optimize things like dynamic traffic management, integrated corridor management and transit priority. These are all operated off of data, and data is the new oil. States, cities and counties have great volumes of data, and now they've got to learn how to use it, and they've got to learn what things they should do on their own and what things they should farm out.

Transportation is really the foster child of Machine-to-Machine and the Internet of Things, and it's making its way into the smart cities environment because we have opportunities to make cities operate better. We're in the beginning stages—I see a number of really great technologies that we're going to be exporting from other industries.

What will have the biggest impact on the transformation of data and on the Internet of Things, and how do you see all this meshing together?

You're going to see DoTs avail themselves of technologies like TraffiCloud™ from All Traffic Solutions (ATS)—a cloud-based platform that allows the operator to manage all of their proprietary data sets in a single, holistic way to optimize the entire traffic management system. They will be using a simple technology tool to link existing legacy traffic devices and sensors to that platform, such as the ATS TrafficBridge, which is a small box that attaches to each device and acts as a cellular gateway to TraffiCloud so that the devices can talk to each other and with the platform.

That means that intersections, traffic flows, ramp metering, parking and dynamic message signs can all be managed holistically through a single enterprise platform, and that's important because that buys the states, cities, counties and transit districts time while they are moving to open, interoperable systems. You want to move away from proprietary hardware and software systems where you're bound to existing hardware and vendors. It's best practice to go out on a regular basis, find the best vendors with the best solutions and have them compete to give you the best price possible. You want hardware that you can plug and play and the ability to work with contractors who can manage your software upgrades and everything else for you.

Another thing that I see coming rapidly is of course, the rise of connected and autonomous vehicles. That's clearly going to change the way we operate, the way we lay out our cities and the way we manage them. We're going to see an ever-increasing use of data and data analytics to optimize our existing traffic management systems, optimize vehicle systems and enhance safety.

How do you see technology affecting safety in the future? Where will technology have the greatest impact, and where do you see the opportunity?

You're going to see technology affecting safety in multiple ways. Let's start with vehicles. Automobile manufacturers have invested a great deal of money and research into make cars safer, and we've pretty much exhausted the ways we can make have vehicles protect you when you're in a crash, whether it's automated braking or seatbelts. Now, we need to focus on how to prevent crashes in the first place. Connected vehicles will reduce crash scenarios by more than 80%, and that's huge. It's bigger than seatbelts, airbags or anti-lock brakes. Autonomous vehicles will take the driver out of the loop, and that's huge because it's the driver that causes accidents, not the vehicles themselves.

You're going to see dynamic traffic signals and dynamic traffic lanes that manage the flow of traffic, which will drive down the number of accidents and fatalities. Also, the trend towards integrated corridors that allow you to manage the data from all of the input holistically—it has been deployed in Dallas and in San Diego, and there will be more movement towards that. All these advances will lead to greater safety.

Companies like All Traffic Solutions have developed work zone safety applications that send the workers a warning when there is a vehicle approaching at high speed. There are autonomous trucks in work zones that move as the workers move and prevent the worker from actually having to get in the vehicle, which is a primary source of fatalities in work zones.

There's a whole range of things that will drive safety, and they will all be driven by cameras, by sensors, and by data and data analytics.

What is integrated corridor management?

In many areas, as you leave one jurisdiction and enter the next one, traffic signals and other devices are on separate platforms and must be managed separately. Integrated corridor management is when the transportation organizations in a region utilize the same platform so that the entire corridor can be managed from one central location, so that they are utilizing a common data stream and common traffic signals.

US DoT has sponsored a program called the Integrated Corridor Management Initiative (ICM) to encourage proactive integration of existing infrastructure along major corridors. ICM enables the entire corridor to be managed holistically. The federal highways, the state arterials, the transit district—are all optimized by having a common data flow and common data management. We've seen that in a number of cities, including San Diego and Dallas.

How long do you think it will take for traffic signaling equipment to transition from proprietary to open architecture so that interconnectivity can be accomplished seamlessly?

Many traffic signals in cities, counties and states are not connected and not using basic technology—somewhere between 30 and 40%. As a result, you've got the operators plugging in algorithms based only on what they know about traffic flows. We've all experienced sitting at a red traffic light when there's no traffic going the other way, but the algorithm is set and so we sit there for 30 seconds or more until it changes. Getting signals upgraded and connected will stop this from happening and will improve traffic flow.

Making them interoperable is going to require that cities and states demand that of their vendors and don't buy a proprietary approach. There are plenty of open and interoperable systems out there, but cities and states and transit districts are financially strapped and won't get rid of functioning systems prematurely. They need to take an interim step to go to a platform like TraffiCloud and manage those proprietary legacy systems as if they weren't proprietary, which is the beauty of an enterprise platform.

How do you see DoTs making their decisions about software moving forward? When we talk about open versus proprietary, what are the criteria they are using to make those decisions?

First, DoTs, whether they're cities, counties or states, need to stick with what they do best and figure out what they can outsource. It makes no sense for a DoT to manage a network any longer. They should outsource that. Figuring out what you do best and what other people do better and cheaper is an important decision for DoTs to make.

The second thing is they need to move towards systems that are open and interoperable. Interoperability means that systems communicate with each other and that other vendors can come in and take over that system. Other industries have all moved in this direction, but DoTs and their vendors are really far behind, and it's largely out of concerns for security.

Open software development is used by most sophisticated industries, including the banking industry, in which they use an open platform in a crowdsourced environment so that multiple parties help solve parts of the problems associated with that software development. The users are able to take those solutions and build them into their own solutions to solve their own problems. When this happens, and it will, it will expedite transportation, making things faster, more creative and making development cheaper.

The third thing I think that DoTs will be doing is figuring out how to leverage their existing assets to generate revenue. DoTs have a lot of valuable assets, and in the past, we've seen situations where DoTs have been taken advantage of. They have given over data and then had that data sold back to them. They've been burnt, but regardless of whether it's transit, cities, states or counties, DoTs all have data—the oil of the future—something that's very valuable. They have real estate, so traffic signals, street lights, fiber—those things are all immensely valuable to the carriers and to the communication infrastructure providers.

All of these things are incredibly valuable, and the reality is we've got to think about the skill sets of our employees because it's no longer enough to understand asphalt and concrete dynamics and flows or bridge design criteria. So many DoT engineers now have got to be able to negotiate public-private partnerships, manage contractors and understand cutting-edge applications, whether it's communications or apps. Those are different skill sets, and that's one of the real challenges that DoTs face. First, we have a shortage of engineers in this country and then, second, getting the right mix of skills is an important aspect.

Are we becoming obsessed with technology to the detriment of extending our understanding of the specific needs of end users?

I think they go hand in hand. Technology for technology's sake is never the answer. One of the critiques of autonomous vehicles is that the average commute in the US is 19 minutes. How much benefit are we really going to get out of autonomous vehicles, as users? There are many other benefits of autonomous vehicles, but as users, how much work can you get done in 19 minutes, or how much sleep? Not a heck of a lot! But if you can intelligently use technology to leverage your existing assets and save resources, then it definitely makes a lot of sense.

The Utah Department of Transportation either brilliantly or fortuitously made a decision. They took a huge risk by laying fiber to all of their traffic signals, not just in the major part of the state where the vast majority of the population is but also in the rural areas. Imagine laying fiber along a stretch of a rural highway and having to answer questions from the legislature and from the governor.

They had to do that, but now that fiber is going to enable them to service rural broadband; that's going to allow them to service connected and autonomous vehicles in rural areas, as well as to generate revenue. That's an example where taking a risk paid off, but we should not be chasing technology for the sake of chasing technology.

However, technology really is transforming the world around us. DoTs are behind the curve. Because they are playing with taxpayer money, they don't have enough money, and they have legacy systems that they've got to manage.

Given the vast amount of data being created and the skill set that's required to managed it, do you see any conflict in how DoTs will manage data going forward and the skills they currently have?

DoTs aren't necessarily set up to manage this data. What you see is that they've got a lot of data and they're not really clear on what to do with it. I can't imagine how difficult it is to be a DoT employee because there are so many companies telling you they've got the solution. There are no silver bullets out there, and the solutions are partnerships with people, with organizations that you trust that are forward thinking and know how to leverage that data. Figuring out what to offload to vendors they can trust is hard, but DoTs know how to write a contract and how to manage a contractor. Partnering with one that knows how to build you a system that will make decisions with the data you've got makes a whole lot of sense.

You speak with a number of DoTs. When they talk about their long-range plans, what are they talking about, and how are they expecting to get there?

If I were a DoT, I would be thinking about how to move my data center to the Cloud and get out of that business. I would be thinking about how to make sure I've got fiber laid and that I am being intentional about how I will work with the carriers to densify the network, meaning putting up small cells for wireless in a way that makes sense. The last thing that DoTs and cities want are traffic poles and streetlights and other infrastructures that have six radio antennas and cameras on them. They need to be thinking, what is our urban infrastructure going to look like in ten years? and beginning to have the conversation about how to plan for a new environment that's built around shared use of mobility, whether it's bike shares, car shares, or connected autonomous vehicles.

For example, when I flew to Phoenix recently, I was struck by how they have really transmogrified their airport to meet the needs of a shared-use environment, to meet the needs of Uber and Lyft and companies like that. It was hard to find where the taxi stand was because the vast majority of people coming off of the planes were logging onto Uber and Lyft.

DoTs have got to be thinking about those things going forward. The biggest issue, always, for DoTs in transit districts is that last mile. If we think about people in urban settings having fewer cars, relying on different modes of transportation, how do DoTs make sure that they have the information they need to optimize the different operands they have? Those are the kinds of things that are important in terms of long-range planning.

To summarize, how can technology be leveraged by DoTs in general, and what are the benefits they can attain?

First and foremost, DoTs can and should leverage data that can create revenue, can help them optimize the existing systems that they have, and can help them integrate their various proprietary systems. They can leverage the communications infrastructure, primarily fiber, to the extent that they have their own fiber that's laid. Finding ways, depending on who owns it and in what rights of way it plays and things like that and whether it's in conduit or not, is a potential goldmine for DoTs in the sense that you can lease your dark strands to other users, whether it's communications providers or Amazon or companies that need and want the ability to move large amounts of data. You can spin that off and reduce your costs by having somebody else operate and manage it.

The reason I am so focused on leveraging infrastructure to generate revenue is because I don't see there being any new stream of revenue coming from the feds any time soon. I don't see Congress acquiring the guts to pass a gas tax increase. I don't see this administration recognizing its role in supporting cities and states and transit organizations. What we're seeing is a movement of these things back to the local levels. That's why I look through the prism of How do we generate revenue?

Cities can use the data they generate to optimize their systems and sell to companies like INRIX, HERE and TomTom to really leverage technology and generate revenue that, to the extent possible, can be put back into the system. Sometimes DoTs can be really creative about generating new revenue only to have it go to the general fund; they should do everything they can to protect it and reinvest it in transportation.

What about smart parking?

I think smart parking is really something to chase after so that cities and states can utilize technology to enhance revenue and provide a great service to their citizens. People spend a third of their time in urban traffic looking for parking. If you can direct them to places, if you can price your parking dynamically— making sure that there's always parking availability but moving cars around in ways that make sense— it's a gateway into really leveraging technology to become a smart city.

All Traffic Solutions has got an interesting smart parking solution that I kind of like, but to be perfectly honest, I like most smart parking solutions.

Smart transportation systems really have focused around large implementations such as cities or large motorways. Where do you see lower costs and ITS supporting smaller roads as well as urban centers?

The telecommunications carriers have difficulty rationalizing an investment in connecting rural areas because they want to see significant return on their investment. Without that connectivity, a lot of ITS solutions can be challenging in the more rural areas.

If a city or county can utilize some basic data analytics to identify where their highest traffic fatalities or traffic crashes are, that can enable them to focus their resources in high-interest areas. Here again is where technology can help, such as by providing information, either to dynamic message signs or to lights, around weather changes, around traffic, or for immediate traffic changes to make these areas safer.

Utilizing new routing systems like Waze can be very beneficial in rural areas.

Unlike other apps out there, Waze is crowdsourced. For example, if somebody who's driving in the rural area sees a crash or other event that's just occurred, they can communicate to the rest of the network. I've seen some really interesting applications relating to lane crossings that can be done cheaply and effectively with sensors and signaling, and I'm starting to see some really effective technologies with train crossings.

All of these things are relatively low-cost and they're resourceful. In less urbanized areas you've got to be in order to drive down fatalities because the revenue is just not there to build out the sexy applications.

How do DoTs manage the inherent conflict between those sexy applications that can create silos and the longer-range building of the ecosystem or infrastructure that will help transportation agencies get to that next level and get to their autonomous platform management?

At the risk of sounding like a broken record, as DoTs move forward they have to think about these applications in a coherent, coordinated manner. They have to make sure they're buying hardware and software that's interoperable, that can interface with other systems, that can operate on a common data platform, that they can plug and play as technology continues to advance, and that they are not buying into proprietary silos.

Who knows what's going to happen with connected vehicles in 5.9? I still think we're going to see 5.9 deployed, but I think it's going to be deployed probably more opportunistically because I am not sure we're going to see a regulation mandating it. How does a city or a state protect themselves there? By making sure that they have power, that they have connectivity to their traffic signals, and if it is available, the necessary infrastructure to accommodate what will be available. But more importantly, as they are thinking about getting or buying a 5.9 infrastructure transponder or buying a small cell or allowing people to deploy those on their infrastructure, I would make sure that whatever they do, they have Bluetooth, Wi-Fi, 3G and 4G slots, 5G slots for whenever that's defined, and that those radio sets are available so that they're ready for the things that we don't yet know about. They've got to make sure they've got the infrastructure and the capability to accommodate them and the openness to do that. That may be easier said than done, but I am seeing companies out there making small cells, making transponders that have multiprotocol readers in them and are prepared for 5G, that can accommodate 5.9—ultimately future-proofing themselves by creating the maximum flexibility and at the same time building that ecosystem.

Conclusion

All Traffic Solutions delivers <u>the solutions</u> to manage the traffic flows, the services, and the adaptive traffic technologies with intelligent mobility and prescriptive analytics to advance road user communication. Much of what Scott Belcher talked about in this white paper centers around the concept of open-platform. TraffiCloud is an open, flexible, extensible platform that can integrate with any sensor to to give you a holistic view of what your traffic infrastructure and your environment look like. All our solutions, including traffic counting, traffic calming, dynamic messaging, dynamic speed, time to destination, virtual drive times, and parking availability fit seamlessly into the TraffiCloud ecosystem.

**To learn more, contact us today. Call 866.366.6602
or email us at <u>sales@alltrafficsolutions.com</u>**

All Traffic Solutions delivers cloud-based traffic management solutions, including radar speed and variable message displays, imaging products and intelligent transportation systems for law enforcement, transportation and communities.

Our innovative TraffiCloud™ traffic management platform is changing the way communities solve their most complex traffic, transportation and parking challenges by allowing them to manage all their traffic equipment remotely, as well as leverage data to increase traffic safety, streamline their operations and achieve lasting results.

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