Part III

Digital Business 2020:
Getting there from here!

Connected Lives
Where Smart Vehicles Meet the Intelligent Road
The digital highway promises to enable an ever-expanding ecosystem encompassing intelligent transportation systems, smart cities and logistics systems, optimizing productivity and performance for businesses and individuals.

As a manufacturing plant manager begins her morning commute, the local segment of the intelligent transportation system (ITS) streams the latest traffic data to her in-car system. The data is synched with the manager’s calendar app, which contains that morning’s production schedule, and the system plots an optimal route to the plant.

Meanwhile, sensor-embedded roadways on the route continuously gather data from passing vehicles. Through real-time analysis of this data, combined with weather data and information from vehicles entering freeway acceleration lanes, the system senses increased traffic density and alerts controllers to a predicted slowdown. The system broadcasts alternate routes to commercial fleet vehicles, including those heading toward the plant manager’s facility, opens an additional express lane, and reduces the speed limits flashing on dynamic signs along the routes.

The manager’s car receives this data, confirms that travel time on the original route remains within acceptable parameters, and reserves a parking space in the plant’s garage, based on estimated arrival time. Throughout the drive, the car and other connected vehicles on the road communicate with each other and the ITS, maintaining safe speeds and distances. Through real-time updates from a logistics app that is in synch with the ITS, the plant manager learns that two shipments needed to start a production line are now projected to arrive ahead of schedule. She arrives at her destination with time to spare, informed, relaxed and ready to start her day.

The wizardry of the connected and eventually driverless autonomous car is the focus of popular attention, but the promise of a more pleasant, safe and even productive drive is only part of the connected vehicle story. Connected vehicles, including long-haul and local delivery trucks, will increasingly participate in a much larger ecosystem that encompasses the ITS and...
ultimately the “smart city,” reducing the stress factors inherent in dense urban environments.

This intelligent and ever-expanding ecosystem, rich in real-time data and fueled by predictive analytics, will give companies more visibility into and control over their fleet performance, supply chain and logistics to use assets more effectively, reduce costs and enhance customer service. The ITS will safely provide drivers with more in-vehicle data and activities, while helping them make better driving decisions. Eventually, the system will enable fully autonomous vehicles, turning them into roving extensions of home and office space, completely changing the driving experience (see Figure 1).

Connecting Vehicles with Intelligence

The ITS vision is to create an intelligent, self-learning and predictive system that improves driver safety. It will also encompass multimodal transport, from trucks and cars to bicycles and scooters, trams and trains, helping individuals easily transition among these modes to enable seamless urban mobility (SUM). The ITS should even help the environment by enabling vehicles to reach optimal fuel efficiency or alerting drivers to take mass transit to avoid congestion.

To accomplish these goals, the ITS concept integrates vehicle-to-vehicle (V2V) and vehicle to infrastructure (V2I) communica-
tions with sensor-equipped roadways, digital surveillance cameras, analytics, electronic signs, traffic signals, tolls, even IP-addressable light poles. The ITS will also incorporate data from weather reports, public parking lots, personal calendars and apps. All of this data will be analyzed in real time by the ITS to create intelligence it can share with vehicles and other assets in the network, such as digital traffic speed and direction signs that can be changed on-the-fly and in-car routing systems.

Australia has been using ITS for active travel management, real-time driver information, vehicle telemetry and railway management. The UK and Switzerland have long used digital surveillance cameras on major arteries to speed emergency response times. China is integrating cloud computing, big data analytics and connected devices into an ITS platform that connects millions of commercial vehicles to the Internet and each other. The U.S. is playing catch up, having recently commenced multiple initiatives to enhance ITS usage and adoption of ITS.

Driving Business Opportunities with the ITS

These abundant connections will drive business opportunities from the ITS and connected vehicles. OEMs can build new vehicle features that capitalize on ITS capabilities, such as calculating routes and adjusting vehicle speed. Providers may also tap ITS data to create personalized subscription services around their vehicles; for example, they could provide a mobility solution that combines vehicle-based telematics and ITS sensor data to note an anomaly in a truck’s tire pressure and trigger a nearby roadside assistance center to dispatch a service vehicle, enabling preventive maintenance before the tire has a chance to fail.

Additional value creation opportunities are possible that range far beyond the vehicle. First, though, cities will need to upgrade their infrastructures to incorporate sensors and electronic signage into their major arteries. Further, logistics management and manufacturing planning systems can deliver additional value when they share data with the ITS (see Quick Take, next page).

The ITS will also capture data that can reveal new patterns and insights that point to business opportunities for virtually every industry. Developers could create intelligent energy management platforms for buildings and cities through insights gleaned from traffic data and energy consumption information from central business districts. Additionally, real estate developers could predict the next hot neighborhood, using data showing traffic spikes in areas frequented by drivers of trendy, high-end vehicles.

Shifting to Strategic Thinking

Maximizing the value from such data requires a mindset shift, from the incremental commercial opportunities gained from ITS and connected vehicles, to bolder visions with more strategic value. Questions should expand from, “What does the data tell me about the best place to locate a manufacturing plant?” to, “How should I design my manufacturing, supply and distribution network?” The ITS will provide both the data collection and connectivity to support a wider perspective on traffic data implications (see Figure 2, page 79).

Context is critical for creators and purveyors of data that seek to monetize data within the connected vehicle and ITS ecosystem. For example, a driver stuck in traffic on the way to the airport is unlikely to appreciate a two-for-one coupon at the big-box store off the next exit. However, the driver might appreciate a real-time discount offer from a drive-through coffee shop at the next exit, as well as alternative route suggestions.

Context-appropriate offers can be devised using information from in-vehicle telematics devices. Based on vehicle location and performance, plus ITS-related traffic conditions, a vehicle concierge app could recommend a dinner break while traffic clears, and open an
Traffic congestion and delays affect the productivity of both businesses and individuals. Industrial manufacturers align production schedules with availability of labor, parts inventory and expected arrival of raw materials or piece parts. Yet there is uncertainty in that chain. Will a berth be available at its port of call for the freighter hauling the raw goods? Will dockworkers be readily available to unload the shipping container, given the port congestion level? How might ground travel time for the shipping container be affected by weather systems?

If raw materials don’t arrive when expected, manufacturers must change their production schedules, resulting in labor expenses and inventory costs that can, according to industry estimates, increase production costs by as much as 12%.

By linking data from the ITS to manufacturing execution systems (MES), manufacturers and other businesses can gain more operational control, as well as in-the-moment visibility into raw materials and/or finished goods in-transit. In a shipping visibility solution we developed for one client, we integrated APIs developed by multiple seaports with vehicle and container tracking technology and the MES.

The APIs provide links to ship arrival times, port labor conditions and unloading schedule data. On-vehicle systems query the APIs so the truck can be in the right loading zone when the shipping container has cleared customs. The container is also traceable, so the solution confirms the right container is on the correct vehicle.

When data from the vehicle is combined with shop floor systems, the manufacturer has a real-time view of incoming materials to optimize plant production. Further, predictive analytics can anticipate issues, such as weather delays, enabling the manufacturer to be a step ahead of events as they unfold and take prescriptive measures, such as rerouting a vehicle to a different plant with the capacity to make the finished goods necessary to complete a customer order.
application programming interface (API) to a restaurant-rating app to find a nearby place that features the driver’s preferred food choices, and then another app to book a table.

Capabilities like these require two or more sources of data, often from separate owners. However, through connectivity and openness — guided by the limits of privacy, regulatory compliance and good consumer relations — everyone involved can share in the revenue and brand experience. Businesses will also need to revisit their operating models; an example is the opportunity to optimize “last-mile” delivery, the final leg of a package’s journey to a customer. With smaller and more frequent deliveries becoming the norm, companies need real-time visibility into inventory across all regional distribution centers. Third-party fleets from those centers may take pre-sorted packages to a local depot for pickup by independent contractors who drive the last mile in their own vehicles to the delivery destination. Each vehicle in this on-demand delivery fleet becomes an information node that must connect and collaborate with other nodes to provide a seamless and transparent one-brand experience for the end consumer.
Start Your Engines

Although the ITS is still emerging, other key elements — ubiquitous smartphones, connected vehicles and addressable devices — are proliferating. Companies that prepare now to participate in the ITS will position themselves competitively in the digital economy. The key areas to focus on include:

- **Organizational structures.** Consider how existing internal management and reward structures enable or hinder innovation that requires collaboration with organizations and data outside the company walls. Traditional incentives are often aligned with performance in discrete components of the value chain; however, driving value from the ITS and similar platforms will require managing and rewarding people in the context of delivering an end-to-end experience and expanding the scope of an offering.

- **IT infrastructure and reference architecture.** Tapping into and contributing to the ITS ecosystem requires a flexible IT and data infrastructure that supports integration with third-party data sources, agile development and rapid service deployment. The IT reference architecture must encompass device management, data capture, analytics and data visualization to help end-users see patterns and insights that spark ideas and innovation.

- **Customer relationship management.** CRM systems need to become anticipatory and proactive, with features that enable a host of tangible products to plug into an ecosystem such as the ITS. An example is connected food-packaging equipment that automatically re-orders the plastic wrap that the manufacturer has specified for its product. The sensor data and plant delivery tracking system can interact with the ITS and the plant’s manufacturing execution system to monitor optimal delivery.

- **Application programming interfaces.** Companies must gauge their ability to ingest, share and manage information through APIs. An ecosystem like the ITS could encompass millions of drivers and thousands of trading partners and developers. Organizations willing to open doorways into their data stores via APIs can stimulate innovation that results in new products and capabilities, generating greater revenue pools for all. Examples include the personal mobility solutions available from several large carmakers, which require OEMs to envision how they can serve drivers around and beyond their vehicles by inviting third-party offerings into their platforms.

- **Security and privacy.** Even as businesses open themselves to ITS opportunities, they must develop strategies to meet physical and digital security challenges, such as preventing unauthorized access to both the vehicle and the onboard digital features and data. Customer privacy must also be considered; lines must be drawn between features that are useful vs. intrusive, and consumers need clarity on whether to share data and the benefits of doing so.

- **Regulatory compliance.** Technology will likely outpace legislation relating to the ITS, connected vehicles, safety requirements, communications standards, etc. In order to build compliant apps, products and services, business leaders must keep abreast of – and even help shape – relevant regulations.

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Reference architectures, CRM systems and APIs may seem far removed from a morning commute today. Yet when added to connected vehicles and an intelligent physical infrastructure, they can provide companies with a powerful toolset for operating more efficiently, and create solutions that contribute to more intelligently operated cities and communities. The drive to work will be better, too.

Footnotes

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