Trends

Transportation 2020

In 2020, transportation is as much about bits and bytes as the physical infrastructure on which we walk, bike, drive, and ride. Sensor-powered dynamic pricing, mobile-enabled collaborative transport models such as ridesharing and social transport apps, all help tackle traffic congestion in major urban corridors. Tremendous advances in connected and automated vehicle technology put the first fleets of autonomous or semi-autonomous vehicles on the roadways. Sustainable transport options such as electric vehicles and e-bikes become widespread. Air travel is reimagined through augmented reality-enabled self-service airports, while the skyways see greater drone use for civilian and commercial purposes.

Digital-age transportation

Shared transportation models

The convergence of technologies such as mobile communications, cloud computing, geospatial analysis, and social media gives rise to shared transportation models. Services such as ridesharing, car sharing, and bike sharing help urbanites get around without owning a car.

In 2020, the global car-sharing market is at 26 million members; the North American market leads the way with 15 million members.

Real-time traffic management

Real-time information optimizes traffic flows. Traffic data collected through sensors and traffic counters and crowdsourced through commuter GPS and Bluetooth allow for real-time reporting of traffic conditions. Predictive forecasting makes it possible for drivers to choose between the lowest cost and the quickest routes. A smarter, networked transportation system becomes an integral component of city life.

Waze connects drivers to one another and helps create local driving communities that work together to improve the quality of daily driving. Drivers can drive with the app open on their phone to passively contribute traffic and other road data or take on the more active role of reporting on accidents, police traps, and any other hazards along the way.

"Connected" vehicles

In 2020, many vehicles are connected to one another, the infrastructure around them, and various data streams, improving traffic flow and safety. These cars automatically scan the Web for information about problems ahead or parking spaces at the destination, and suggest alternative routes or even different modes of travel if traffic is too heavy.

Massachusetts Institute of Technology's CityCar effort is working on a suite of capabilities that will allow cars to drive themselves, while the Mercedes-Benz mbrace app allows remote door locking and services such as driving directions and restaurant listings through the navigation system. Similarly, Nissan's CARWINGS allows electric-vehicle drivers to control functions remotely.

By 2020, more than 50 percent of cars are equipped with GPS navigation.

Automated driving

Driverless vehicles make driving safer, more convenient, and more energy-efficient. Building on the pilots and experiments of the previous decade, manufacturers incrementally deploy the first driverless technology on urban roads. Manufacturers incorporate new sensor and GIS technology at the design stage, addressing cyber security issues and thus quelling data privacy concerns. These developments help refine regulations and legislation concerning driverless technology. Consumers can opt to share their data with insurers in return for discounts on insurance payments.

In 2020, 103 million cars are AR-enabled.

Social transport

Transportation systems are built on collaboration among neighbors, communities, governments, and traffic managers, touching on everything from traffic planning and signal timing to commute planning. Individual decisions are based on other people's advice, broader system-level objectives, real-time travel conditions, crowdsourced information, and community values. Beyond cost-efficiency, the system provides a social experience by matching personal preferences with transportation offerings.

The Century City Transportation Management Organization created by RideAmigos doesn't just compare the cost and time of different travel modes, it also does a carbon dioxide and health-benefit analysis and awards points to members on a tiered basis. Users with the highest point totals are awarded free bikes, transit passes, and other goods funded by local government, businesses, and nonprofits—adding a social component to what had been purely individual decisions.

Rise of the "alternatives"

Pedal power makes a comeback

The market for e-bikes picks up globally, providing an alternative for people who would generally avoid traditional bikes. The battery pack provides an additional boost for bikers on steep inclines or just allows them to move faster. Innovations in e-bike design make bike travel more attractive and affordable. Other designs such as foldable and backpack bikes and ultra-lightweight bikes also power the bicycle revolution.

Electric vehicles as a feasible alternative

Electric vehicles (EVs) emerge as a workable replacement for gas-powered vehicles. Given limitations on range and the availability of public charging stations, EV growth is fastest in public transport and fleet solutions before retail expansion. The UK is already piloting electric buses on a busy route in London; the buses will be recharged at the end of each journey using inductive charging.

Innovations in pricing, funding, and payment

Dynamic pricing models to improve efficiencies

With pressure building on limited infrastructure assets, new dynamic pricing models improve efficiency and embed two key values in the transportation system: Users begin paying a direct portion of the actual cost, and prices respond to demand. The advent of mobile technology and embedded sensors make dynamic pricing possible based on variables such as time of day, road congestion, speed, occupancy, and even carbon emissions. Pricing variants include: 1) Dynamic tolling where toll rates change based on variables such as the amount of traffic or time of day and 2) Dynamic parking which uses sensor technology to provide information on vacant spaces and allows parking managers to adjust pricing according to demand.

SFPark, San Francisco's smart parking management system uses a network of sensors in 7,000 metered parking spots and 12,250 spots in city garages. If spaces in an area open up, the information is communicated to users within a minute. To manage availability, the application periodically adjusts its pricing according to demand, encouraging drivers to park in underused garages and lots.

Maturing public-private-partnership transportation models

Governments regularly engage the private sector to help finance and deliver large infrastructure projects using a full complement of public-private partnership (PPP) approaches. These are already commonplace in the UK, Canada, and Australia, and by 2020 more markets are reaching maturity. PPP deals go beyond traditional toll user-fee models and include variations such as shadow tolling (with fees based on the number of vehicles using the roadway) and availability payment options (payments based on particular project milestones or performance standards). To increase public acceptance for newly priced roadways, investment PPPs (or IP3s) become common. Under an IP3, public entities divert a portion of the concession payment and toll revenue to a protected investment fund that pays households in the region an annual dividend to help offset the additional costs they incur from tolls. On the finance side, banks and institutional investors embrace a model in which institutions take on parts of the loan based on their risk appetite.

Beyond the gas tax

Increased fuel efficiency and the popularity of electric and alternative-fuel vehicles continue to erode the gas tax base. To protect the revenue base, governments introduce innovations such as mileage-based user fees (MBUFs), charges based on how much one drives rather than how much gasoline is purchased. Advancements in geospatial and other technologies help mitigate privacy issues.

The Oregon Department of Transportation (ODOT) will set up a program of 5,000 volunteer motorists beginning in 2015 to test the Mileage Based User Fee system, following two successful pilots by the ODOT in 2012–13.

Universal travel accounts

Travel cards or smartphones enabled with near-field communication (NFC) provide an integrated payment solution for transportation users. Account-based payment systems integrate all forms of transit payments such as bus fares, metro, parking, tolling, car and bike rentals, reducing transaction costs.

The airport re-imagined

Augmented airports

The Copenhagen airport is already piloting an app to help passengers find their way within the airport. By 2020, a common 3D tool on a mobile or wearable-augmented reality device positions passengers through the triangulation of Wi-Fi access points in the terminal, and guides them through each section of the airport.

Total air travel mobile apps

With advances in mobile and NFC technologies, all travel-related information moves to electronic formats. A master mobile app provides end-to-end service, aggregating research and booking for airlines, airports, hotels, and ground transport; at the airport, it guides commuters through the terminal and tells them where to check in, check luggage, and exchange currency.

By 2017 total air travel passenger numbers rise to 3.91 billion—an increase of 930 million passengers over the 2.98 billion carried in 2012.

Self-service airports

The self-service airport takes travel convenience a step further, offering an automated system integrated from departure through arrival, including self-help check-in kiosks, e-passports, and facial recognition for immigration formalities and mobile-enabled e-boarding passes.

Civilian drones enter the skies

Unmanned aerial vehicles appear in an ever-increasing variety of commercial and civilian roles, including geological surveys, law enforcement, environmental monitoring, asset management, and emergency response. Civilian UAV markets develop in countries with drone-friendly regulations.

More than 30,000 drones operate in the US domestic airspace in 2020.

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