THE FUTURE IS NOW

Meeting Urban Mobility Challenges

Urban mobility is on the cusp of stunning, multiyear change—a top-to-bottom transformation that's all but certain to be breathtaking in its size and scope. In fact, a convincing case could be made its already underway.

For example, who could have imagined just a few years ago that some large cities would be integrating electric bikes or electric scooters into their transportation-infrastructure planning and encouraging scooters' widespread use? **The worldwide market for electric bikes alone is projected to expand at a compound annual growth rate of about 2.4 percent over the next five years, reaching nearly $8 billion by 2024, according to a recent Global Info Research study.** Another example: One by one, car and truck makers are pledging to completely phase out production of vehicles powered by fossil fuels over the next 15 to 20 years; electrically-powered vehicles will become standard production.

The reality is that a host of social, technological and natural forces—from cultural shifts around the globe to climate change, from ubiquitous connectivity to scientific advances—will influence individuals' and businesses' transportation choices in coming decades. Urban mobility is also affected by the last-mile delivery effects of the growing number of online purchases. In the process, there will be a fundamental re-imagining of how people and goods move in and around urban areas, much as on-demand ride-sharing services in recent years sprang into existence, based on innovative new business models and the need for more creative transportation solutions.

Whatever forms these solutions take, this much is certain: The transition from the current state to what lies ahead can be haphazard and chaotic—or it can be optimized to best serve society as a whole. It all depends on the level of collaboration among all stakeholders and how they approach the search for solutions.

Tony Velocci is former Editor-in-Chief of Aviation Week & Space Technology (AW&ST) magazine and Editorial Director, Aviation Week Group. At the end of 2012, he retired from The McGraw-Hill Companies, Aviation Week's parent company, and remains deeply engaged in the aerospace industry.

At Aviation Week, he received the distinguished McGraw-Hill Corporate Achievement Award for Editorial Excellence, and was named the Royal Aeronautical Society's Aerospace Journalist of the Year award in multiple categories (2006 and 2002).

Velocci led Aviation Week's coverage of the aerospace industry's massive consolidation, its rapid globalization, and the struggles of suppliers. In 1994, he developed Aviation Week's Top-Performing Companies study, a benchmarking tool used to measure operating performance. He also led or co-chaired various international forums on innovation and competitiveness, cross-border collaboration, and co-chaired annual aerospace executive summits on critical challenges facing the industry.

GREEN AND
MICROMOBILITY MACHINES

Boston wants to achieve full climate neutrality by 2050, and is charting a completely new course to get there. The metropolis won't ban cars and trucks from its center. They'll still be welcome—if they're electric. Many other high-density areas around the world are on the same quest: replace private cars with an interconnected multimodal transportation system, while encouraging residents to cover short distances on foot.

Changes in transportation technology, design and connectivity will radically reduce the problems traditionally associated with private automobiles in urban areas, including a new generation of eco-friendly, micro-mobility vehicles and smaller, more maneuverable cars. Along the way, car makers will feel growing pressure to collaborate with each other, urban planners and technology-oriented companies in other industries to develop whatever combination of transportation solutions best fits local conditions.

"Such partnerships currently are happening more on a one-off basis, since many automakers are developing driving-automation technologies in-house to assure their companies remain relevant and profitable in a future in which software, data, and connectivity are more valuable than the mechanical elements of a vehicle," said Carla Bailo, President and CEO for the Center for Automotive Research, a motor vehicle think tank near Detroit.

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AIR MOBILTY:
THE DAWN OF A NEW ERA

In 2017, traffic congestion was a $166-billion problem for U.S. cities, resulting in some 8.8 billion hours of lost productivity, according to recent research from Texas A&M University. It's a costly problem for big cities in other parts of the world as well.
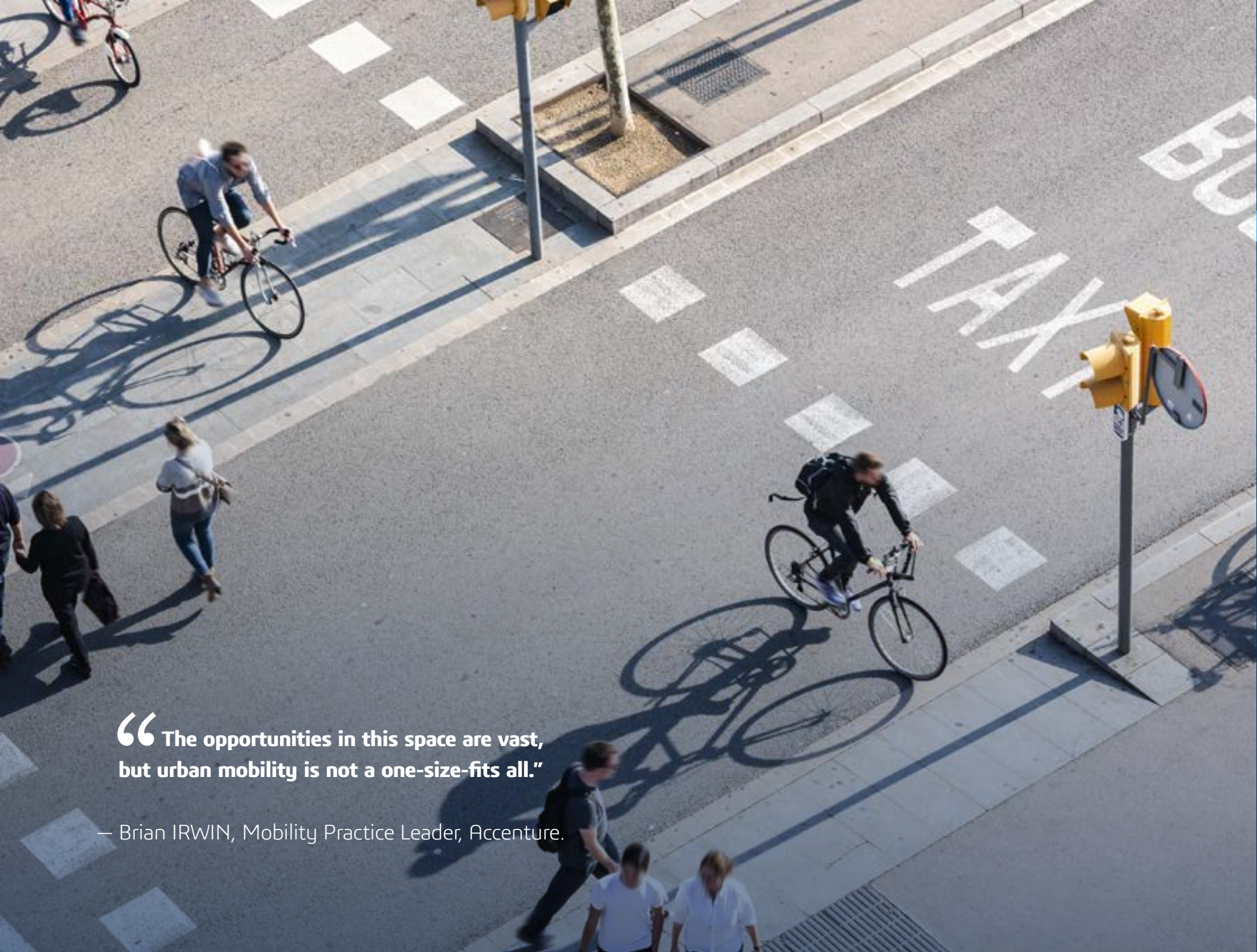
Enter electric vertical-takeoff-and-landing (eVTOL) craft. Of the more than 200 concepts in development, about a dozen different full-scale prototypes of vehicles carrying 2 to 5 people will have flown by the end of 2019. The first such aircraft could be certified as early as 2020.

But Bell's Carey Cannon, Chief Engineer, Innovation, cautions: "There must be a culture of safety from the beginning, because it will be impossible to unlock the benefits of vertical lift for the masses unless they have faith in the technology." Bell is in

the vanguard of developing urban air mobility vehicles. She adds: "We're working closely with some urban planners on such critical considerations as the most efficient and safest flight paths to and from pick-up and drop-off points for electric vertical-takeoff-and-landing craft."

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> **"The opportunities in this space are vast, but urban mobility is not a one-size-fits all."**
>
> — Brian IRWIN, Mobility Practice Leader, Accenture.

DATA HELPS PLAN THE SMART CITY

Over time, smaller, more maneuverable cars will greatly reduce the amount of land and building space devoted to parking. Today's typical on-street parking space, for example, could easily accommodate as many as three two-passenger, battery-electric CiltyCar prototypes, according to a New York University study.

How will city planners and construction companies arrive at the right solutions for taking advantage of such efficiency gains and associated complex challenges involving huge volumes of data?

A good place to start would be to adopt a portal that can help make sense of the data, which would vastly improve decision making as industry and cities collaborate to develop the right infrastructure for urban mobility's near-term future.

"The opportunities in this space are vast, but urban mobility is not a one-size-fits all," according to Brian Irwin, who leads the mobility practice at consultancy Accenture. "We're working across the public/private partnership to identify the best solutions."

INFRASTRUCTURE PAVES THE WAY
FOR URBAN MOBILITY

An urban center's capacity to have multiple, varied modes of transportation tailored to its own needs will be vital to that city's ability to prosper and sustain urban mobility in the 21st century. But that journey will require massive investment in the appropriate infrastructure before there's significant deployment.

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> — Simon MENCARELLI, CEO, XYT.

This includes such essential services as urban air mobility ports where people can access eVTOL vehicles. There also will need to be substantial investment in "soft" infrastructure of information and communications systems—such as pavement and roadside sensors—to support connectivity between individual vehicles and central servers, along with the capacity needed to process, analyze and effectively optimize everything related to the infrastructure.

"Technology for technology's sake isn't the answer for 21st century urban mobility," said Chief Executive Officer Simon Mencarelli, co-founder of Paris-based XYT, developer of light, modular electric vehicles for last-mile delivery services. "I don't know how much people understand that the proper infrastructure is just as important for long-term sustainability of urban-mobility solutions."

5G CONNECTIVITY
FOR SMART URBAN MOBILITY

The newest mobile connectivity technologies, more commonly known as 5G, hold enormous potential for urban mobility. For example, stakeholders such as first-responders will benefit from new mission-critical services. As an urban-mobility enabler, 5G also could give a huge boost to self-driving car technology.

Current autonomous vehicles are relatively self-contained, meaning that each one functions independently. With 5G's faster, more stable cellular network and lower latency, all self-driving vehicles will be able to "talk" to each other and communicate instantaneously with "smart" roads, improving safety and helping to optimize traffic management. Advanced active mobility vehicles such as electric bikes and electric scooters are connected IoT (Internet of Things) devices to provide various services, including geolocation. With 5G, new features are likely to include safety-related capabilities.

Due to the underlying technology and massive radio spectrum of 5G, service providers will have a way of delivering three key use cases in urban areas: high-speed mobile broadband, ultra-reliable connectivity and the ability to connect to a massive number of devices simultaneously, according to Mahesh Deshpande, senior director of High-Tech Industry Business Consulting at Dassault Systemes.

> " Widespread implementation of 5G will be one of the keys to enhancing urban-mobility solutions."
>
> — Mahesh DESHPANDE, Senior Director, High-Tech, Dassault Systemes.

NEW RETAIL AND
LAST-MILE DELIVERY

For all the discussion surrounding the coming transformations in urban mobility, improvements generally will be measured in increments spread over years, versus dramatic single events. There will be exceptions, of course—much as the introduction of commercial jets forever changed the way people see the world. Otherwise, the "new order" will creep into the lives of people bit by bit.

All the same, emerging demographic patterns almost certainly will influence the development of urban mobility, as will the impact of the "new consumer"—the growing segment of the population who are shifting to online ordering and showing an increasing desire for faster and more frequent delivery of goods directly to their homes. These people include increasing single-person households; senior citizens in cities worldwide; and inhabitants of the rapidly growing cities in developing countries. Some 40 percent of consumers now rank last-mile delivery services as a "must-have" feature for food and grocery purchases, according to Capgemini Research Institute.

Single-person households generally spend a larger share of their total income on housing and related expenses, leaving fewer resources available for car ownership. As the 65-and-older population grows, the spatial distribution of both public services and commerce may gradually shift to one that places greater emphasis on both walkability and auto-based accessibility.

The concentration of urban growth in developing countries means that future approaches to improving urban mobility must consider the conditions of cities, requiring developments in mobility that are within reach of people at various income levels.

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THE PASSENGER
ACCEPTANCE HURDLE

Today, much of the technology required to enable urban mobility in the first half of the 21st century is ready. A futuristic transportation system and infrastructure -- autonomous air taxis -- operate on a relatively small scale in the prototype stage providing invaluable feedback on how they're working.

> **" Public education is the first step, and so everyone should be talking about this stuff now."**
>
> — Carey CANNON, Chief Engineer, Innovation, Bell

In fact, technology is advancing so rapidly that the pace belies significant challenges. Perhaps chief among them is consumer confidence in future urban air mobility vehicles and how they will be managed. Without consumer buy-in, acceptance is likely to elude service providers and urban mobility champions as new technologies are rolled out. To be successful, there must be alignment between city planners, regulators, and operators of autonomous vehicles (air and ground) and other providers such as micromobility solutions.

To avoid missteps and unwelcomed surprises, collaboration and communications among all stakeholders is critical, asserted Carey Cannon, chief engineer of Innovation at Bell. "Public education is the first step, and so everyone should be talking about this stuff now."

WHY PLATFORMS?

Data management, digital information exchanges, shared intelligence and situational understanding—all within a collaborative environment—are critical for identifying and implementing the ideal combination of transportation services and associated infrastructure.

What if a city, working in partnership with industry, had the ability to produce a digital twin and simulate what might seem to be the ideal combination of transportation solutions tailored to its particular needs, or accelerate innovation? Not only is this possible, but it's doable using a platform approach to the overarching challenge.

INNO Design, a South Korean and California-based design firm, learned first-hand the advantages of a platform approach. Adopting Dassault Systèmes' **3D**EXPERIENCE® platform on the cloud to accelerate new-product development resulted in the company streamlining its design processes and improving

how they share design ideas. Bell, one of many companies involved with urban mobility planning and engineering, also attests to the value a platform approach offers. "There are many interdependent elements to consider in the lifecycle of the electric vertical-takeoff-and-landing vehicle we are developing," said Scott Drennan, vice president of innovation at Bell.

> " For the best outcome, a platform approach is the smartest way to tie these elements together to the digital infrastructure."
>
> — Scott DRENNAN, Vice President, Innovation, Bell.

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