The Annual

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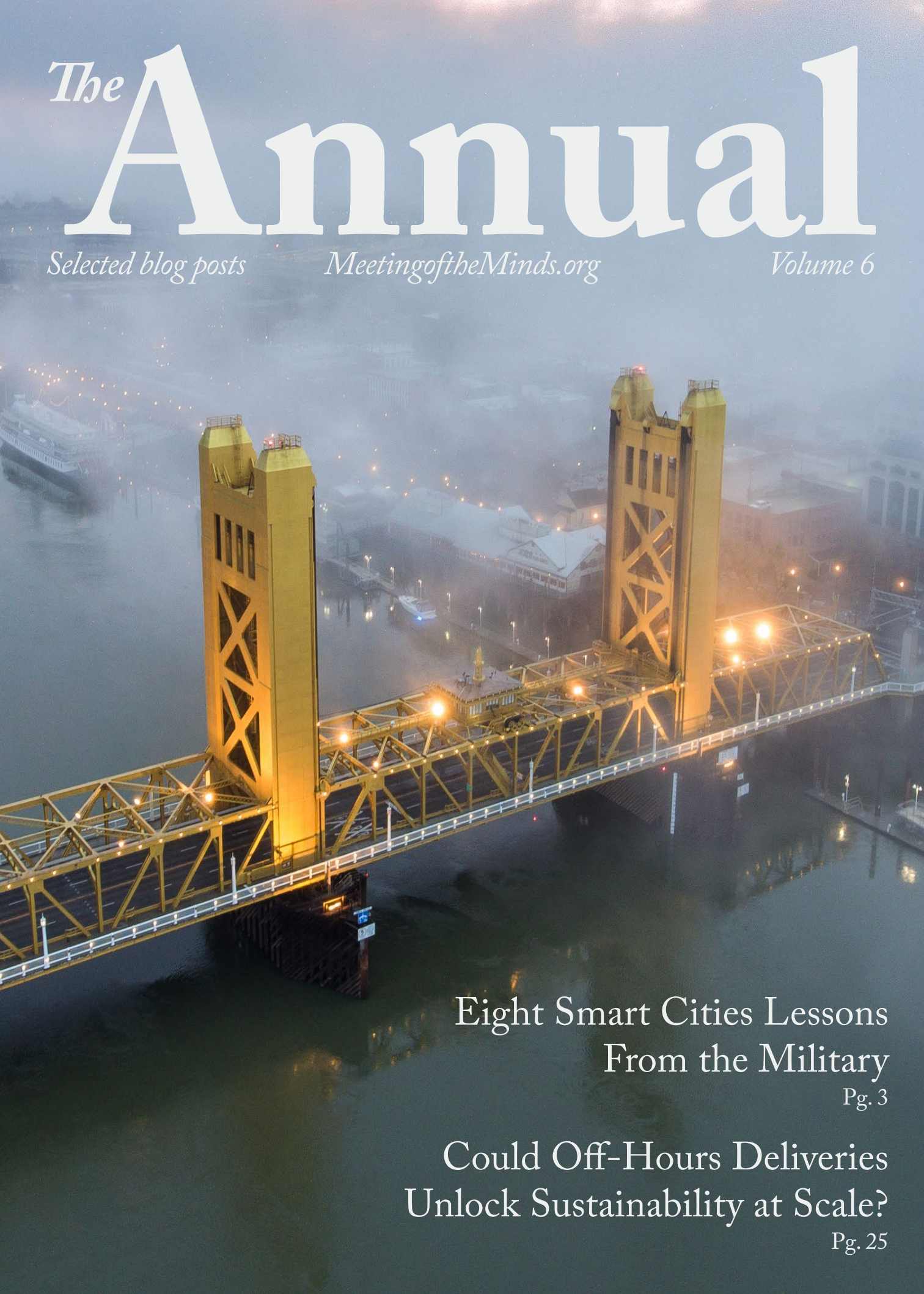


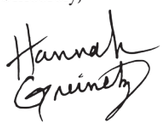
Meeting of the Minds

Letter from the Editor

The past year has been full of change, shifting perspectives, and for many of us, renewed focus. The term 'resilience' has taken on new meaning as city leaders face political, social, and environmental challenges. The blog posts we've published at MeetingoftheMinds.org over the past year have spotlighted scores of innovative solutions — from the application of technologies like blockchain, to the deployment of urban sensor networks, to the development of scalable strategies for tackling affordable housing, to the analysis of policy standards for on-demand mobility.

In the following pages you'll find a sampling of the articles we've published over the last 12 months. Our hope is that the ideas and use cases shared throughout our media have sparked partnerships and discussion, and provided a source of news and inspiration. We are proud to have published the writings of mayors, business innovators, non-profit leaders, and other urban practitioners working toward more comprehensive and human-centered urban solutions.

Sincerely,



Hannah Greinetz
Managing Editor

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Eight Smart Cities Lessons From the Military

By Bob Bennett

My Silicon Valley was actually comprised of bits of Silicon – desert sand – about 40 miles south of Mosul, Iraq.

In early 2004, I was part of the Army's first Stryker Brigade, a wheeled force that featured a tactical internet with digital communications liberally deployed across vehicles and other equipment assigned to the unit. One of our soldiers was wounded in an IED attack, and radio communications with his convoy were limited because of a sandstorm. We could barely hear the convoy commander request a medical evacuation for his soldier. But we could read his text message on our tactical internet, and we were able to deploy a MEDEVAC helicopter.

That young man survived his injuries.

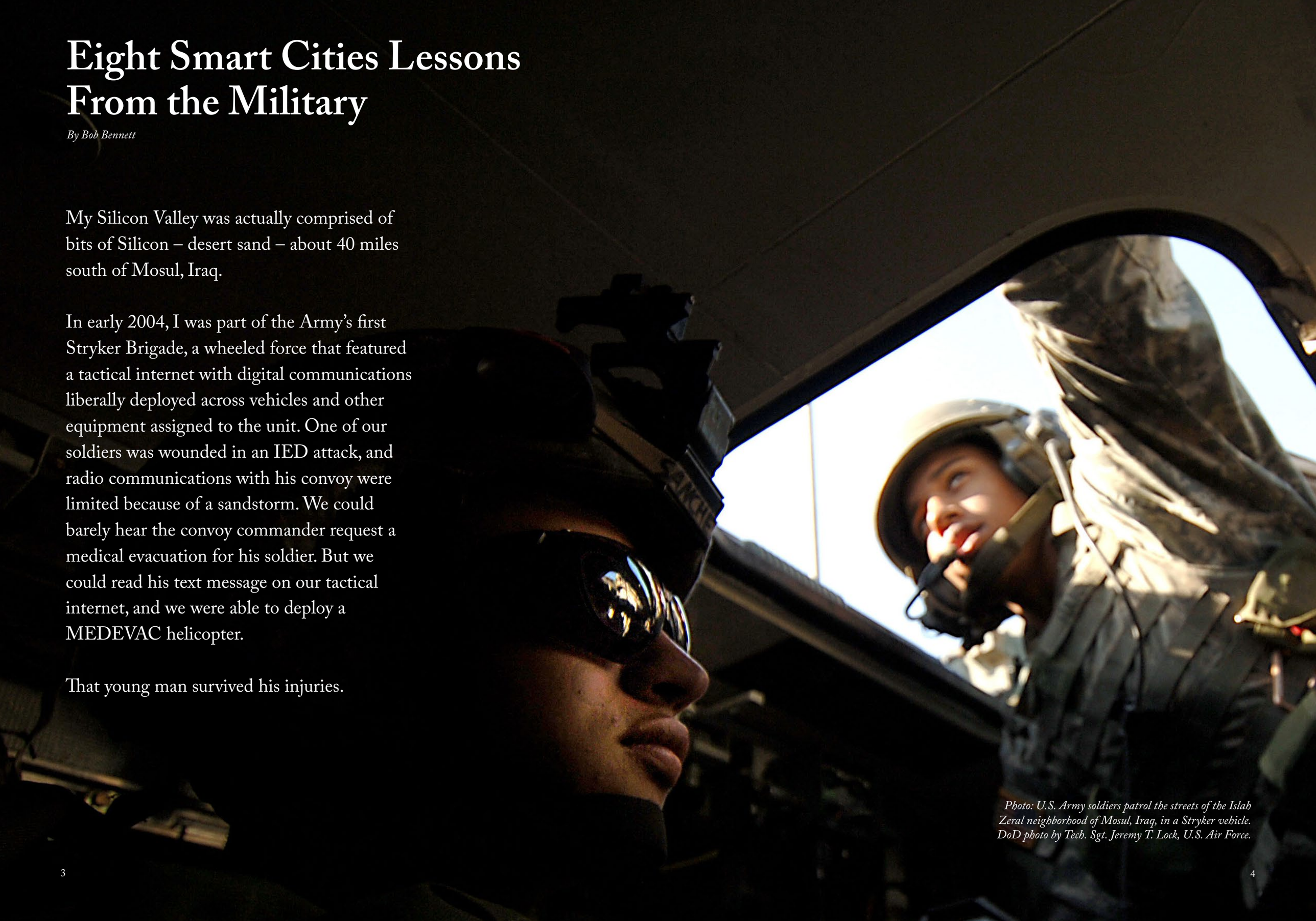

Photo: U.S. Army soldiers patrol the streets of the Islah Zeral neighborhood of Mosul, Iraq, in a Stryker vehicle. DoD photo by Tech. Sgt. Jeremy T. Lock, U.S. Air Force.

Opposite: Army soldiers provide security for Iraqi National Guard soldiers as they search a house during Operation Mutual Security II in Mosul, Iraq, on July 3, 2004. DoD photo by Sgt. Jeremiah Johnson, U.S. Army.

Long before I had the opportunity to examine the impact of sensors and data analysis in a civic sense, I had an appreciation for the potential associated with the Internet of Things.

Twelve years after my "Silicon Valley moment," I was given the amazing opportunity to lead Kansas City's smart city efforts. Through the deliberate concentration of multiple types of smart city infrastructure including WiFi access points, sensors, data analysis platforms and kiosks, we were able to assess and understand what the total effect of digitalization can be on a community. The 54 smartest blocks in North America are not special because of the technology; they are special because the technology and data provided generate secondary and tertiary insights that make an impact outside the 54 blocks.

Many of the techniques that enabled this evolution to take place were not learned in northern California. For me, smart city concepts originated in muddy holes, sandstorms and military classrooms around the world. Functional smart city use cases originated in the cabs of Public Works trucks and at water treatment plants and were articulated by City employees with decades of civil service experience, not a coding background. Truly smart evolutions grow out of solving real problems for real people based on real experiences. In this quick assessment, I will try to illustrate how ten military experiences transitioned to this "techie" environment.

Lesson 1: Do Your Mission Analysis

In the Army, young leaders are taught a planning process that begins with focused research in the real world. Effective leaders identify the most relevant facts bearing on the problem and become an expert in those areas. This was true in 2008, when our planning team was tasked to identify weak points in the al Qaeda structure so that we could write an interagency strategy to destroy that organization. It was also true in 2016, when the City of Kansas City developed a comprehensive Smart Transportation plan in response to the Department of Transportation Smart City Challenge. In both cases, leaders have to understand causality, or at least strong correlations, between the problem one is facing and the options available to solve or mitigate it.

Lesson 2: Embrace Risk

Among the things that we were taught as very young artillerymen by a battalion commander we referred to as "Coach," was to choose objectives that appeared out of reach to most of our peers. Where other battalions focused on winning a particular battle at the National Training Center, our coach challenged us to write a plan that ended the "war" in which we were engaged. Decades later, we chose to focus on "transformational projects that redefine the civil / military relationship in Africa." In Kansas City, Mayor Sly James challenged our office to create a smart city strategy that includes all Kansas City residents and the region. When a leader defines a large goal, the existent tools or means to achieve the goal are simply inadequate. This forces the leader to embrace the risks associated with doing things differently while designing a system that mitigates the risk to the maximum extent.

Lesson 3: Train to Standard

It's not enough to attend a single conference, read a technical specification requirement or write some cool code and then consider yourself or your team competent to take your technology to market. Young platoon leaders conduct hundreds of howitzer section occupation drills before boarding aircraft and ships to deploy overseas; that repetition enables the Soldiers to perform when conditions are at their most challenging. Network architects have to deploy and test WiFi access points in the elements and in a public environment with "customers" – employees who test the network – putting every strain on the system from virus infused email downloads to questionable internet searches to deliberate hacking attempts before a network can be considered "street worthy." Those leaders who fail to test themselves in a training or learning environment will inevitably fail when the consequences of that failure are much more significant.

Lesson 4: Execute Now

In 2004, one of our operations officers accompanied an artillery battery on a raid of a suspected insurgent's property. His unit secured the objective and learned from one of our teammates that there was a larger cache of ammunition nearby in a location our team had not initially identified. Instead of waiting for perfect data, our teams evaluated the risk and tied it to the day's objective: decreasing insurgent access to weapons and explosive material. In the tech world, we applied the same methodology in November 2017. Avis had a connected fleet and were looking for a test bed where the company could collaborate with a community. Since Avis' goal of operationalizing a connected fleet pilot meshed with the city's goal of implementing smart city technologies, we seriously considered it. Both organizations had data that could improve operations for both groups using existent data management policies. Based on the shared goals and existent compatibility, we formed a partnership and created the first fleet-size test of connected vehicles in the United States.

Bob Bennett, pictured above in Iraq in 2004, is the Chief Innovation Officer for the City of Kansas City, Missouri.

Lesson 5: Maintain Situational Awareness

Once hard working people who are naturally inclined to focus on difficult tasks begin work, they are frequently found in a head down, fingers on keyboards position typing or researching. Lunch hours pass, fire drill alarms sound and the end-of-the-day whistle blows without them leaving that position. Leaders can best support these individuals by helping them see what is happening around them so they can adjust the project on which they are working to meet current needs. In the tech world, things move fast. Software engineers need to be able to account for growth in the network by building spare space on an edge processor so that today's vehicle counting sensor can easily evolve into a connected vehicle V2I interface.

Lesson 6: Make Contingency Plans

If an organization embraces risk, executes tasks with short notice and tries to achieve big things, it will fail occasionally. Military planners identify the most likely points at which an operation will fail during their planning process and task staff members to assume failure at that point and develop a contingency plan to address that failure or opportunity. The lead planner then returns her or his focus to the task at hand and continues developing the strategic path of tasks and projects to be completed for an operation to achieve the big goal. The contingency plan, once completed, is reviewed, improved and placed on the shelf. If it's needed, the organization can then adjust to the contingency and mitigate the impact of a failure or opportunity. Smart city projects work the same way. In pursuit of the DoT Smart City Challenge, we wrote a strategy that assumed that we would be awarded. When that didn't happen, we pursued three other grant opportunities. When those didn't pan out, we modified a successful city public/private partnership model and released our Comprehensive Smart City RFP in less time than it took for the city that won the DoT Challenge to publish their strategy.

Lesson 7: Think About Logistics

Every single brigade commander has a story – not necessarily a fun or entertaining story – that entails the preparation for a rotation at a training center where, as a battalion executive officer, battalion operations officer, or support operations officer, they spent hundreds of hours focused on the minutia associated with an operation their unit was beginning. Cities work the same way. An RFP process takes 12 months – when it's done quickly. Leaders looking for a quick fix or instant impact will be disappointed. Leaders who understand the processes required to make changes that are sustainable beyond a single project or opportunity are much more likely to have success in a smart city effort for a community.

Lesson 8: Coordinate

As a senior planner, I was frequently part of organizations that could drive action in some areas but only influence action in others. Sometimes, those actions that could be influenced were more important than those we could independently drive. This was most certainly true in Africa, where the military is almost never the primary federal agency involved in a project; the State Department is generally the lead.

This is also the case in Kansas City's smart city effort. The Office of Innovation has no budget and only one full time employee. The sensors deployed along Main Street are maintained by the Public Works Department, and the Director of Public Works is also funding the city's data analysis. The Water Department manages a pilot for advanced metering infrastructure. The City Manager has a dedicated assistant city manager to keep the EPA Consent Decree and Waste / Storm Water Sewer Management on track.

The key skill required for both military planners at senior levels and smart city leaders is the ability to understand the breadth of a program or project and then help subject matter experts or budgeting authorities understand how the success of the overarching project supports them. And since funds are extremely limited, smart city leaders have to embrace the tribe of smart city leaders nationwide and leverage the experience and technologies pioneered in other communities whenever you can. Because you will not be able to pilot all the things you want to do in your town. The good news is that the tribe will support you on any and every day you need it. ■

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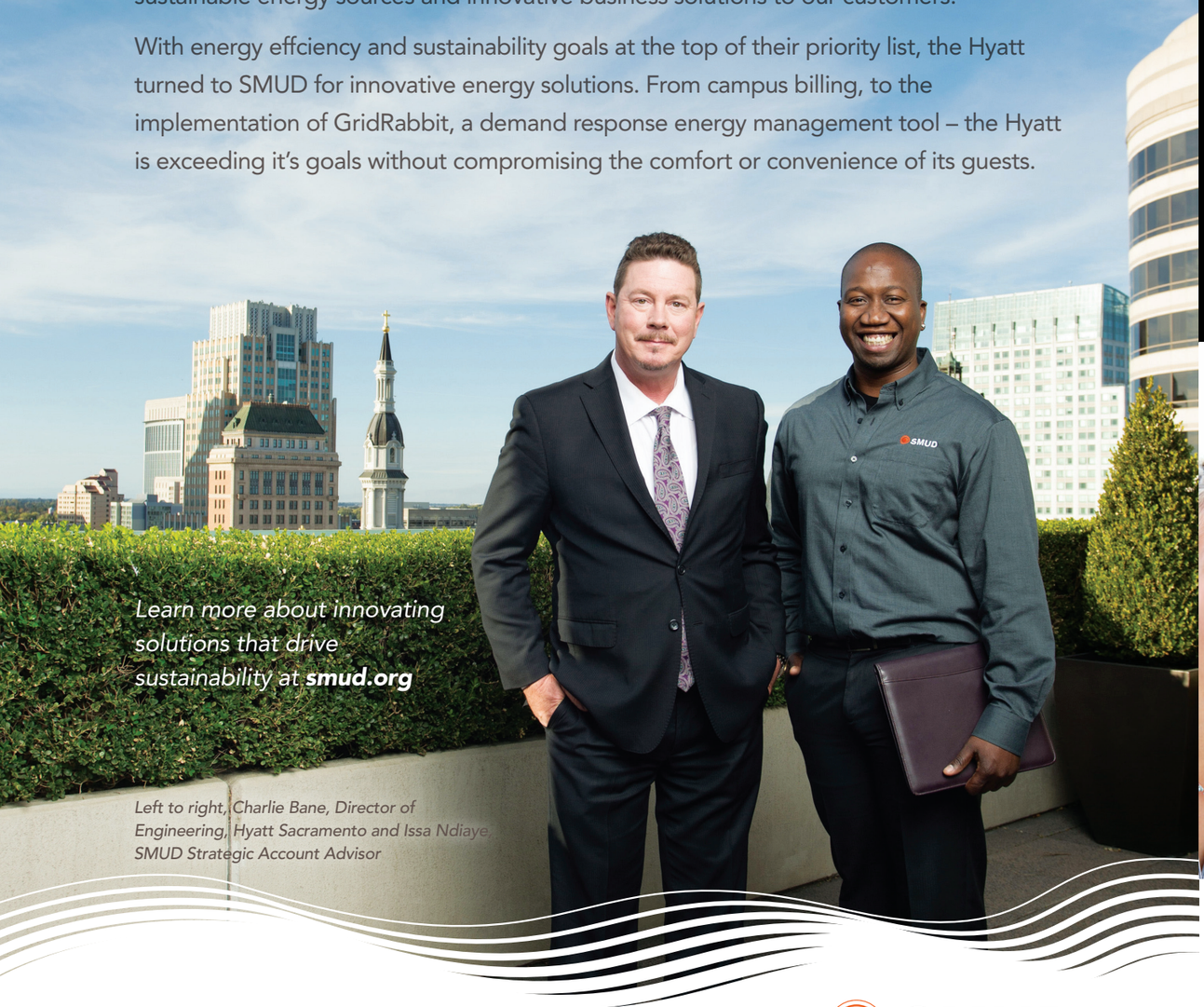

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Left to right, Charlie Bane, Director of Engineering, Hyatt Sacramento and Issa Ndiaye, SMUD Strategic Account Advisor

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Ten Objectives for Assessing Mobility as a Service

By Matt Cole

Matt Cole is a thought leader in Mobility as a Service and President of Cubic Transportation Systems.

The concept of Mobility as a Service (or MaaS) is well known in the transit industry. Generally understood as a vision of transportation that involves the integration of various forms and modes of transit, MaaS has been the subject of a heated debate for the last few years. Some industry leaders see it as a fad – a fancy name for the collection of concepts and ideas about the future of transportation that does little to further actual implementation of pragmatic solutions and technologies. Others think of MaaS as an umbrella term for the proliferation of alternative transit services such as Zipcar, Lyft or BlaBlaCar that have dominated the transportation market in recent years. Then there are those that see genuine potential in the ideas embodied by MaaS and its technologies. But with so many points of view, it is very much the case that where you stand on MaaS depends largely on where you sit.

The situation begs the question: What do we really know about MaaS? With so many points of view, how can we objectively assess the potential of the concept? Is it possible to once and for all decide on its place in the making or breaking the future of transportation? I believe it is – and it can be achieved through an exercise in conceptualization.

Maas: Ground Zero

In order to accurately assess the potential of MaaS, it's necessary to first establish a proper definition of the concept. From the perspective of the wider transportation network, MaaS that's dictated by the commercial interests of private mobility providers doesn't offer much value over the direct monetary gain of the private operator. On the other hand, MaaS that relates only to public transit and excludes other forms of transportation is too limiting. Finally, MaaS understood without considering the context in which it will ultimately operate seems impulsive and unconsidered. For those reasons, I propose a new definition of MaaS – one that looks at the transportation network in its entirety, and takes into account wider implications of the concept on the community:

Mobility as a Service is a combination of public and private transportation services within a given regional environment that provides holistic, optimal and people-centered travel options, to enable end-to-end journeys paid for by the user as a single charge, and which aims to achieve key public equity objectives.

Adjusting the Focus

With a new definition of MaaS, we can now take a closer look at its key stakeholders. For several years, MaaS has been directly associated with the private sector. After all, private companies have dominated the conversations about MaaS in many regions, oftentimes becoming the early adopters of the concept.

Yet, MaaS has a lot to offer to public transit and it's time to take a closer look at those benefits. Contrary to a common misconception, integration of third-party transit services into the wider public mobility offering doesn't hurt transit, it actually encourages wider use of public transit, maintaining and even actively increasing ridership. Alternative transit services can address first/last mile problems as well as serve routes that are typically very costly and require a high level of government subsidy (e.g. paratransit), not only increasing revenues for transit agencies but also helping to direct funding and investment back to core transit services.

For that to happen, however, the transportation industry must shift focus – encouraging public transit authorities to assume their place as the backbone of mobility. With public transit at its heart, MaaS can not only benefit individual travelers but make a lasting impact on our cities and communities, improving the standard of living, reducing congestion and pollution and connecting more people than ever to opportunities. In scenarios where public transit agencies take complete ownership of MaaS and are able to define how future mobility offerings should interact and connect with transit, everybody wins – including private operators, public transit agencies, cities, and most importantly, travelers themselves.

Pushing the Gas Pedal on MaaS

Once we accept that public transit is best suited to drive MaaS implementation it's crucial that we establish objectives that responsible, people-centered, and socially inclusive MaaS must strive to meet. I strongly believe that any MaaS effort should aim to help cities achieve the following 10 objectives:

1. Limit congestion, particularly during peak travel periods
2. Reduce car ownership, car usage and the number of vehicles on roads
3. Use existing infrastructure more effectively and create economies of scale
4. Ease pressure on the transportation network
5. Enable better traffic and capacity management
6. Improve the customer experience by presenting the transportation network as an integrated system
7. Cater to all travelers, young and old, able and less-able, the wealthy and the economically disadvantaged
8. Create a model that supports the funding of infrastructure
9. Lessen the overall environmental impact of transportation
10. Work in a driver-controlled and autonomous environment

Setting clear objectives is not only helpful in assessing and quantifying the effectiveness of MaaS initiatives, but it can also help direct investment and choice of technology and agree the appropriate level of regulation.

That's an important consideration since regulation can be rigid and oftentimes slow to adopt. Cities will need to find the right balance between allowing innovation to grow organically and ensuring consumers' and cities' best interests are kept in check. The ultimate goal of a regulated approach to MaaS should promote investment, while making sure any mobility efforts are aligned with broader social equity goals. As a general rule, regulators should play the role of responsible and encouraging guardians: stepping in and correcting the course when necessary but allowing cities to arrive at their own solutions without a negative impact on innovation.

It's time we recognize that Mobility as a Service can be a truly transformative concept when thinking about the future of transportation and how the integration – of different forms and modes of transport, customer experience, payment and back office functions, can inspire the creation of new transit models.

For that to happen, public transit must act as the driving force behind MaaS initiatives, acting as facilitator of partnerships, enabler of innovation and guardian of cities' and the public's interests. If it can do that, it will help MaaS achieve its full potential for the future of mobility. ■

Consider Anthropology in Your Next Urban Design Project

By Katrina Johnston-Zimmerman

For the first time in our history, we are a majority urban species. It's a statistic you've heard before, I'm sure, but its significance should not be so quickly overlooked.

Until recently, cities were far from the norm. Human populations have generally worked out a balance between their urban center and their complimentary rural hinterland. The denser city was a center for trade, government, and later, manufacturing, while the rural hinterland produced food and goods for the society at large. When cities declined in the last century, it was in large part because of a shift to the suburbs with the centers suffering because of it.

Amazingly, it wasn't until barely 50 years ago that we began looking at cities in a different light. Thanks to the likes of Jane Jacobs, William H. "Holly" Whyte, and Jan Gehl, cities have been transforming steadily into vibrant places to live and work, and are (clearly) the place to be. So much so, that we are urbanizing at an even more rapid rate than expected, with 66 percent of all humans predicted to live in cities by 2050. More than a hot topic, cities are the future of our habitation on this planet, as our population only grows and consolidates in these urban centers.

Despite the pioneering work of these early urbanists, cities still face, and will continue to face major challenges that will confront this assumption of a more livable urban future. With the advent of smart city technology and an autonomous future looming over the horizon, there's no better time to reassess what "livable" really is. Working to create more human-scale cities will only be successful with the continued analysis of our urban environments, much like those urban greats of the recent past. Anthropology, and other social sciences, will be paramount to ensure this future is focused on people first, especially as we move rapidly towards our "innovation age."

Urban Anthropology: UX Design and Research for Our Cities

Anthropology is a field that is often relegated to an academic exercise in human studies; archaeology, linguistics, and sociology dominate the degrees with research results occasionally making their way into the popular mindset. However, anthropology as a whole (the comprehensive study of human beings), is seeing a resurgence in many occupations. Applied anthropologists now fill positions in business, marketing, design, and importantly, urbanism.

Urban anthropology is best defined as the study of humans in their urban environments. It includes everything from studying our earliest cities, beginning roughly 10,000 years ago, to contemporary housing politics. It brings together the multidisciplinary nature of the discipline, a host of quantitative and qualitative research methods, and a systems-level of thinking within an urbanist context.

When applied to today's cities in a non-academic context, urban anthropology provides a kind of "outsider's perspective" to the dominant fields of urban planning and design. An anthropologist's brain is one that views the current age through the long arc of humanity; they see the comparison between the best and worst of the human condition, and can balance human needs with human desire accordingly. This leads to an acceptance (and appreciation) of cultural contexts, with communication and co-creation at its core.

An anthropologist also brings to the table specialized knowledge, especially in qualitative research methods. Ethnographic studies embed the researcher into the culture, subculture, or even place (public or private), in order to create a comprehensive story about that system and its actors. Additionally, they are guided by a principle of ethics, allowing for a grounded analysis that is scientifically sound. Research is traditionally difficult to integrate into the standard urban planning or architectural practice, but can provide not only an in-depth look into the human experience in a city, but also financial benefits to the larger design process.

As an example, an urban anthropologist can conduct direct observations to create a phenomenological analysis of a public space before and after it is redesigned. In other words, an anthropologist integrated into a design team is a connection to existing users, and an insight into possible future users, much in the same way that user experience (UX) design and research tests products for human capability (and joy) before a product is launched. Through iterative design, the anthropologist is the touchpoint for existing and expected uses, improving the chances of success through this comprehensive approach.

Applied Anthropological Urbanism

When designing cities, it's useful to think of them like chairs. A chair in its simplest iteration is four legs and a seat. The design provides ample support for human beings, and barring any extra design in the armrests, motion, or recline, can only ever hope to be a practical construction around human form and need with comfort layered on top.

A city is no different than a chair. What's really interesting is that, like cities, human beings existed without chairs for thousands of years. When we finally came around to settling down (as opposed to being nomadic hunter-gatherers) we built cities that fit our form as human beings. Cities were built to feel familiar, comfortable, in short: human scale. Over time, we refined the process to fulfill other desires and human comforts, largely until the industrial revolution famously introduced health risks the likes we had never seen before.

As our cities are constantly changing in use, population, and size, it stands to reason that they require a continued analysis so as to benchmark their progress. Future cities will require a critical eye to the speed and level of technological advances that we at times fantasize about, and at others introduce in advance of user testing. If you wouldn't make a chair that doesn't fit a human's backside, why would we ever do the same for cities? Like Holly Whyte before us, it is not only "nice to have," but necessary to apply anthropology to our urban environments for the success of our future cities. ■

Katrina Johnston-Zimmerman is an urban anthropologist and director of THINK.urban, a consulting firm focused on spurring urban change through the lens of anthropology. She has recently launched the Women Led Cities Initiative which aims to increase women's representation in the shaping and management of our cities.

Better Urban Living Through Parking Solutions

By Jason Schulz

Jason Schulz works in Verizon's Smart Communities organization as a Product Manager overseeing the Parking solution. Before joining Verizon, Jason spent over 20 years in transportation working for Lexus, Toyota and INRIX.

It's the end of a long week. You and your better half are due for a much-needed date night. The kids are with the sitter, the car is washed, and the mood is set. Dressed to the nines, the two of you drive downtown where you've scored reservations at the hottest restaurant. You leave plenty early to account for the time it'll take to find parking.

But apparently, not early enough. It took twice as long to find a spot, and half a mile away from the restaurant at that. You finally arrive, late, sweaty and frazzled. The hostess shakes her head as she motions to the wait-listed couple who took your table.

Does it really have to be like that?

The growing problem of scarce parking doesn't just ruin your dinner plans (though that's reason enough for a change). People cruising the streets for places to park add unnecessary traffic to the already congested roads; and combined with taxis and ride-sharing cars dropping off passengers and patrolling for fares, vehicle density in city centers is only getting worse.

With 88% of U.S. commuters using private vehicles, and millions on the roads at the same time of the day, streets don't have the capacity to efficiently handle the demand for more space. And when 30% of traffic congestion in downtown areas is cars looking for parking, solving the parking problem will go a long way toward easing overall gridlock; especially when much of this problem is a result of lack of information. Had you known there were a handful of available spots on a side street merely one block away from the restaurant, you wouldn't have spent that extra twenty minutes searching in vain.

Providing Real Time Information About Available Parking

Smarter technology can help. Currently available parking solutions can detect when vehicles are entering or leaving spaces and combine pricing data from city-owned and private spaces, then share that information with drivers looking for available spaces to make navigation and parking decisions faster while easing traffic congestion.

Parking information can be integrated into existing applications, such as MapQuest, to steer drivers toward open parking. Getting better information into the hands of drivers will help cities make the most of their highest-valued real estate: on-street parking spaces.

Benefits for Cities and Private Parking Owners

Cities and private parking owners can use parking analytics to create policies and rates, adapting them to changing conditions or shifts in demand. Parking analytics help managers better understand pricing and maximize revenue in different parts of the city. This can also be adjusted for special events or if new businesses move into a location.

Parking managers can use historical and current availability and events to help decide when to expand or contract available parking, to enforce violations, and optimize staffing and associated services.

A cloud-based solution can easily transmit that information to those who need it and can be continually upgraded and modified to adapt to changing needs.

The Future of Intelligent Parking

The World Economic Forum estimates that 48% of parking spaces will change function once autonomous vehicles (AV) are widely in use. But in order to know how a parking space will change its function it's important to know how it was being used in the first place—drop-offs, pickups, short-term parking, long term parking, etc.—data that an intelligent parking solution can accurately provide. For example, many parking operators are beginning to reimagine their spaces by becoming more of a transit hub that supplies locations for pickups and drop-offs (to accommodate AV) as well as parking.

It will take investments from cities, private parking lot operators and car makers to integrate parking and traffic information to ease congestion, optimize city resources and ease mobility. Yet the power of delivering real-time information creates significant benefits for everyone using city streets.

Fast-Forward to a Smarter City

It's taken six months to get another reservation at the hottest restaurant in town, but this time the city has helped you prepare. Your car app shows you an accurate map where you see the location of seven open spots within a block away. You arrive in style with time to spare. As you and your better half toast a drink at the bar, you serendipitously meet the celebrity chef, who treats you to his latest kitchen masterpiece.

Life is good with better parking. ■

Smart City Chicago

By John Addison

I have traveled to Chicago over 40 times for business and family. I've enjoyed concerts in Millennium Park on warm summer evenings and dressed for the Antarctic on winter nights when the wind chill was minus 70. Chicago is one of our Top 10 Walkable Cities. With 2.7 million living in the city and 10 million in the region, the city has a long history of urban innovation from being the first city with skyscrapers to having the most green roofs to now leading in smart city technology.

Cities are enthusiastic about smart city technology, but also constrained by budgets, stakeholder conflicts, and evolving technology. Chicago's best smart city initiative is the installation of 270,000 smart street lights that quickly pay for themselves by saving energy and in saving millions in maintenance.

Follow the Money

Of the 300 million streetlights in the world, few use efficient LED lighting and very few use the Internet of Things (IoT) that can leverage their value and create a path to smart cities. According to lighting provider Acuity, 12.5 million U.S. street lights are now LED. By 2026, 73 million are forecasted. Ninety-five percent of U.S. street lights use old-fashion dusk-to-dawn controls. Only one million U.S. street lights are smart-city enabled with IoT. Chicago's Smart Lighting Project with 270,000 IoT-connected LED lights is a huge step forward.

Chicago may cut its annual energy cost for street lighting by 60 percent. Millions more will be saved by not using expensive trucks and labor to patrol streets looking for burned-out bulbs. Using the internet of things (IoT), the light poles will include sensors and wireless communication and communicate when an LED light needs replacing. To improve safety, the light poles will be integrated with the city's 311 system, which provides a portal for access to city services. In the future, street lighting may also be integrated into the 911 system.

Argonne National Laboratory, headquartered in Chicago, is a partner in making some of the street lights much smarter. Fourteen-inch cylinders with multiple sensors and cameras will be attached to some poles. This will lead to data about everything from heat islands to asthma clusters. The project, named the Array of Things, has 500 installations including some street lights. In the future, the light poles could include other safety features like cameras, motion detection, recognition of people screaming for help, and gunshot detection sensors. Along with sensors and data that facilitate health and safety, comes the concern of lost privacy.

Chicago's smart lighting project is facilitating an IoT platform for broad Smart City initiatives. In the future, some light poles could be upgraded to street kiosks.

Innovation and Technology

With sensors and IoT, added data can be collected at 270,000 points in the city. The city already has 600 data sets on its open data portal for planners and app partners. Rich in data, the city has the foundation for a smart city platform. With open data, the city is not going it alone with only its own money. A wealth of open data is leading to open source projects and strategic partnerships.

Mayor Rahm Emanuel has stated that he wants to transform Chicago into "the most data-driven government in the world." That means it must catch and pass the leadership of cities such as Barcelona, Copenhagen, London and Singapore.

Microsoft is a partner in City Digital. One pilot project uses sensors to test "green" ways to curtail urban flooding, and reduce pollution flowing into the Chicago River and Lake Michigan. Another pilot uses sonar technology to produce virtual maps of the mess of cables and pipes beneath the city's streets, potentially lowering maintenance and construction costs for many vendors. With rich data, analytics and machine learning can model where to best improve traffic flow, reduce flooding, improve water quality, and respond to health risks.

Smart Mobility

Rich in local data, with apps and web services, people can find stores, restaurants, and child care. They can map safe walks, bike-friendly rides, and park paths for winter cross-country skiing.

Smart city technology can dynamically adjust parking pricing to demand, allow people to find the best available and lowest cost parking, and give apps data to guide people to the least cost parking. Reduced driving and congestion result.

Chicago Transit Authority makes bus travel faster by using transit signal priority (TSP) on priority corridors. With TSP lights turn green sooner as buses approach and stay green until the bus has cleared the intersection. In the future, more sophisticated vehicle to grid and to vehicle to vehicle (V2X) will enable autonomous cars and shuttles to move faster and safer through the city, reducing congestion. These vehicles could be routed along rodes with inductive charging and parked remotely off-peak. Smart mobility will be dimension in making Chicago a smart city.

Like most other cities, Chicago needs faster broadband networks for V2X success. Broadband may come from Wi-Max or 5G networks. Fast networks with low-latency response are needed by all cities for full smart city implementations.

Smart City Forecast

Navigant forecasts that the global market for smart city solutions and services is expected to grow from $40 billion in 2017 to $98 billion in 2026. The report includes a number of smart-city use cases:

- Smart lighting
- Connected cities
- Smart parking
- Smart traffic lights
- Weather sensors
- Digital signage
- Acoustic sensors
- Water and gas metering
- Traffic monitoring and control
- Autonomous vehicles
- EV charging
- IP security cameras
- Air quality
- Waste collection
- Energy-efficient demand response

Chicago's Smart Lighting Project with 270,000 IoT-connected LED lights is an excellent step forward in scope and in advancing smart-city data and IoT infrastructure. Chicago's smart city progress will be advanced by projects that provide a fast return on investment, improve safety and health.

With smart lighting, IoT, and 600 data sets open-sourced, Chicago and its partners have a platform to keep extending Chicago's smart city leadership. ■

John Addison is the author of two books – Save Gas, Save the Planet that details the future of transportation, and Revenue Rocket about technology partner strategy. CNET, Clean Fleet Report, and Meeting of the Minds have published over 300 of his articles. Prior to being a writer and speaker, he was in partner and sales management for technology companies such as Sun Microsystems. Follow John on Twitter @soaringcities.

Smart City Initiatives and Community Engagement in Spokane

By Mayor David Condon

David Condon has served as Mayor of Spokane, Washington since January 2013. He is the first two-term Mayor of Spokane in more than 40 years. Mayor Condon is focused on creating a City that is safe, healthy, innovative, sustainable and provides an urban experience. Smart city projects are part of that vision.

As Mayor of Spokane, Washington, I spend lots of time talking to people—delivering speeches, facilitating discussions, connecting at receptions, and yes, even chatting it up in the grocery store line.

I find people can connect easily with information about street projects, property crime, and economic development in the form of new businesses and jobs. These are things they can relate to; they are tangible to them in some way.

Smart City initiatives, like our Urbanova initiative in Spokane, however, are more challenging to explain. You can tell someone you want to use data to create places that are safer, healthier, and more sustainable, but that doesn't immediately resonate. They look at you quizzically, while they remotely close the garage door they accidentally left open or schedule a Facetime visit with the grandkids.

Usually, my strategy is to take them out of the world as they understand it today and ask them, "what if?" What if you had real-time information on your use of electricity; how could that change your behavior? What if we could harness shared data about transportation needs in a given day or at a given hour to dynamically route freight traffic and free up regular commuter routes? What if we could install sensors on our street lights that dim them when traffic drops to near zero in the wee hours of the morning to save energy—and money—without impacting traffic safety? (We're piloting that, by the way.)

Spokane's Urbanova encompasses our 770-acre University District and serves as a living laboratory for smart city solutions like our dimming street lights that ultimately could be replicated around the world. This urban district is home to more than 54,000 residents and daily commuters. The district, adjacent to our vibrant downtown and growing medical district, is ripe for development and redevelopment as well as packed with students who are more open to emerging technology. This is a great location for our smart city initiative.

Urbanova's partners include our regional gas and electric utility – Avista – as well as Itron, which is innovating the way utilities and cities manage energy and water; McKinstry, a leading built environment contractor; the University District Development Association, which also oversees our public development authority; and Washington State University, our state's land grant research university. That partnership has led to our early pilot project success; we are all committed to finding solutions that are replicable, scalable, and sustainable and which improve the economic, social and environmental equity and resiliency in our community and communities like ours.

Everywhere, smart city initiatives are exciting, but somehow as a group of leaders and collaborators, we haven't found a reliable, straight forward way to talk to regular people about it. If we're really going to be successful in these efforts, that has to change. We can't continue to communicate only with each other - the people who are immersed in the Internet of Things or advanced analytics.

Recently, we formalized our intentional steps to address this gap by announcing our partnership with global analytics firm, Gallup. Known by most people as a polling company, the firm is actually the global leader in insights about the attitudes and behaviors of citizens, customers, students and employees. Tailored for an industry audience, the headline was "Gallup and Urbanova launch groundbreaking people-centered platform to enhance global smart city initiatives."

Now, I—and probably you—know we are working on cutting-edge information gathering that is designed to provide a road map to what's most important to our citizens. The projects we could pursue are almost endless. This will help us define what we should pursue first. But, my citizens mostly know Gallup as the polling company, not as the advanced analytics company that supports data-driven decision making, and "people-centered platform" defies easy explanation. While this announcement is an important step forward, it doesn't help me talk to citizens about "smart cities" – yet.

In August, though, we celebrated an allied initiative in our living laboratory that can be seen and touched and visited when finished. Avista Development, which is related to our regional gas and electric utility, broke ground on the "Catalyst" building. It will be the first net zero energy and zero carbon building in the Intermountain Northwest and will include all the latest energy and environmental bells and whistles. The building will feature cross-laminated timber construction, solar panels, and a way to store excess energy for later use.

And it will house all kinds of smart people—students and professors from Eastern Washington University in the fields of computer science, electrical engineering, and visual communication design; employees of Katerra, a technology company optimizing every aspect of building development, design and construction; and offices for McKinstry, known for its commitment to building a thriving planet.

This building will be a physical place that we can use not just to talk about smart cities but to see some of these concepts in action. It will be located at the landing of our new iconic arch bridge for pedestrians and bicyclists that will physically connect two sides of our Urbanova living lab. Today, that area is divided by a railroad viaduct, much as the understanding of some of these concepts may feel divided depending on your perspective.

I expect all of this to help us bridge the communication divide and lead to greater understanding.

Public acceptance, of course, is critically important for smart city implementation. More and more, our expenditures on public infrastructure will need to include technology investments in fiber, sensors, and other mostly invisible equipment. Limited scope projects conducted under Urbanova will help our citizens get comfortable with what information will be collected, why it will be collected, what might be in it for the citizen and what may be shared and how.

As a well-intentioned industry sector, we have to stop talking about clouds—things that can't be touched—and start talking about (and showing) homes and work places and families and how our efforts can make things better or easier or less expensive. You know, things that actually mean something to people. We have to show them the future—and let them touch it. ■

Commuter Rail as a Core Interconnected Mobility Service

By David Scorey

Mr. David Scorey is chief executive officer for Keolis Commuter Services, the operator of the MBTA Commuter Rail and a subsidiary of Keolis Group, a global leader in mobility solutions and interconnected transit.

Whether you live in the Worcester area or the North Shore, in Walpole or Weymouth, when you think about the Massachusetts Bay Transportation Authority (MBTA) Commuter Rail, we tend to have the same thing in mind: going to work in Boston, with trains feeding into two urban "hubs" at North and South Station. Many still prefer driving, but for a growing number of people in the traffic-dense Boston area, riding the Commuter Rail certainly beats the bumper-to-bumper trek and $40 daily price tag to park.

But even with Commuter Rail providing more service than ever before, at Keolis, which began operating the network for the MBTA in 2014, we believe it will become so much more. More than an alternative to getting to work, it can become an interconnected transit option that is a core service for the residents of the greater Boston area.

On the Right Track

The catastrophic winter of 2015 dropped a record 108 inches of snow on the ground and revealed infrastructure, investment, and maintenance vulnerabilities in Boston's rail systems. The network's history of under-investment and neglect was exposed. This served as a critical junction for an injection of capital by newly-elected Governor Charlie Baker and the MBTA. Today this work continues, however we have seen progress in key measurable areas.

A decade ago, ridership was in decline at a time when it was increasing in other regions of the country, whereas today the Commuter Rail is expanding into new communities and performance is trending up. Service levels and revenues are at an all-time high, and approximately 9 out of 10 trains arrive within five minutes of their scheduled time. This was made possible by close collaboration between Keolis and the MBTA to jointly identify areas in need of investment and execute against these significant capital programs, all while continuing to deliver service.

Since the winter of 2015, 10 track miles of rail and 200,000 rail ties in critical areas of the network have been replaced, making service more reliable and resilient in varying weather. For instance, these investments have significantly reduced the impact of heat-related speed restrictions during the summer, which delay our passengers. From 2015 to 2017, the network has seen a 97 percent decrease in these heat-related speed restrictions. Further, trains tended to bottleneck in locations with single track. In many of these areas, we have added double track to allow for more efficient train movements and better on-time performance.

The MBTA invested tens of millions of dollars of capital to refurbish nearly half of the locomotive fleet and help to grow coach availability. Combined with organizational improvements, such as a shift from a five-day maintenance work week to a seven-day operation, fleet availability for locomotives and coaches is higher than it has ever been. This helps improve performance. On-time performance for 2016, 2017 and year to date 2018 is at 89 percent, 2 points ahead of the 10-year average. These investments also allows for expanded train service. Keolis operated 10,000 more trains in 2017 compared to when we took over operations in 2014.

To match our growth in service, we're investing into the workforce. Jointly with the MBTA, we have added new assistant conductors, helping to further improve service to our passengers. In early 2015, Commuter Rail had approximately 368 conductors and assistant conductors. Today, we have approximately 407. By working collaboratively and toward a mutual goal of investing into the network for our passengers, we're best able to improve service.

While many transit agencies struggle in the age of ride-sharing services such as Uber and Lyft, the MBTA Commuter Rail offers a bright spot and the potential for continued revenue growth for Massachusetts taxpayers. But we need to re-double our efforts to encourage residents to think about Commuter Rail as an increasingly reliable, convenient and affordable option to get around the region.

Changing the Mindset

Officials at the MBTA and the Massachusetts Department of Transportation have already taken major positive steps toward changing this mindset. The agency is actively considering, testing, and expanding successful new ideas. Dedicated bus lanes, increased bike share opportunities, major investments into the nation's oldest subway system and other mobility advancements are regularly on board agendas for discussion and in the news encouraging ridership.

Keolis and Commuter Rail are certainly not excluded in this process, especially considering the role we expect it to play in a future with increasing home prices and opportunities to work remotely. This includes significant investments into what Governor Charlie Baker refers to as the core of the system, such as rail, rail ties, switches and other critical infrastructure. These investments are important. But another component of his Administration's vision is changing the mindset about how we think about travel, specifically Commuter Rail.

As a step in the right direction, the MBTA and Keolis expanded their partnership in July 2017 to include the first-ever revenue sharing agreement between a transit agency and a private operator in the United States. A concept borrowed from successful Keolis transit systems in Europe, we have seen this serve as a major driver of positive mobility advancement. It helped turn many European cities, such Bordeaux, France, from yesterday's transit to today's era of interconnected transit.

There are many benefits to this new partnership in Boston. One of the most noticeable benefits is the creation of marketing initiatives designed to increase ridership on trains with capacity, such as weekend and off-peak travel. Never before has Commuter Rail deployed demand creation activities, never mind a dynamic program that targets potential riders for trains with available seats. While this program is still in its early stages, passengers have shown enthusiasm about several of the initiative's programs.

For instance, we're testing a pilot program this summer that reduces weekend fares to $10 for unlimited travel on a weekend with children 11 and under free. In Quebec, Keolis rolled out similar marketing initiatives together with dynamic pricing like this, which led to 31 percent ridership growth over three years. The Orleans Express busses, managed by Keolis, are helping to keep people moving, off the roads and connected to the places they want to go, and throughout Boston we're seeing similar excitement with this weekend fare pilot.

Our expanded partnership is also improving and transforming the rider experience itself, which helps to encourage people to think differently about Commuter Rail as the service moves toward interconnected mobility.

At a time in our lives when we expect to conduct almost any transaction seamlessly and electronically, Commuter Rail conductors process a high number of cash transactions. The network is a prime candidate for modernization and new technologies for passengers. This year, Keolis deployed a new handheld ticketing device that accepts for the first time onboard payment with a credit card, a feature requested by passengers.

Another critical step forward is the MBTA's Automated Fare Collection vision. Known as AFC 2.0, this will move the network toward a more digitized, tap-in tap-out system. Easier for passengers, this interconnected vision is similar to a Keolis operation in Lyon, France, that includes bike sharing, autonomous vehicles and trains connected via one system that encourages multimodal transit and helps to solve first mile-last mile challenges.

As Chris Osgood, Mayor Marty Walsh's chief of streets, recently commented to The Boston Globe about the mayor's "key to the city" vision, "There are very few people who are just Hubway [now Blue Bikes], or who are just train riders." He's right, and we're proud to help the MBTA advance this vision that encourages more door-to-door mobility and customizable transit solutions.

Another visible enhancement for passengers is our updated Keolis Commuter Rail App, which, similar to AFC 2.0, helps advance toward an interconnected system. It includes real-time train updates and information on typical seat availability to help riders make choices that fit their schedules and – in some cases – alleviate crowding by understanding train-specific ridership levels.

When we think about Commuter Rail differently, we think about living differently. Places such as Manchester-by-the-Sea, Framingham and the vibrant city of Providence come to life in new ways. Whether we shift our transit mindset because of increasing housing prices or a new job in the growing cities around Boston, we will also help to reduce traffic congestion and greenhouse gas emissions, both pillars of Keolis' corporate values. We hope as access increases and the experience continues to improve more people will consider swapping a day or two of their weekday driving for trains.

MBTA 1027 motors out of Yawkey station and approaches the St. Mary's Street bridge with train 529 in tow. Photo by Ian Martin.

A Vision for What's Possible

Several years ago, we faced similar challenges in Bordeaux, France. Home to 760,000 people, Bordeaux's transit agency advanced the relationship between a private operator and a public transit authority by delegating the design and operation of the region's transportation network to Keolis.

The relationship began when Bordeaux was looking for a more innovative and effective approach to its bus services. Keolis won this bid with a proposal to significantly modify the bus routes across 90 percent of the network, a necessity to improve service and access. In 2009, Keolis began this reconfiguration and following its success Bordeaux in 2014 awarded Keolis additional services, including the tram and key metrics to forecast and grow income.

This is a progressive relationship focused on outputs with goals established by the authority and implemented through the brain power of the best and brightest in specific fields – fleet management, IT, marketing and passenger experience. This allows for both accountability and an entrepreneurial approach by the private operator to improve and increase service, while transforming toward interconnecting mobility.

The Bordeaux results: fare box revenue doubled from 2009 to 2017, light rail on-time performance increased to 95 percent, ridership grew by 60 percent and ticketless travel was significantly reduced. The approach transformed Bordeaux into a more livable city. Car usage declined from 62 percent to 49 percent and parking spaces were replaced by parks and multi-modal transport hubs. Four lane streets gave way to pedestrian zones and bike paths, and historic buildings blackened by car emissions retained a healthier shine.

Even while MBTA commuter rail revenue has grown 25 percent over the last three years, there is more work to do to improve service and modernize the experience, and as a result attract more passengers.

It's worth emphasizing that the Bordeaux example is not a suggestion for the way Boston can or should be modeled, but there may be elements from Bordeaux and other Keolis operations that can inspire and help to further improve the MBTA Commuter Rail for current passengers, future passengers and our 2,400 employees who live here in Boston. ■

Ten Ways Portland is Addressing Housing Issues

By Mayor Ted Wheeler

Ted Wheeler is the Mayor of Portland, Oregon. He previously served as Multnomah County Commissioner and Oregon State Treasurer.

Like many cities, Portland, Oregon has had a massive influx of new residents in the last decade. More than 100 people move to Portland every day—and more than 100,000 more are projected to move here over the next 20 years.

This growth is undoubtedly exciting: Portland is often listed as one of the most desirable places in America to live. Situated in a park-like setting, thanks to the green trees, parks, and the various rose gardens Portland is known for, visitors and new residents alike enjoy our creativity evidenced through our celebrations, our maker culture, and our pioneering spirit. This has created an economic draw for many of our visitors and new residents. *The Seattle Times* recently called Portland's economy "transformational." Forbes called Portland the best place in America for careers and business.

I'm taking on these challenges. So are mayors across the country. It is our responsibility to grow smart, which we are doing by protecting renters, preserving existing units, and producing new units.

Here are 10 ways Portland is tackling housing—along a spectrum from homelessness to homeownership, and creating affordable solutions along that spectrum. We have focused our efforts on leveraging funding sources, and maximizing strategic investment opportunities:

1. We are implementing a fee on short-term rental units, including Airbnb, to create additional homeownership opportunities. Because short-term rental companies have a significant impact on the availability of rental units, we are modestly increasing the fee to create a dedicated fund for homeownership opportunities in our gentrifying neighborhoods in our community.

2. We are leveraging Portland dollars to create 1300 units in five to seven years with a Housing Bond. We are delivering well ahead of schedule on this promise—announcing four projects totaling more than 560 units of permanently affordable housing planned or purchased to date under the Bond only 18 months in. We are also pushing for a constitutional amendment statewide to allow us to leverage our dollars by combining them with private resources to create more housing units.

3. We are implementing Tax Increment Funding in urban renewal areas. We have over 600 units (and hundreds more on the way) in the construction or permitting process in our urban renewal districts.

4. We utilize public and private sector partnerships to increase housing opportunities. Portland continues to work with longtime partner Kaiser Permanente, who recently joined Mayors and CEOs for U.S. Housing Investment. Kaiser committed a record $200M into a new community investment fund to preserve and expand affordable housing.

5. We utilize methods of creating permanent affordability. We continue to partner with our local land trust housing provider, Proud Ground, and our local Habitat for Humanity affiliate to create permanently affordable homeownership opportunities for Portland area residents.

6. We work with local and state agencies to create funding availability for permanent supportive housing units. This funding opportunity marks the first-time funding to build affordable housing has been bundled with funding for the services residents will need to thrive in that housing. By packaging construction capital and support services funding together for the first time, the City and its partners hope to achieve a minimum of 50 permanent supportive housing units.

7. We are using a Smart Cities PDX Priorities Framework to ensure our growth is equitable. As the City evaluates new technologies, uses of information, and related partnerships, we must ensure they promote equity, address inequities and disparities in our city, and provide tangible benefits to the people of Portland. We intend to expand this framework into how we approach housing—promoting equity and addressing inequities and disparities in our city.

8. We are increasing renter protections with an expungement program. The pilot program reduces barriers for those with a criminal record trying to rent homes and increases access to housing opportunities. Those with violations, misdemeanors or low-level felonies are eligible for expungement.

9. We leverage market rate developments to include affordable housing. The Multiple-Unit Limited Tax Exemption program incentivizes those with market rate developments in the pipeline to include affordable housing units in their projects, so we can more quickly put more affordable housing units on the ground.

10. We utilize Inclusionary Zoning. We require any new development of 20 units or more to have affordable housing units included in the development.

We have focused our efforts on leveraging funding sources, and maximizing strategic investment opportunities because I want to ensure that Portland remains a city that is accessible and affordable for everyone. I don't want millionaires to be the only people who can afford to live downtown. I don't want service industry workers to have a two-hour commute. I want a city where we actively create housing options at every income level and for people of all ages.

Portland City Council has consistently voted in favor of more housing despite otherwise important and competing values—and I want to be clear that our efforts have paid off.

Annual production and permitting levels are higher than at any point in the last 15 years. In 2017, there were 14,000 units in the production pipeline, including permits. More than 600 affordable housing units came online in 2017—more than double the number of units in the prior year.

And this year will be another record year. There are currently more than 700 newly affordable units under construction and slated to open in 2018. This will be the largest number of affordable units ever produced by the City of Portland in a single year in modern history.

As Mayor, I will continue to prioritize policies to protect renters, preserve existing units, and produce new units. ■

Off-Hours Consumer Delivery Systems

May Unlock Sustainability at Scale

By Kate O'Brien

Kate O'Brien writes the Global Mobility Research blog series for Meeting of the Minds. A collaborative consultant focused on coaching, capacity building, and facilitation, Kate supports change agents and their transformative work in communities across the United States.

In this inteview, Meeting of the Minds' Kate O'Brien connected by phone with José Holguín-Veras, who is the William J. Hart Professor of Civil and Environmental Engineering; Director of the Center for Infrastructure, Transportation, and the Environment; and Director of the Volvo Research and Educational Foundation (VREF) Center of Excellence on Sustainable Urban Freight Systems at the Rensselaer Polytechnic Institute in New York. In addition to his research focus on efficiencies in assuring access to transportation systems in post-disaster recovery scenarios, Holguín-Veras has led ground-breaking research on the implementation and potential impacts associated with off-hours delivery transportation systems.

José Holguín-Veras, William H. Hart Professor of Civil and Environmental Engineering and Director of the Center for Infrastructure, Transportation, and the Environment at Rensselaer Polytechnic Institute.

Kate O'Brien: I gather that your research has yielded some really promising data that points to game-changing strategies for increasing sustainability at scale. Specifically, you focus on transport systems that facilitate business-to-business (B2B) delivery and, heightening in recent years with internet purchasing, business-to-consumer (B2C) delivery. Please give me some context for your work and why it's important.

José Holguín-Veras: In my work, I try to help other people see that complex problems—like congestion and air pollution resulting from combustion engines—do not have simple solutions. Technology is no magic silver bullet. Artificial intelligence, big data, drone deliveries…there's this prevailing belief that these technological innovations will solve all our problems. But we humans have been developing technology since the dawn of humanity, and rarely has technology been able to provide a complete solution to humanity's problems. Technology is and has always been only one part of what needs to be a multi-faceted response to our complex challenges.

Let me give you an example. During the Industrial Revolution, we developed more efficient combustion engines. One might think that would have driven down the consumption of coal. But, in fact, consumption of coal during the Industrial Revolution actually increased. As demand for the new technology rose, the price of new engines came down, and a number of new inventions, innovations, and uses drove even more demand for the combustion engine.

Here's a more recent example. Between 1970 and 2014, the efficiency of diesel engines increased by about 1% each year. But at the same time, demand for and use of diesel engines increased by 3-5% each year. During that window of time, globalization and just in time (JIT) supply chain systems drove demand for transportation systems that relied more heavily on trucking and diesel engines.

In each of these examples, it is clear that new technology produced benefits. But we never paused to ask and answer a key question: how do we reduce consumption of non-renewable resources? My research has been informed by this very question. We need to think of the answer to this question as a suite of holistic approaches that will help us achieve more sustainability. Most profound in this suite of solutions, I feel, includes behavior change. Let me tell you more about how my work informs this assertion.

In my research, I've been collecting and analyzing data from delivery transportation systems. We see that while rates of commercial delivery have remained steady, the rates of internet purchasing have increased dramatically. In fact, internet purchasing has tripled in the past eight years, and all freight activity—household and commercial—has doubled in that same time.

KO: So, what do you suggest we do to mitigate that increase?

JHV: My research has shown that without changes in behavior—of the expectations, assumptions, and consumption patterns among consumers—we won't be able to reduce the environmental impact of those systems. We need to educate ourselves as individuals in a society, as taxpayers, about the consequences of convenience, the trade-offs, the negative impacts not fully accounted for. There are tough decisions we've long needed to make. We need to start cultivating a willingness to change. We need enlightened policy to push that along, otherwise we'll just keep increasing our consumption of non-renewable resources in this new age.

KO: Seems pretty daunting. What kinds of behavior changes are we talking about? Where do you see us gaining some traction?

JHV: Changing behaviors is easier once we change our values. I'll give you a key example from my own work. We've been studying the benefits and efficiencies that happen when communities incentivize manufacturers to stagger employee start and end times, or freight companies to shift delivery schedules to off-hours. The data shows us that nudging stakeholders across delivery transportation systems to question their assumptions and expectations about how we all operate and why, can be a powerful enabler of behavior change. You asked me what kind of behavior change I'm contemplating here. I'll answer by asking you a question:

Think about all the internet purchases you've made in the past year. Of those purchases, how many of them were ones you truly needed delivered urgently? Most of us would probably admit that few of our online purchases are things we need delivered right away. But in the relatively short time internet shopping has been around, a couple things have happened quite rapidly. For one thing, rather than planning ahead, online purchasing and the prospect of free, overnight delivery has helped us grow accustomed to speed, whether we truly need something quickly or not. At the same time, shipping companies and suppliers are marketing speed of delivery as a comparative and competitive advantage. We have come to value speed of delivery more than living in cities that are congestion-free or breathing clean air.

There are many problems with speed of delivery, but just to expound on one: shipping speed is counterproductive to freight consolidation. By this I mean consolidating shipments—a "one large truck trip to deliver 20 packages centrally versus 20 passenger vehicles making each of those 20 singular deliveries" consideration. Freight consolidation is a very straightforward way to reduce operating costs while also providing a host of externalities associated with reduced congestion and emissions. There are dozens of examples like this I could offer.

KO: So, policy aimed at consolidating freight, and at staggering delivery times, could be pretty impactful then.

JHV: Yes. Now, I'm not suggesting that a sweeping policy change like this is a magic silver bullet. It's not. But my research shows that enlightened and strategic policy change can encourage more nuanced use of technology, thereby bringing more sustainability to our marketplace and our delivery systems. What we're talking about here is re-framing the objective of transport efficiency. Policymakers need to leverage where there are already interests in the marketplace; for instance, efficiency in delivery transportation is in the best financial interest of shipping companies. But get this—what the data also shows is that improved efficiency of delivery transport is also value-add for workers. Delivery drivers are happier making off-hours delivery runs because they are less vexing. Off-hours delivery drivers are not contending with the stress of double parking, or idling while waiting for curb space to load and unload, or sitting in traffic jams. This is a no-brainer. It's an opportunity for a win-win-win, if you also count improvements to air quality and less traffic congestion.

KO: Wow, I never really thought about the benefits to employees and their work places.

JHV: Exactly! And the dimensions and magnitude of positive impacts associated with off-hours delivery efficiency is jaw-dropping. We've been studying GPS data from delivery vehicles in several places—New York City, Sao Paulo, Stockholm, Bogotá, and others. In Bogotá alone, shifting delivery start times from traditional business hours to a 6pm to 10pm window resulted in a 13% drop in emissions. In Sao Paulo, when deliveries were shifted from daytime to the overnight realm of 7pm – 6am, there was a 49-55% reduction in GHG emissions. The potential impacts are staggering!

KO: Can you walk me through the factors that enable that emissions decrease? What's actually happening when delivery times are shifted to off-hours?

JHV: Sure. It all hinges on increased efficiency. First, because nighttime traffic patterns are smoother, we see a reduction in rates of acceleration and deceleration. Less congestion means greater fuel efficiency, so fewer emissions. Second, delivery vehicles are able to travel faster at night than during daytime peak hours. Faster speeds are more efficient, so fewer emissions. Third, in congested conditions, we travel longer distances, use alternate routes that are far from optimal. Shorter trips mean less fuel consumed and fewer emissions.

KO: Amazing that seemingly subtle shifts in delivery hours can produce such dramatic results. Where do you see a role for policy in encouraging more widespread implementation of these kinds of practices?

JHV: There are several parts of the web where change needs to happen, and enlightened policy has the potential to facilitate change across that web. Shifting delivery times seems straightforward and simple, but moving an entire community and its supply chains to greater sustainability requires multiple interventions happening in parallel—with consumer behavior, with infrastructure, and with use of technology.

With respect to behaviors, our ultimate challenge is convincing each receiver in the delivery transportation system—whether household consumer or commercial proprietor—to honestly understand and account for the environmental impacts of their operations and their consumer decisions, while at the same time questioning their assumptions.

If I'm an avid online shoe shopper, I'm questioning my perception of need for overnight shipping. Let's play that out. Do I value my shoes arriving right away more than I value clean air and less traffic? If not, will the slight inconvenience of waiting a couple days for my shipment to be included in a larger truck making hundreds of package deliveries with one single, efficient trip be that detrimental to me? Is diminished air quality and more traffic congestion a price worth paying so my shoes are on my doorstep the morning after I click "buy"? Is it fair to force my neighbors to bear the burden of my choices? These are inconvenient but important questions we need to be asking ourselves.

If I'm a restaurant chef who needs fresh vegetables to cook, I'm questioning my assumption about whether a produce delivery actually needs to happen in the daytime hours simply because we've always had a staff member be in person to receive our shipments. In fact, our off-hours delivery research shows that over a third of commercial vendors surveyed say they have no reason to not allow supply deliveries to be made overnight without staff supervision. Embracing this kind of behavior change, really questioning convention or a long-standing rationale, enables off-hours delivery to take hold bit by bit. "Foodie" cities have a real opportunity on their hands for encouraging reductions in congestion and emissions in this way.

If I'm EPA, and I'm truly committed to increasing efficiency and reducing emissions dramatically, I would provide incentives to communities that mandate local business embrace of off-hours delivery hours—which has the potential to bring about a 55% increase in system-wide efficiency—rather than providing incentives to trucking companies that purchase replacement engines, which only increases efficiency of the delivery transportation system by just 5%. If I'm an elected official who wants to encourage climate action locally in the absence of federal mandates, I can foster programming that inspires willingness to lead local action.

If I'm a municipal planner, I'm looking at new development and redevelopment projects through the lens of infrastructure. I'm finding ways to address customers looking for parking and delivery truck drivers looking for curb space to load and unload pallets. I'm looking at requiring the commercial real estate developer to ensure ample curb space and loading docks for deliveries during the site plan review process rather than fining delivery truck drivers for double parking or idling because there isn't sufficient infrastructure enabling their deliveries.

Behavior change is required all over our communities' systems to take fullest advantage of convenience technologies while also improving our ecological footprint. I know there is much we can do at the personal, commercial, and local government levels to affect global-scale change. ■

Meeting of the Minds

Writing Guidelines

for the Meeting of the Minds Blog

"The Six Rules"

1. Submissions must be greater than 800 words, but less than 2,000.
2. Absolutely no advertising copy or press-releases.
3. Blog posts should be exclusive to Meeting of the Minds and not previously published online.
4. Blog posts should be written in a non-academic, conversational tone.
5. Include, whenever possible, bullet-point lists, short paragraphs, and the judicious use of bold and italics.
6. Images, videos and hyperlinks are encouraged.

Send your submission to Hannah Greinetz, Managing Editor, at hannah@meetingoftheminds.org. Please also include a short, one (1) sentence biography with your blog post. Your bio will be published with your blog post.

Why Write for the Meeting of the Minds Blog?

Our blog is a collection of articles written by busy professionals working in a fast-paced industry. We know that you have a lot on your calendar, and that committing to write for the Meeting of the Minds Blog is a big ask.

So why should you spend time on this?

Reach Influential Decision Makers

Our audience is a lot like you — working professionals interested in wonky, detailed descriptions of ideas and projects happening in the urban sustainability and smart cities industry. They are executive and senior level leaders interested in staying up-to-date with the newest innovations in the industry, and looking for the "big picture."

Third-party Validation

Our mission at Meeting of the Minds is to connect people and ideas working at the leading edge of urban sustainability, in order to catalyze positive change in cities worldwide. There is a community of people looking to us to find and spotlight the trends and innovations happening in this space, and our blog is your opportunity to present your thoughts to this community — backed by the validation of our platform.

Editorial Assistance

When you sit down to write for the Meeting of the Minds Blog, you are not alone. We have dedicated staff to help you craft your message. From basic things, like fixing typos, to larger issues of tone and substance, we are here to help.

Promotion

Your article will be emailed to the 25,000+ people on our email list. It will be deployed on all of our social media channels, and re-deployed on our social media feeds at regular intervals for the next two years. Your article will be archived on all of the major search engines, and may even rank on the first page of search queries related to your topic.