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future of cities

By Scott Corwin

Photography by Oliver Ludlow

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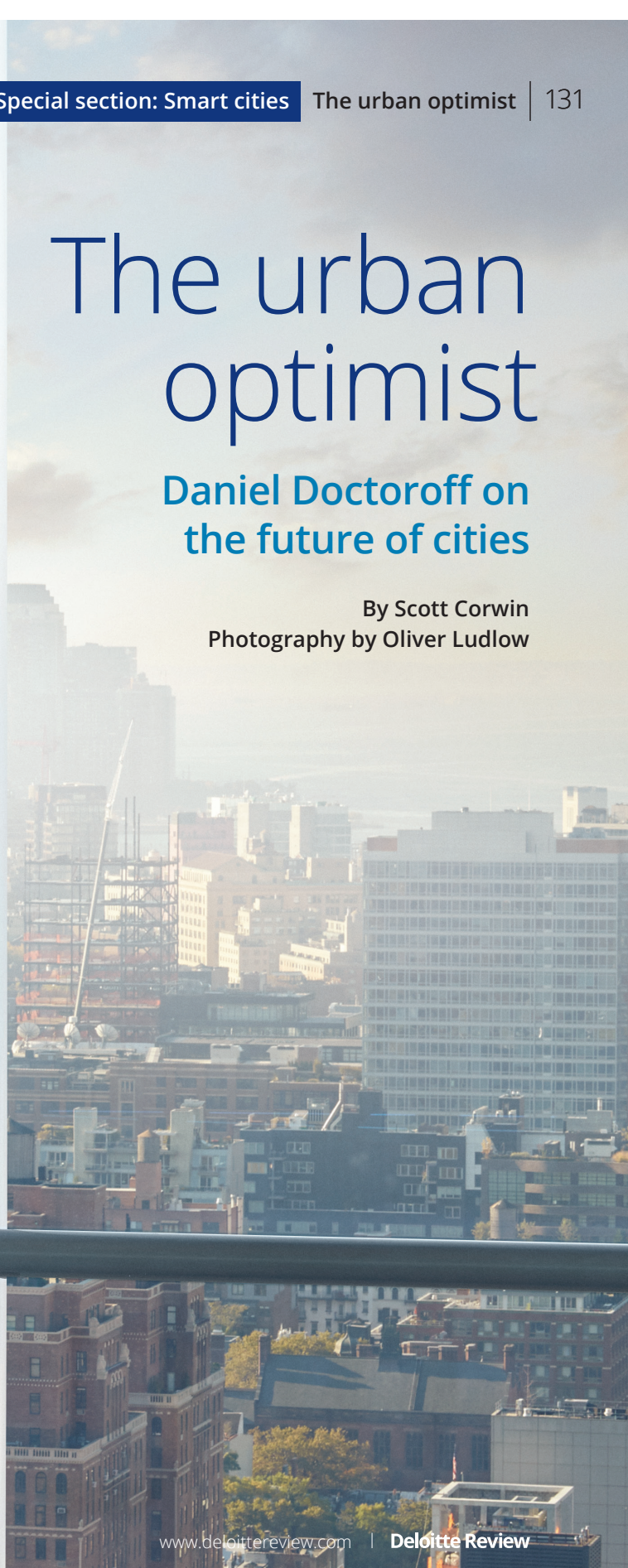
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To Daniel L. Doctoroff, chairman and CEO of Sidewalk Labs, cities are more than just aggregations of people and buildings. They're opportunities for innovations that can improve the quality of urban life for everyone—citizens, governments, and businesses alike. Sidewalk Labs, a subsidiary of Alphabet, combines technology, data, policy, and capital to develop products to address “big urban problems” around the world. It's an ambitious goal, but Dan is no stranger to tackling big-city issues: Prior to founding Sidewalk Labs, he was president and CEO of Bloomberg LP and served as deputy mayor for economic development and rebuilding for the City of New York in the Bloomberg administration.

I caught up with Dan as Sidewalk Labs was in the midst of relocating its headquarters to Hudson Yards, a longtime industrial area of New York City, which is being transformed into one of America's largest mixed-use developments. It's a place where cutting-edge construction sits atop century-old railyards. Dan conceived of the project as deputy mayor, and fittingly, our conversation covered cities' history and their future, and how technology could be poised to remake urban life.

Scott Corwin: From your perspective, where are cities today?

Daniel Doctoroff: On one hand, if you look at cities today, you see the extraordinary challenges that most face. In the most successful cities, there are massive supply and demand imbalances that are producing crises of affordability and inequality, and, at the same time, many cities are wrestling with deep financial problems. In the less successful cities, you're seeing depopulation and a massive reduction in services, which are leading to crises like what happened in Flint, Michigan. So you can look at cities today and say, for the best cities,

it's tough, and for cities that are suffering, it's worse. This is cause for real concern.

On the other hand, I believe there is a very powerful case to be made for optimism—I think that we're actually on the threshold of a rare era of technological innovation in cities that has the potential to fundamentally alter quality of life across almost every dimension.

SC: Can you put this era of technological innovation in historical context?

DD: Well, when you look back over the past 200 years and you think about the formation of the modern city, there have been three pre-

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vious periods where we’ve seen the kind of impact that we may be beginning to experience now.

The first was the invention of the steam engine, which brought people and goods to cities across long distances, enabled them to become industrialized on a scale that was not possible before. The steam engine also made modern sanitation possible. This all occurred in the early 1800s and played out over the course of a couple of generations.

Second, in the late 1880s, the electric grid was rolled out. That made it possible to light up cities 24 hours a day, and to get around more easily on streetcars and subways. It also verticalized cities with the elevator, and ultimately enabled modern communications.

The third, which really began in the early part of the 20th century, was the automobile. That forced cities to completely reconceive space. They had to accommodate a separation of roadways, provide for parking, and, obviously, the automobile made it easier to flee cities, which, in many cases, hollowed out the urban core.

In each case, there were positives and negatives, but each invention fundamentally altered

city life. If you look at the city in 1880, when the fastest vehicle was pulled by a horse and the best lighting was produced with kerosene, and compare it with 1940, by which time the automobile was fully integrated into urban life, the two would be almost unrecognizable.

Now the interesting thing is that if you compare 1940 with today, it’s clear that we really haven’t had a revolution in cities since. The way we move around, where we get our energy and water, even the way we live in apartments (other than TV and the Internet)—none of it has fundamentally changed. So the question is, what happens now? I think we’re on the verge of a fourth technological revolution, which will be the result of a combination of digital networked technologies.

SC: What are these technologies, and have they already started coalescing to produce change?

DD: The first is *ubiquitous connectivity*, which we are rapidly approaching. The second is *sensing*—and by sensing, I mean things like location services, specialty sensors, cameras—which gives us the capacity to measure what’s going on in real time. The third is *social networks*. The reason social networks are impor-

tant is that they increase our capacity to trust wider and wider circles of people, places, and things, not just because we can get information about them, but also because people are rating them. The next one is *computing power*, which helps the average person understand the implications of data and gives them the ability to understand it in new ways through artificial intelligence and machine learning. And the fifth is *a set of technologies*, like 3D printing and robotics, which will enable us to rethink the design and fabrication of buildings and spaces. So we believe that the combination of those five technologies will make the city of today unrecognizable when we look back from the vantage point of 2050 or 2060.

You begin to see the combinational power of four of these technologies in Uber. Think about what makes Uber possible. Ubiquitous connectivity allows everyone to connect to vehicles through the Uber app on her smartphone. Through sensing, the driver knows where you are, and you know where the driver is, which creates a sense of confidence in the service. Social networks also give you the confidence to get into a car with a driver you don't know, because you see the driver's rating. And it's the same for the driver. If you have a bad rating, you are less likely to get picked up, so you have an incentive to actually behave better. The last is computing power: Uber is continually learning about passengers to improve the customer experience. It is the combination of these technologies that has fundamentally disrupted a

monopoly that we thought to be impregnable as recently as five years ago.

But I would argue that what Uber has *not* done is fundamentally produce meaningful growth. Uber, for the most part, is a substitution play. The real opportunity will come when these technologies get integrated into the physical environment. That's when we will begin to see real growth in productivity and meaningful change in quality of life.

However, full integration is hard. It took 30 to 50 years for each of the three previous technology revolutions to be integrated into the urban environment. Those were also simpler eras where regulation was not nearly as complex as it is today.

SC: So you're arguing that once you integrate this set of foundational technologies, you would be able to provide the same quality of life at a lower overall system cost—freeing up capital dollars for reinvestment and, in turn, leading to greater productivity and quality of life. Is that right?

DD: Yes, I believe the integration of these core technologies will have five core impacts on urban environments.

The first is *greater efficiency from sharing assets*: space, infrastructure, but also less tangible ones such as knowledge and time. The second is a *more personalized world*: Our environment will learn about us, and we will learn about it in many different ways. The third



is a *greater sense of community*: As we pool and share community resources, the feeling of belonging to a community grows stronger. The fourth is *using real-time monitoring* to get a better sense of what's happening and to hold people accountable, so that we can potentially understand the real cost of externalities. Last, *more adaptability*: Cities can become more flexible and adapt to the needs of their residents.

Let me give you an example of adaptability in zoning laws. Why do we have zoning laws? Because there are uses of buildings that are incompatible with other uses of buildings. We don't typically put factories next to schools,

and, for the most part, we don't put residences next to commercial buildings. There is little transparency about what is going on inside these buildings, so we classify them crudely. We do the same thing with building codes: We over-engineer buildings because we can't actually monitor them over time.

Now imagine the digital networked age where technologies such as sensors and social networks help us better understand what's going on. Cities can say, "You can do whatever you want in that building as long as your decibel level doesn't go above X, and we'll be monitoring it." The ability to change uses and space quickly becomes possible, enabling the emer-



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gence of a whole set of new industries around flexible buildings that can be monitored, lowering cost and creating economic growth.

The biggest change in the digital networked age is likely to be centered on mobility. Deloitte has done some of the best research on the economics of shared autonomous vehicles (AV).¹ An average vehicle is used 3 percent or 4 percent of the time, and it is the second-highest expense for an average American family making \$55,000 a year. Now imagine a place that has only autonomous vehicles. At Sidewalk Labs, we’ve actually modeled an all-autonomous environment, and we expect that an average family would spend about half as much money on transportation as it does today. And putting \$5,000 back into the pocket of a family could be the difference between struggling to get by and being able to afford things that seem out of reach today.

However, it isn’t just about money. AV-only environments will be safer, meaning the time-starved parent can feel confident allowing her child to get home from school safely, potentially saving precious time. We will also be able to save on space. Parking and separated roadways take up 30 percent of a city’s available land, but we think we can dramatically reduce that, creating more open space and, ultimately, improving health outcomes.

In just these two examples, it is pretty clear how profoundly we can change urban life.

SC: How do you see all of these foundational technologies and impacts converging over time? What is the catalyst for change for this new era? It obviously won't be the same in every single city.

DD: I think we are going to see—and this is the approach that we are taking at Sidewalk Labs—that initially you don't need an idea to be successful in every city. Instead, you need to make something a success in one city. Once it is proven to be successful there, other cities are far more likely to adopt the idea.

I saw this happen with the High Line when I was deputy mayor of New York. We opened the High Line in early 2009, and, within a year, there were 36 high lines under development around the world.² Bike-sharing started in Paris in 2007, and today I believe it's in more than 800 cities worldwide. You don't need to get something adopted everywhere; a good idea will follow its own path to adoption. What's important is that we have cities, entrepreneurs, and others who are willing to try an idea.

For example, in New York we created PlaNYC, our sustainability plan that featured 127 initiatives looking to answer two questions: How can we accommodate growth of 1 million more people in New York over the next 25 to 30 years? And how can we dramatically reduce carbon emissions generated by the city at the same time? The 127 separate initiatives looked at transportation, land use, energy, water quality, air quality, water reliability, brownfields,

parks, housing—essentially every aspect of the physical environment. Out of the 127, only a handful of the ideas were original. Mostly, we simply chose what was working in other cities around the world.

The key point is that city leaders and citizens are trying very hard to improve the quality of life in their cities, and they are willing to look anywhere for good ideas. If cities experiment enough, in partnership with the private sector, you're going to see innovation flower and spread around the world.

SC: What are the hallmarks of success looking ahead 50 years from now? How will we measure progress?

DD: One of the questions Sidewalk Labs has spent a lot of time thinking about is, "How can we accelerate progress?" We conducted a detailed thought experiment in which we asked what would happen if you built a new city or district from "the Internet up." We looked at innovation around mobility, infrastructure, governance, and even social and community policy. And we explored what those innovations on an integrated basis would produce. In reality, cities are not a set of separate subsystems but an integrated set of activities where everything has an impact on everything else. You learn that when you pull one strand, they're all interrelated in some form.

Ultimately, it is important to remember that the benefits are not about technology but, rather, better quality of life. The technology is

an enabler. Increasingly, we have come to the view that there can be great value in attempting to create a place that makes possible the integration of innovation in all of these realms on an accelerated basis, perhaps in the form of a new district at scale, as a way of “pulling the future forward.”

SC: Given the thought exercise we’ve just run through, what is Sidewalk Labs doing now?

DD: In a nutshell, our mission is to embrace the power of ubiquitous connectivity to improve urban life. We plan to do that by developing a whole set of products and services that can improve the quality of life in cities, and it’s important for us to really understand what the benefits and issues are with ubiquitous connectivity. Two projects we’re involved with, LinkNYC and Flow, are our initial experiments in this space.

Believe it or not, there are still 7,000 payphones in New York City, 4,000 of them in Manhattan below 96th Street. The idea of LinkNYC is to replace all of them, in all five boroughs, with super-fast, free Wi-Fi hubs. The service, which is expensive to roll out, will be paid for through digital advertising on the large hub displays. We saw this as an interesting business proposition that would allow New York City to provide an incredible public service and reduce the city’s digital divide.

The second company, Flow, is a data and analytics platform we created to improve mobility. Congestion in every city is a massive problem

and, in general, is getting worse. Increasingly, we see that the poorest people in our communities are getting pushed further out and having less access to opportunity because of their lack of mobility. Flow will ingest all sorts of data (from Google Maps, cameras, sensors, and the city’s own data) to give us as complete a picture of real-time traffic conditions on the streets as possible, on which we can build applications that we hope will meaningfully increase mobility. Our objective is always to improve quality of life—in this case, by helping people get where they want to go less expensively and in less time.

At Sidewalk Labs, we have taken great pains to build a team that crosses what I would call “the urbanist-technologist divide.” When I talk about the future of cities, the people I talk to fall crudely into two categories, the *technologists* and the *urbanists*. Overwhelmingly, they do not speak the same language. The technologists are generally insensitive to the complexities of cities, and the urbanists generally don’t understand technology. As more cities hire chief digital and technology officers, the situation is getting better, but the number of people who really combine both sets of skills are low. Sidewalk Labs has tried to bring in people who speak both languages.

SC: So how do you see that friction playing out between urbanists, preserving some vision of what life in cities is supposed to be like, and technologists, looking at what the technology can do? Where do they run into each other?

DD: The greatest danger to preventing the transformation of cities is the issue of data and privacy. Ubiquitous connectivity is at the center of this opportunity, because how you harvest that data—while protecting people’s privacy—is ultimately the key to the system, right?

Currently, we do not have a set of agreed-upon principles or protocols to manage this issue. We all recognize that in our private lives, we are giving out lots of data in exchange for services. Sometimes we do it knowingly, sometimes we do it tacitly. Some places make it easier, some places make it harder, but we really haven’t begun to confront the issue of data privacy in public spaces. So this integration of physical and digital resting on a foundation of data will create a debate, and that’s a good thing. We’ve

got to be able to have those conversations as a society.³

SC: Your optimistic view of the future of cities depends upon integrating technologies to create the digital network era. Can you really see that coming to pass?

DD: Yes, I am truly optimistic about the future of cities. When I think about a fully connected city with integrated data, I start thinking about the implications on health care, education, public safety, and many other parts of urban life. I think we’re going to see transformative change because cities will be able to better understand what’s happening around them and then apply those insights to better anticipate and prevent problems than we can’t even see today. **DR**

Endnotes

1. For deeper insight into Deloitte’s perspectives on the future of mobility, see our complete collection of research at <http://dupress.deloitte.com/dup-us-en/focus/future-of-mobility.html>.
2. Owned by the City of New York, the High Line is a public park on the site of an old railway line. <http://www.thehighline.org/about>.
3. For more on the relationship between companies and customers in an increasingly connected age, see Michael E. Raynor and Brenna Sniderman, “Power struggle: Customers, companies, and the Internet of Things,” *Deloitte Review* 17, July 27, 2015, <https://dupress.deloitte.com/dup-us-en/deloitte-review/issue-17/internet-of-things-customers-companies.html>.

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