BIG DATA

Moving beyond systems modelling using traditional statistical techniques and towards measuring urban development in real time. Welcome to the world of Big Data.

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Cover: City of Kitchener viewshed analysis shows every point in the city from which a chosen building or feature can be seen from an observer at ground level. See story, page 11, figure B. Image courtesy of the authors.

Smart cities.
Connected communities.
Big data.

By Chris Tyrrell, RPP & Yousaf Shah

From the dawn of civilization until 2003, humankind generated five exabytes of data. Now we produce five exabytes every two days...and the pace is accelerating.[1] It is estimated that 40 zettabytes of data will be created by 2020.[2]

To the everyday person these are among the many new technical terms thrown about in a cacophony of technology jargon. But these terms are linked to the development of cities and affect how we plan and use our cities. While, the interplay between technology and planning is not new[3], it is only in the last decade or so, with the explosion of the internet and remote sensing technologies, that we've begun to move beyond systems modelling using traditional statistical techniques towards measuring urban development in real time. Welcome to the world of Big Data.

But what exactly is big data?

The term Big Data first came into use at the beginning of the millennium; however, writing on the "information explosion" or the volume of readily available data dates back to the 1940s. The most widely accepted definition comes from a publication by Gartner Inc., which describes big data according to three dimensions: volume (amount of data), velocity (speed at which it is gathered) and variety (the different types of data gathered). Later, IBM added a fourth dimension: veracity, or the degree of accuracy of the data.

A more colloquial definition would be that big data refers to data sets that are too large and growing too quickly to be captured, managed or analyzed by day-to-day business software (such as Microsoft Excel) and require computational algorithms to make sense.

How is big data used in planning?

As Dr. Rick Huijbregts writes in his article, we are living in a fourth industrial revolution. Advances in digital technology are changing how we plan, how we live, and how cities are developed. To date, the most widely publicized use of big data has been in the realms of business and technology. Though its application in urban planning is still relatively new, a number of recent

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Yousaf Shah

ventures have developed to specifically address urban issues: IBM's Smarter Cities Challenge, Google's Sidewalk Labs, the City of Boston's Office of New Urban Dynamics and the City of Toronto's Big Data Innovation Team. Cities around the world are dreaming up new and innovative techniques to address civic issues, such as San Francisco's use of sensors to manage parking demand. Researchers are using complex data-mining techniques to understand how cities grow and develop. They are even using data from the unlikeliest of places, such as Twitter or Yelp.

We are very excited to present this issue of the Ontario Planning Journal, where we have gathered articles by a number of individuals and organizations doing interesting and cutting edge work in the realm of big data. The features follow three overarching themes: providing a conceptual understanding of the potential for big data analytics in urban planning; illustrating how municipalities are using big data for planning and management; and showing how universities and research organizations are pushing the envelope on analytics.

Planners must collaborate with organizations that are driving innovation and shaping our digital economy. The global experiences of the likes of Google, IBM, Cisco, Microsoft and Amazon, to name a few, can be invaluable in supporting and shaping our planning of infrastructure, communities, and buildings. This issue also explores data platforms such as Uber Movement and Strava Metro, which are collaborating with urban planners to use big data to better understand and predict traffic and mobility patterns in major cities around the world, and to improve land use and urban policy.

We present articles from Dr. Rick Huijbregts, Simon Lapointe, Dr. Daniel Hoornweg and Lisa Prime about planning cities in an era of digital disruption. Bianca Wylie, Dr. Pamela Robinson and Ian Malczewski describe

some of the challenges related to releasing government data for the public interest.

Planners and engineers at the cities of Cambridge, Kitchener and Toronto offer a window into how municipalities in Ontario are reimagining urban systems using large-scale and real-time datasets. We hear from Dayna Edwards and Adam Clark at the City of Kitchener on the use of LiDAR data in urban design, from the City of Cambridge in providing access to city data, and Jesse Coleman of the City of Toronto's Big Data Innovation Team on how Toronto is leveraging new tools and techniques to address transportation issues in real time.

Dr. Patricia McCarney writes about the World Council on City Data, the value of high-quality and standardized data, and how data allow planners and city managers to optimize performance, create efficiencies in complex systems, and understand and learn from other comparable communities. Finally, we present an article by Dr. Eric Miller's team at the University of Toronto's iCity Program, who show us how research institutions are designing novel approaches to urban informatics.

Chris Tyrrell, MCIP, RPP is a member of OPPI and is the national vice president of planning, landscape architecture and urban design at WSP Canada | MMM Group. He has over 20 years of professional experience in strategic policy formulation, community revitalization, infrastructure planning, development approvals, and management of large data-driven geospatial applications. Yousaf Shah is a Candidate Member of OPPI and is an urban planner and consultant with Hemson Consulting Ltd., where he manages large demographic and geospatial datasets to prepare forecasts for land use and infrastructure planning.

Endnotes

[1] Eric Schmidt, executive chairman of Alphabet Inc. and former executive of Google (Smolan, R., Erwitt, J. *The Human Face of Big Data*. Against All Odds Productions, 2012).

[2] https://cloudtweaks.com/2015/03/surprising-facts-and-stats-about-the-big-data-industry/

[3] The notion that cities can be measured and managed using algorithms was established by a systems scientist at MIT named Jay Wright Forrester, with the publication of *Urban Dynamics in 1969.*

Separation of traffic families in a 30 km/h environment

Planning for Digital Disruption

By Dr. Rick Huijbregts

We are living during the fourth industrial revolution. Thanks to advances in digital technology, our physical and virtual worlds are converging, creating new experiences, services and business models that will forever change how our cities, living spaces and infrastructure are developed.

Disruptive technologies

Mobile, video, Internet of Things, cloud, and big data are the technology foundation for business transformation today. For example, a business without a mobile strategy may become irrelevant very quickly. More than 90 per cent of the internet is consumed by mobile devices and more than 75 per cent of all internet traffic is generated from video. Already 1-million minutes of video traverses the internet every second.

Every day, the internet is connecting more people, processes, data and things that have the ability to alter how we work, live, learn and play. Over the next three years the internet will connect more than 50-billion smart objects, four times more devices than are connected today. Together these billions of smart devices is known as the Internet of Things, and each produces an increasing amount of data.

This data—your data—needs to be processed, stored, and protected. Cloud computing (leveraging remote and secure data centres) and fog computing (big data analytics and processing at the edge, near connected devices) are transforming the role of computing and networking.

In addition to these foundational technologies, transformational capabilities such as robots, drones, artificial intelligence, mixed reality, and autonomous vehicles are allowing us to re-imagine processes, products, services, business models and experiences.

Driven by digital innovation, this pace of change is unprecedented. But it also introduces great challenges and opportunities. This has become our new reality, and Canadians are ready for it. Canada ranks #1 globally in internet utilization. We have among the highest participation per capita worldwide on social media networks such as Facebook and Twitter. Conversely, we rank only 16th in internet penetration. Not everyone is able to benefit from the opportunities presented to us by the fourth industrial revolution because Canada is lagging behind in building the networks and infrastructure for today's digital innovation economy.

Digital literacy and readiness

Businesses are also slow to adopt and embrace digital transformation. An IDC study (2016) observed that 97 per cent of Canadian business executives appreciate the

disruptive nature of digital, and expect their organization to be impacted in the next three years by the emerging trend and related technologies. The same study, however, showed that only 17 per cent of these business executives are prepared with an agile strategy, infused with digital practices, to protect themselves from digital disrupters or take advantage of the opportunities in front of them.

Businesses and industries are impacted by digital transformation. Legacy practices cease to exist at a faster pace than ever before, and new businesses, which dramatically alter supply-chains, reconnect supply and demand in innovative ways, and deliver unprecedented customer service. The emergence, and success, of digital companies such as Uber, AirBnB, Spotify and Alibaba validate the impact of this transformation. In a very short time, young entrepreneurs re-imagined experiences—and entire industries—we had previously deemed satisfactory. The mission of these companies, however, isn't to simply provide an alternative to a taxi services, hospitality service, music consumption, or commerce. They all aspire to build new communities and experiences to make the world a better place.

In less than five years, each of these businesses has overtaken the market capitalization of their legacy competitors. What do you think the business executives of those established businesses are thinking today? How high of a priority has "digital transformation" become in their boardroom discussions?

All companies in all industries are going to need 21st century infrastructure (beyond what was designed to support the 1st and 2nd industrial revolutions, such as electrical grids, water infrastructure, railways and highways) to innovate and transform themselves. A secure, resilient and open digital infrastructure needs to envelop our communities and built environment if we want to take advantage of this new industrial revolution and successfully compete in tomorrow's digital world.

Role of planners

Everyone has a role to play in reshaping our digital future. If you are a small business owner, a big enterprise, an educator or librarian, a government agency, or academic; we all have to start shaping a business strategy infused with digital capabilities if we want to remain relevant. Possibly the biggest task lies ahead for the planners, designers and builders that give physical shape to our future neighbourhoods, communities and infrastructure. Their responsibility is to accommodate the digital elements of our future into the physical world that surrounds us. And they have to do this while their own business, or existence, may be jeopardized by the emergence of digital disrupters or new, creative technologies.

Today, planners may need to (re)consider what they are planning for, and how to plan effectively and efficiently in order to accommodate these rapid changes and meet the changing expectations around them.

Some of the concepts introduced by the digital economy have the ability to reshape our communities and built environment. These include the sharing economy, autonomous vehicles, urban mobility and smart buildings. Some of the emerging digital capabilities that will influence how we best plan and design for our future include big data analytics, artificial intelligence and mixed reality. However, these factors will continue to increase, develop and disrupt how we plan in the coming years.

Sharing economy

The sharing economy is giving new meaning to the concept of ownership. In congested urban settings, where the cost of ownership is rising significantly, we will see future generations participate increasingly in the sharing economy. There may be a decreased need to own a home (AirBnB) or car (Uber), and we already see sharing services focused on health care (changing the dynamics of seniors' homes and medical centres), home care (maintenance, handy-man services, and even borrowing tools from one another), and bike share programs, to name a few.

How will these affect the size and function of our future homes, the need for parking in populated areas, and the logistical design of our neighbourhoods?

Autonomous vehicles

Autonomous vehicles are undoubtedly already top of mind for most planners. Automobile manufacturers are expecting the first commercial, large-scale availability of autonomous cars within the next 10 years. That means the most costly and extensive planning decisions we make today must consider the needs of digital vehicles. First, our physical infrastructure (roadways, sidewalks, intersections) will need to be prepared with digital capabilities and markers to make them safe for autonomous vehicles. Second, research shows that autonomous cars will have a positive impact on traffic congestion, meaning the same rules for road utilization and capacity may not apply if we eliminate the human factor from driving. One will get quicker from point A to B, with less chance of accidents and reduced congestion. New projections may apply for planning our roads, intersections and parking.

Urban mobility

With car and bike sharing services, improved transit and the introduction of autonomous vehicles on our roads, we have the ability to re-imagine mobility in our rural and urban communities. The need for disruptive transit expansions may seem less relevant if we augment our choices with rich and integrated mobility options. Smaller towns may look at Uber-like services to offset costly transit scenarios—reducing cost while enhancing citizen services. Digital kiosks and mobile applications will make it easy for citizens to move around the city, leveraging the best and fastest mobility services. Maybe it's not only roads for cars that we need. And maybe, just maybe, we can spend less on transit infrastructure and focus more on the implications of the sharing economy and autonomous vehicles that will reshape how we move.

Smart buildings

The Internet of Things is starting to have a profound impact on our built environment. Every smart object in our buildings (light fixtures, security systems, HVAC controllers and automation, automated blinds and windows, elevators, parking systems, etc.) is becoming a smart and connected device on a secure, converged digital infrastructure.

In a networked building, all systems are integrated and correlated through advanced data analytics. Smart, networked buildings are more energy efficient due to advanced control and management of environmental systems, safer and more secure, and less costly to operate. They also have a positive impact on the productivity of those that work, live, learn, and play in them.

Digital tools

Digital advances such as artificial intelligence will equally impact the way we plan and design our future infrastructure, buildings and communities. The promise of AI is that it allows us to inform ourselves better of possible future uses of our public spaces, neighbourhoods and communities by considering all potential scenarios.

Mixed reality will give us modernized ways to visualize the art of the possible. Both augmented reality and virtual reality are already leveraged in design and planning processes, but we will see how further advances in AI, analytics, and mixed reality will allow us to re-imagine what our future looks like.

These are just a few examples of how digital transformation will affect our communities and built environment, and why we must plan for them. New technologies and trends will constantly be introduced that have an additional impact.

It will be hard for planners to be aware, all the time, of everything that is available to them, or to understand the impact of every newly introduced capability. So how can we embrace digital disruption while ensuring we build future-ready infrastructure, buildings, and communities?

Getting started

First, it starts with the design of an open, secure and scalable digital infrastructure (regardless of whether it is for a neighbourhood, community, building, or roadway). This network will be the platform for future business transformation and the engine for continuous disruption and improvement. Note that the digital network cannot be "value-engineered" (in other words, cut out of budgets due to financial limitations); it is the most critical infrastructure for our future.

Second, planners need to partner with organizations that are active in the reshaping of our digital economy today. Their global experience in building 21st century infrastructure, as well as delivering unprecedented new services and experiences, is invaluable when planning and designing our future infrastructure, neighbourhoods, communities, and buildings. Partnerships are essential for success in a digital world.

Third, an agile strategy will ensure we continue to improve upon decisions made today. We need continuous planning and design, and collaboration and partnerships will secure a sustainable future that is ready to absorb future changes and innovations.

Lastly, together, we need to dream more. Ideation and vision sessions will become more crucial than ever before because they allow participants in a collaborative ecosystem to contribute to the re-imagination of our future infrastructure and communities. The internet has only been a public domain since 1994, and the transformation we have witnessed since is unprecedented. The speed of this change will not slow down. Creativity and imagination will be cornerstones of how we define our future… a future that is digital. And there is nobody better equipped to take charge of this journey than our planners, designers and builders.

Dr. Rick Huijbregts is vice-president, Digital Transformation and Innovation at Cisco Canada. He is also responsible for Cisco Canada's smart city strategy, and a frequent speaker on topics of innovation, disruption, and urban digitization.

Improving cities starts with better data

By Simon Lapointe, RPP

Cities face huge challenges: Lack of affordable housing, crumbling infrastructure, population pressures, and rising legacy costs of suburbs. But unlike other industries, cities haven't yet fully realized the power of data to help find solutions to these problems.

While the idea of a smart city using interconnected devices and technology embedded into infrastructure to increase productivity is nothing new, cities and government services have been slow to realize the potential of data-driven technology. Companies like IBM, General Electric, and Cisco Systems are using sensors and wireless networks to build smarter more efficient infrastructure. Startups like Tado are taking aim at the home and building industry with the intention of making homes more intelligent. But when it comes to urban planning and policy, cities have been largely ignored by the tech sector.

But things are beginning to change and a new round of tech startups and tech entrepreneurs are working on building novel solutions using data to improve the urban environment.

URBAN-X, a venture accelerator founded by BMW in 2015, is working with startups focussing on developing human-focused technology for cities. Govtech Fund, the first-ever venture capital fund dedicated to government technology startups, launched in 2014 and is taking aim at this $450-billion global market.[1] Other more established startups like Facebook, Uber and Strava are seeing inadvertent tech business spinoff or accidental urban planning tools in the vast amount of data they collect. Every pinned photo, Uber ride, Twitter post, and every Tinder date captured by mobile devices could be used to visualize patterns and to create new insights and actionable information from massive streams of real-time data. As a result, some companies are challenging their engineers to come up with innovative ways to use technology and data to support more informed municipal decision-making.

Open data also plays a role in empowering governments to better cope with the planning challenges that urban areas face. Data can help transform cities by improving infrastructure, creating more efficient and cost effective municipal services, enhancing public transportation, reducing traffic congestion, and keeping citizens safe and more engaged.

But for planners, how to use data to make data-driven decisions and make cities better places for people remains a big question. Can data help make sense of human interactions and behaviours in a way that augments planning and design decisions? Can a data-driven approach to planning and design have a profound effect on cities? Can it influence how cities are designed, how they operate, and how they change over time? There are great opportunities for planners and designers to make use of data (big and small) and the applications they power. In fact, the application of spatial data to planning is one of the key digital disruptions that planning has emerged over time. With real-time data generated by sensors and mobile devices, urban planning and design interventions could experience even more disruptions.

For data to fulfill its potential, it must empower planners and designers to do their jobs more efficiently and effectively. But to achieve these objectives, planners need to change from a policy-driven approach to a user-centric, service-oriented approach to planning. These may include using data to identify what people think and say about places and to analyze patterns and model predictive situations to improve land use and policy.

Citizen engagement

Citizen engagement is critical to the health of any government and civic tech is changing how people share what they think about services, plans and policy decisions.

Civic tech covers a broad range of citizen engagement and democracy related activities including advocating, providing input, community organizing, writing petitions, crowdsourcing information, and connecting with elected officials. And civic tech such as online engagement platforms and social media monitoring sites allow planners to gain powerful insight into their communities and get input from a broader cross-section of the community. But simply engaging is no longer enough.

Citizen participation blossoms when citizens are informed and governance is open. This happens when government and citizens enter collaborations as near-equals and government is transparent. This requires that citizens have access to resources and information. In successful tech projects, citizens are the starting

point for data collection and active participants in the process of building applications (and entire businesses). Cities and governments need to look at ways to encourage and facilitate citizen engagement and data is the logical first starting point.

As cities and governments engage with citizens on policy proposals, plans or service delivery, releasing open data sets relevant to the task can help make engagement flourish. And ideally, exploring data is done in a way that doesn't require advance technological skills. For example, when engaging as part of a trails master plan a city could release the number of times a trail is used by pedestrians and cyclists at various points over the course of the year. This data could be released online in different shapes and forms and through various channels such as online engagement platforms and social media networking sites. It could also be presented in person during a public event. Citizens who use the trail could then explore the data, ask questions, learn, and gain additional insight to inform their opinions.

Beyond informing citizens to improve participation, efficiently sharing vast amounts of data across various departments and with citizens is an issue that faces most cities and governments. Publishing a PDF map or uploading an Excel spreadsheet to a website is easy but it's unfit for creating engagement online—readers expect more, feedback is limited, and scaling is difficult. Digital products are more interactive and spread quicker. Open data portals and Application Programming Interface (API) are key tools to tackling this challenge. Open data portals increase efficiency by allowing organizations to share data across departments and collaborate with other organizations. APIs on the other hand, support open data initiatives by allowing programs to interact with data more quickly without the need for a developer to share its entire code.

Embedding and connecting the process of engaging citizens in public decision-making and informing with data can allow more knowledgeable and honest conversations to take place, resulting in more engaged citizens, more informed responses to policy proposals or programs and services. An open data policy/portal combined with online citizen participation enhances transparency, and accountability, and promotes participation. Both are proliferating and for good reason: both make civic engagement flourish.

Analyze patterns and model predictive situations

How do people use space? How do people move through space? Startups like Uber, Strava, and Lyft store enormous amount of ridership data that can let cities visualize traffic patterns based on millions of trips. This type of data can be extremely helpful in policy/design/planning decisions about how to use roads more effectively. Imagine having access to data that showed when and where passengers get picked up and dropped off.

As part of an effort to make amends with cities, Uber is launching Movement[2]—a data-driven platform that tracks how long it takes to get from one point to another, depending on the time of the day, day of the week, and factors like road shutdowns or city-wide events, providing insights and analytics to improve urban planning and design.

Based in San Francisco, Strava is another startup that holds coveted data cities want. Strava built a website and mobile app to track athletic activity. The most popular activities tracked are cycling and running. Strava Metro[3] anonymizes and aggregates data and then partners with transportation departments and city planning groups to improve infrastructure for bicyclists and pedestrians. Over 85 cities and organizations around the world use Strava Metro. Most are using it to measure and improve their bicycle and pedestrian infrastructure. Metro data enables deep analyses to ensure partner organizations make impactful, data-driven decisions, whether planning and building new infrastructure or measuring impact and behaviour change after a project is complete.

With Metro and Movement you can get minute-by-minute activity counts across an entire network. You can see activity starting and ending points, and cyclist wait times at every intersection. And the only reason that these startups have so much data is that they started with a user-centric approach to solving real problems.

Conclusion

These are both exciting and daunting times for cities, governments and planners. The confluence of civic tech and open data infrastructure is unlocking a wealth of opportunities. The good news is that more and more cities and governments are opening up their data—adopting open data policies, setting up open data portals to share their data with the public—and more companies are starting to make good use of this data to develop powerful applications. This highlights the single biggest challenge facing the planning community: Data is of no use unless it is analyzed and used to make informed decisions.

But it's time for planners, data scientists, and coders to start talking. At the end of the day, urban planning needs much more than technology. It needs new ideas for policy and planning that will make cities better and more efficient for everyone. What we don't need are cities that are merely outfitted with sci-fi tech that only make life better for some of us.

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Endnotes

1 http://govtechfund.com/2016/01/
   govtech-the-400-billion-market-hiding-in-plain-sight/
2 https://movement.uber.com/cities
3 http://metro.strava.com/

Focus on the small things

By Daniel Hoornweg & Lisa Prime, RPP

Daniel Hoornweg

Lisa Prime

Vision and large-scale infrastructure built our cities. For example, New York City owes much of its prominence over Philadelphia to the Erie Canal. San Francisco is knitted together through the Golden Gate Bridge, and London enjoys safe harbour because of the $2-billion Thames Barrier. The economy of the Toronto urban region can be traced back to two key infrastructure projects: Highway 401 and Adam Beck power station (Hoornweg, 2015).

For cities in advanced economies, where economic growth is likely to remain an anemic few percentage points, the challenge is no longer to develop grand plans and build large-scale infrastructure. Rather, plans are about better understanding a complex set of circumstances. Big data is emerging as a powerful and necessary tool to enhance this understanding.

Today, successful urban areas are those that focus on the small things that collectively make up the big things. It is their strategic use of big data, collaboration, and the application of many tweaks to the existing system that are proving most promising.

Cities need to build resilience, improve existing infrastructure, reduce carbon emissions, and provide jobs and livability. Meeting this complex challenge is difficult, especially in large cities where trust is eroding and fear increasing as citizens adapt to local and global changes. Big data can provide an opportunity to engage the public in planning processes as well as provide critical public assurances on levels of service delivery and their cost effectiveness. It can support various planning tools and processes, and impact how we innovate across sectors, how people move, where employment is cultivated and how clusters interact.

Access to and use of data in defining plans provides an opportunity to engage the community more actively. For example, the use of real time data to support traditional modeling—so residents can see the relationship between data and decisions—facilitates active engagement in processes that most, other than planners, don't even pay attention to. This is significant.

Big data can also enhance collaboration across large urban regions. For example, in an effort to encourage commuters to change their travel behaviours, there is power in various jurisdictions collaborating to prioritize interventions and promote understanding.

Likely the most compelling role for big data is in the transportation sector. Autonomous vehicles will generate large amounts of data. By 2050, all vehicles are expected to be electric (or fuel cell) and fully autonomous. Building cities to adapt to such evolving circumstances is important, but even more important is to design cities to reap their benefits is the goal of today's professional planners.

Reliance on data systems and IT integrated management brings its own challenges. Cyber-security and data quality management are among the fastest evolving issues for municipalities. System redundancy, privacy protection, and data quality maintenance are critical. And new challenges will arise as we progressively integrate data into the planning process.

Daniel Hoornweg is the Richard Marceau chair and associate professor at the University of Ontario Institute of Technology and the chief safety and risk officer for the Province of Ontario (Technical Standards and Safety Authority). Lisa A. Prime, RPP is a member of OPPI and the principal of Prime Strategy and Planning. She is an industry leader in sustainable community development focused on policy development and implementation including green buildings, revitalizing underutilized lands, integrating infrastructure with urban design and function.

Endnotes

Burnham (1907) quoted in: Charles Moore (1921) Daniel H. Burnham, Architect, Planner of Cities.

Traffic congestion in Toronto Urban Area (Greater Golden Horseshoe) is at least $3.3-billion/year (OECD, 2009)

Big Data, Open Data in Planning

By Bianca Wylie, Dr. Pamela Robinson, RPP & Ian Malczewski, RPP

Planning as a profession is fundamentally impossible to break apart from data. It's data-heavy work. Data informs every street plan, park design, economic development zone, and any other undertaking. When a new planning project is underway, reams of data come into play—site data, ideas from participants in public engagement efforts, official plan data, data about the environment of a new site, maps, images, and traffic data. So the data part of planning is old news. But what about open data and big data?

As defined by the Open Data Institute, open data is "data that anyone can access, use or share. Simple as that." Inherent to this definition is that the data is free (does not have to be paid for) and machine-readable (in a form that a computer can process). Big data is exactly what it sounds like—a lot of data: volumes of files so large that particular software is required to store and manage it. Beyond the fact that both are types of data, they do not have any consistent connection—big data can be open or closed, and open data can be big or little. All big or open data could be published by any number of sources: government, private sector, non-profits, or citizens.

A large amount of the open data currently available in Canada and published by all three levels of government is geospatial data—data tied to place and location, data that identifies where things are and affixes certain properties to it. This type of data is used frequently in planning.

Bianca Wylie

Dr. Pamela Robinson

Ian Malczewski

Opportunities

But is planning as a profession ready to take advantage of the movement to make more use of data, both open and big? There are some obvious opportunities and some daunting challenges to face.

We live in a time when facts and data are under increasing scrutiny. Trust and faith in experts (and expertise) are at a low point. But planners have an opportunity to combat this trend by revealing their expertise—along with the data informing it—and opening discussion. Planners are acutely aware of how emotional and political decisions can be at the community scale. Empowering residents with data is one of the most accessible and exciting ways to use data in planning. But it is still early days for the planning profession in terms of how we use open and big data in discussions with the public.

Open data presents interesting food for thought for private sector planning consulting firms too. Procurement reform is starting to hint at the need to think more about how those who receive government money should do their work. One can imagine that there will only be an increase in pressure on governments to open any data that it can.

Part of the movement for open data has always been informed by a belief that residents have a right to data because they pay for it through their taxes. This is an overly simplistic take on it, one that places too much emphasis on the landowner. In an open government environment, we are all in need of access to open data for economic and civic purposes.

Open data—paired with openness and discussion about how to interpret or apply that data—can help build trust and a sense of shared ownership over planning decisions. It is data that everyone can consult, that everyone can see, that everyone can point to in a shared way to have a public and open conversation about planning decisions, variables at play, impacts, trade-offs and risks. It moves the role of the planner a step further away from 'Trust me, I'm an expert." and a step towards "I'm an expert, here's how I'm doing my work. What do you think?" and it allows residents to challenge and talk about how the data reflects what they know. Data can help bring more people along when decisions are being made.

Another opportunity with open and big data is to help inform a new era of civic education, one that includes public education about our shared infrastructure and parks, our shared assets and spaces. Open and big data add new dimensions to citizen-planner relationships.

Challenges

The amount of data we collect and generate is constantly on the rise. This creates a domino set of challenges.

For planners, one fundamental challenge is our ability to ensure that the data we are using to inform our decision-making is representative of the people with whom we plan. With the rise of the smart city in which sensors and mobile devices gather big data that

we intend to use to optimize the planning and running of our cities we run the risk of maximizing benefits for some but not all community members. Take, for example, local governments purchasing STRAVA data to inform their bicycle planning. STRAVA is an app that some cyclists use to plan, track and share their routes and many of its users are recreational cyclists. This data could be used in part to inform a bicycle route plan but if it is the only data source used then how would these data distort the outcome?

Planners also need to be wary of becoming too enamored with data that only tells part of the story. Much of the smart city movement understandably glorifies the opportunities data presents to create more efficient cities. While efficiency is highly desirable when it comes to planning transportation systems, delivering municipal services, or managing energy systems, but is it the most important measure of a city? Are we also considering the quality of place? What data do we need to collect and interpret to make sure we're balancing the many different qualities that make livable, complete communities?

Finally, as a profession, we need to ask ourselves if we are ready for planning in a world of big and open data. While the next generation of planning students are tech-savvy in their personal lives, how many planning students are gaining exposure to open data, open government, big data and smart cities in their education and professional placement opportunities?

And what about practicing planners? At Ryerson, students can take a course on civic technology and civic engagement. But given the rapid growth of open data, this kind of learning should be core in planning education.

Conclusion

The world of open data and big data gives us, as planners, an opportunity to think about our expertise in the planning process and how we continue to use that expertise to help deliver strong planning outcomes for Ontario communities. It also gives us an opportunity to reveal how we think about data, share what kinds of consequences we consider when providing advice, and invite communities to learn from and improve how we think about hard planning challenges. There are clear opportunities for new and important discussions and professional development. One of our most valuable skill sets as planners is that we can bring big ideas down to scale—using data of all kinds we can, and do, make real change happen on the ground.

Bianca Wylie is head of the Open Data Institute Toronto and an associate expert at Open North. Dr. Pamela Robinson, MCIP, RPP is a member of OPPI and is an associate professor at the School of Urban and Regional Planning at Ryerson University and a researcher with geothink.ca. Ian Malczewski, MCIP, RPP is a member of OPPI and is an associate at Swerhun Facilitation.

Tall building viewshed analysis

By Adam Clark & Dayna Edwards, RPP

Urban design is an ever-evolving practice, with increasing emphasis placed on design flexibility, contextual analysis and resilience, resulting in a more complex review process. Achieving good urban design at the municipal level relies on the knowledge and experience of dedicated urban design staff. Best practices, established standards, and principles of urban design all contribute to a thorough review of development proposals, as well as the creation of studies, design guidelines and standards. In order to push existing methods further and sharpen local urban design practices, we increasingly need to study, model and visualize existing and proposed conditions.

Increasingly, we are able to engage in empirical urban design using analytics created from big data mapping resources. These tools allow us to analyze location-specific conditions for new developments that are spatially accurate, procedurally sophisticated and capable of demonstrating a real-world context—at the site, neighbourhood, or city scale—and how it can and should influence the urban design decision-making process. It is important to visualize data to more effectively communicate ideas to proponents, staff and the public.

In this article, we explore one such tool: the creation, interpretation and application of LIDAR-based viewshed analysis for tall building development.

Creating the viewshed

Recently, the City of Kitchener obtained comprehensive

Adam Clark

Dayna Edwards

LIDAR data of the entire city. LIDAR (Light Detection and Ranging) is a remote sensing method that uses lasers to measure where features in the environment are located. This creates a three-dimensional point map of everything from buildings and trees to streetlights and benches. What this provides is a spatially accurate representation of the entire city, which can be interpreted using various GIS tools. This results in massive datasets pertaining to things like urban tree canopy, flood modeling, and measuring average building height across an entire neighbourhood.

When using LIDAR to study design, challenges arise. Neither the LIDAR data nor the GIS tools commonly applied to that data were created with the urban designer in mind. Therefore, it is key to find the intersection of "what does the urban designer want to measure" and "what can we measure" with the data and tools available. One such intersection can be found in viewshed analysis.

Viewshed analysis provides, with mathematical certainty, every point in the city from which a chosen building or feature can be seen from an observer at ground level. This analysis is run for each of the 138,304,124 one-metre squared grid cells of Kitchener, through a 3D LIDAR cloud containing 482,858,019 points. It is inclusive of every feature captured by the LIDAR; meaning that if the observer is behind a tree, edged up beside a light standard or ducked behind a mailbox, a blocked view is reflected in the viewshed results that are returned. While there are many possible applications, we
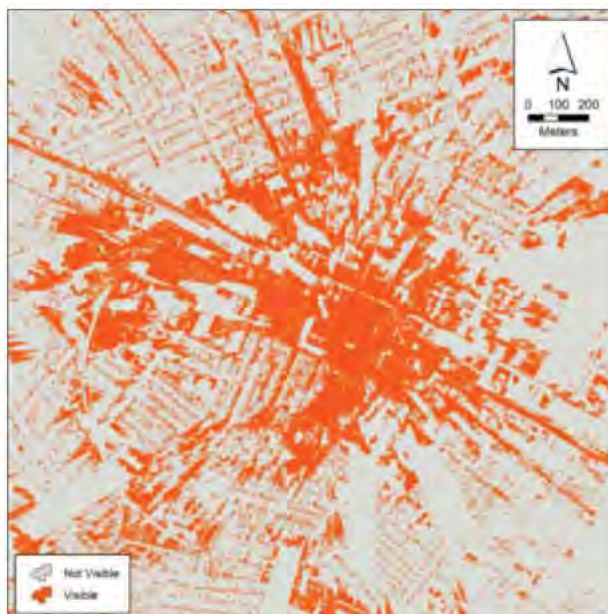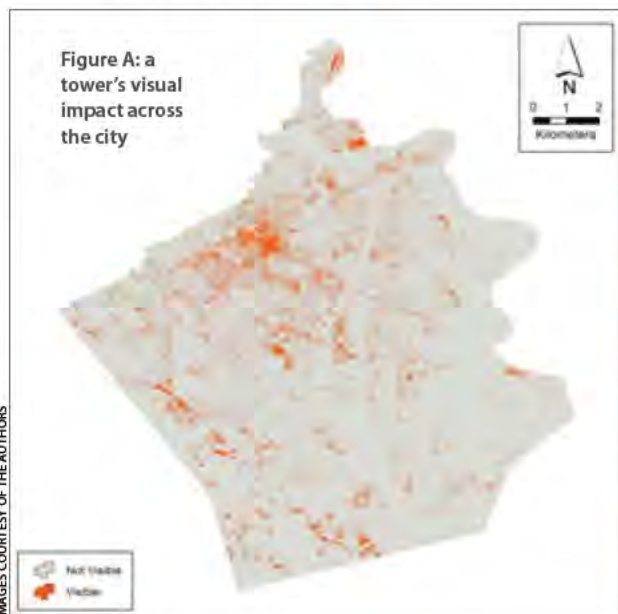

Figure A: a tower's visual impact across the city

Not Visible
Visible

Figure B zooms in on figure A to show the level of detail (see cover, too)

Not Visible
Visible

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Figure C: viewshed map combined with a 3D-context model

Figure D: visualizing a tower relative to a chosen point

currently apply viewshed analysis to help us determine the visual impact of tall building proposals in the city.

The result is a map (Figure A) that illustrates the tower's visual impact: from a park bench a block away, to a motorist a few kilometres down a major roadway, to a person's backyard on the complete opposite end of the city. Figure B zooms in on this same map to show the level of detail.

Interpreting the results

The viewshed map is visualized and interpreted to identify issues and opportunities not readily apparent from traditional methods of evaluation. Alternately, the data can help to support or dispute an opinion-based design argument, to ensure that a designer's or proponent's position is backed up with objective evidence. It can help diffuse a difference of opinion or reaffirm that a certain design element is appropriate.

Visual impact can be measured to help provide detailed design direction—a tower several blocks away might be visible from 60 per cent of a major public square. That same tower's opposite elevation might be visible from 40 per cent of an adjacent neighbourhood. This would suggest different design approaches for each tower façade; something an urban designer may know intuitively, but which can now be supported inarguably with the data.

In this way, viewshed analysis provides precision in the design feedback staff provide for tall buildings. A project may be presented as a landmark development, a gateway project, or as having a privileged place within Kitchener's developing skyline. A comprehensive viewshed helps everyone determine how accurate such claims are, and how the design may be improved to reach the desired impact. It helps to complement conversations on building height, tower orientation and massing, materials, tower top design, and other elements, and those conversations can be targeted to a single building element.

Applying the data

A viewshed map can be presented alone or combined with our 3D-context model to provide a detailed, representative look at a tower and its impact on its surroundings (Figure C). In real time, it is possible to choose a point identified by the viewshed map, place an observer on the ground, and visualize the tower relative to that point (Figure D). By combining objective data analysis with subjective 3D vantage points, significant observations about a project can be made, and design feedback can be prepared and discussed accordingly. Perhaps a proposed landmark tall building is blocked by a nearby tower from achieving its desired effect. Perhaps a tower that otherwise follows best practices for good transition to lower-rise areas still has an unnecessarily

large impact in an important historical neighbourhood. Or maybe an unassuming tower, by nature of its size, elevation, location and orientation, is actually going to hold a much more significant place in the skyline than might be assumed.

Knowing such things in a measurable way helps to guide tall building design so that we may deliver a high standard while limiting negative visual impacts on surrounding neighbourhoods. It gives us an evolving understanding of our existing conditions as new projects rise to create far more complex relationships among elements of the urban environment.

In addition to viewshed analysis, Kitchener's urban designers are able to leverage GIS resources to test and study urban design elements using available big data sets. This includes walkability studies (accurate route tracing via existing sidewalks and paths), intelligently applying tree canopy policies city-wide, and skyview analysis. With this, planners and designers are able to complete studies and develop guidelines that are comprehensively tested, contextually appropriate, and representative of a true made-in-Kitchener approach.

Adam Clark B.Eng, M.Arch is a design and visualization analyst at the City of Kitchener. Adam's background is in architecture and he contributes to a wide range of design-related initiatives. Dayna Edwards, RPP is a member of OPPI and CIP and a planner of urban design at the City of Kitchener. She works to coordinate and implement the city's Urban Design Program. GIS and LIDAR data has been provided and interpreted by Mike Elliott, mapping technologist, City of Kitchener.

Accessing Cambridge data

By James Goodram, RPP

When the City of Cambridge created its strategic plan last year, one of the top goals was to provide "open, transparent, accountable and innovative leadership in local governance and service delivery." Committing to this goal, the city has made significant achievements in the way it provides access to city data and information, and as a result, it has been honoured with the highest standard for data reporting.

Joining innovative cities around the world, the city's open data portal was launched in 2016. This provides raw city data to the public and allows it to be used and redistributed in useful ways without a formal approval process.

The city has collaborated with the Region of Waterloo and the cities of Kitchener and Waterloo to deliver seamless integrated access to datasets. The partnership allows users to pull in data, such as heritage properties, trails, parks, Business Improvement Areas, aerial images and contours, from all four municipalities at the same time. Currently 230 combined datasets are offered.

The city has also expanded its geographic information systems portal to provide a comprehensive scan of city information. The portal allows instant access to valuable geographic and spatial information such as open building permits, minor wooded areas, and committee of adjustment applications.

Recently, the City of Cambridge was awarded the ISO 37120 Platinum certification from the World Council on City Data, joining only six cities in Canada. As a global leader in standardized city data, the WCCD provides a global network of data that helps create smart and sustainable cities. This can easily be accessed by anyone around the world and helps inform city decision-making. The Platinum certification comprises 100 indicators based on around 17 theme areas, including the quality of life elements that inform successful placemaking.

The ISO certification not only allows Cambridge to share city information globally, but also provides the metrics to measure progress and opens the door to future collaborations.

The city's planning and GIS staff have been working with the University of Waterloo's School of Planning, on a project-based course that provides senior students with real world experience in municipal planning. Through this partnership, students gain exposure to municipal planning while working to discover new ways to provide access and deliver information to the public.

The transparency and accountability that comes from both ready access to city data and the city-to-city comparisons offered by the ISO certification, allows Cambridge to respond appropriately to questions from the public.

In the rapidly changing digital landscape the City of Cambridge understands the necessity of re-evaluating processes to ensure we continue to meet the needs of the community. Guided by our strategic plan and digital strategy, the city plans to expand its open data and GIS offerings, and continue to actively seek partnership opportunities that keep at the forefront of innovative government administration and service delivery.

ISO 37120

PLATINUM CERTIFIED

WCCD

2016

WORLD COUNCIL ON CITY DATA

James Goodram, MCIP, RPP, PLE is a member of OPPI and the director of economic development and corporate strategy in the office of the City Manager at the City of Cambridge.

Toronto's Transportation Big Data Innovation Team

By Jesse Coleman, Raphael Dumas & Daniel Olejarz

The City of Toronto's Big Data Innovation Team was created in 2015 as an innovation and data analytics team within the city's Transportation Services Division. The team is one of the first dedicated big data teams to be formed in a North America transportation agency and was created to leverage both existing and emerging data sources to identify, measure and evaluate projects and policies. Its objectives are to help inform and evaluate traffic congestion management initiatives and better understand travel across all modes in the city.

Three key principles guide the team's approach:

Repurpose existing data streams within the division by looking holistically at data collected from a variety of business functions while also looking to new and emerging data collection technologies—New types of transportation data, largely from crowd-sourced and GPS-based sources, have revolutionized the types of measurement and analysis that can be conducted by transportation planners and engineers. Not only are these new data sources higher resolution and more pervasive (offering travel and traffic data 365 days a year 24 hours a day), but they can mean a shift away from traditional collection methods, which can be slow, manual, tedious and expensive, to more rigorous continuous measurement and analysis.

Maintain a focus on practical and repeatable analytics that produce automated data products and easily digestible visuals—The team strives to balance the longer term need to identify how new data collection technologies and analysis methodologies can be incorporated into practice with an immediate need to answer practical policy and operational questions.

Focus on using and creating free and open source software and analyses to develop internal capacity while enabling learning and collaboration with external practitioners—Not only does this reduce licensing costs but more importantly it reduces barriers to collaboration with researchers, practitioners in other government agencies, and enthusiastic citizens. The team uses the online code sharing, version control and collaboration platform Github to work transparently in the open and publish its code and methodologies for anyone to use.

The project work undertaken by the team relies on four core functions:

Network performance modelling—The emergence of passive, automatic data collection methods has enabled the collection of an unprecedented volume of traffic data with extensive coverage over space and time. While the cost of purchasing this type of data is generally higher than any single traditional data collection method, the benefit of network-wide coverage dating back many years easily outweighs the cost. Leveraging these new datasets, the team is building an ongoing congestion monitoring program within the city that is able to track traffic congestion trends both at the city level and the corridor level. This monitoring will provide a fair and consistent analytical backdrop to discussions around the very sensitive topic of growth and traffic congestion. The focus of the reporting will be on developing interactive data products and visualizations that are able to communicate the complex causes of traffic congestion in a balanced manner, while focusing on the reliability of travel times and the conditions that
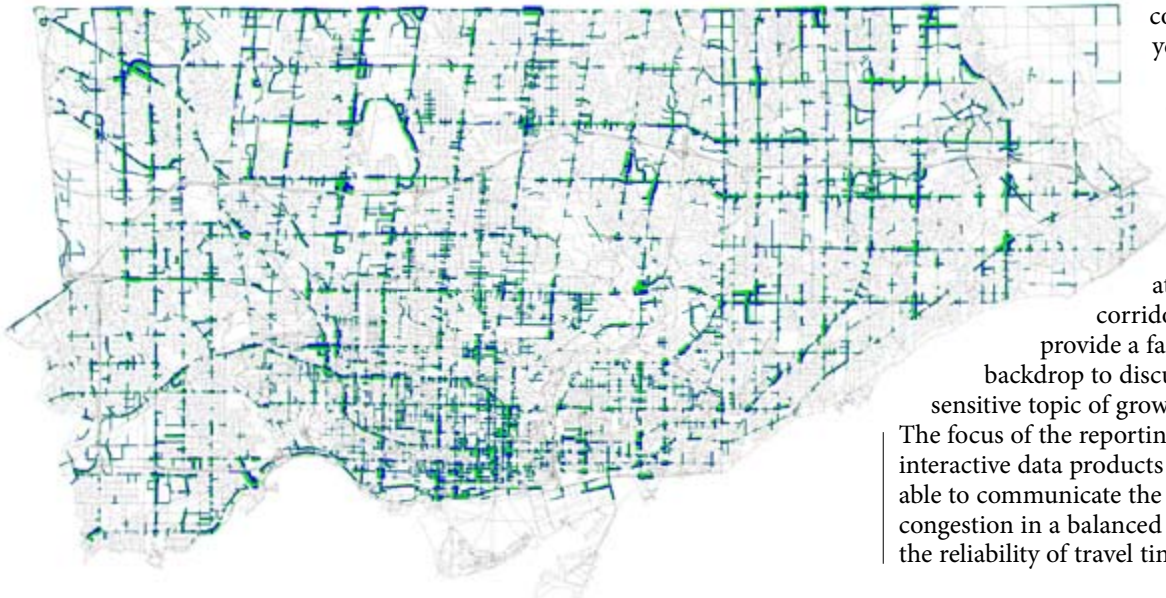
Jesse Coleman

Raphael Dumas

Daniel Olejarz

Turning movement counts conducted in the City of Toronto 2010-2016

IMAGES COURTESY OF THE AUTHORS

cause travellers to experience their worst trips of the month or year.

Policy and program evaluation—With legacy data collection methods, monitoring had to be deliberately done at the target locations and suitable control locations for an extended period before, during and after an intervention. With automatic data collection, the selection and setup of monitoring no longer has to be premeditated. This enables the evaluation of policies and interventions retroactively. The age of no longer being able to comment on a project because sensors or counters were not deployed is over. To shape how these studies are carried out going forward, the team is working with Ryerson University to develop a framework for conducting before-after evaluations using the city's wide range of emerging and legacy data sources.

To date, the team has evaluated a range of policies as before/after studies using various big data sources including signal coordination before/after impacts, evaluating the reduction in traffic delay from accelerating road construction projects, measuring the impact of changes in parking prohibition periods, and measuring the impact of the construction of new dedicated cycling infrastructure on some major arterials.

In addition, in 2014 the city commissioned a trip tracking GPS smartphone app for cyclists. When activated, the app collects GPS traces, user demographics and trip attributes from cyclists. Data collected has informed the evaluation of newly installed bicycling infrastructure and pilots such as the Bloor Street bike lane.

Research and data analytics—The BDI team operates as an internal research and development hub for advanced data analytics within the Transportation Services Division. This enhances the division's capability to deploy new technologies, software platforms and analytical techniques. Traditionally, it has been challenging to bridge the gap between academic research and state of practice in city government. The BDI team is trying to bridge that gap by working with local research teams on applied research projects. As a first example, BDI partnered with McMaster University to develop methodologies for using third party traffic data to measure congestion trends over time.

BDI recently launched a new research project with University of Toronto Transportation Research Institute to mine information and insight from the city's short term and permanent traffic count data. This project fuses these different data sources to provide detailed time of day information about traffic volumes on any given street in the city over the history of the traffic counting program. Looking forward, this will enable us to identify optimal locations for future multi-modal counts.

Outreach and collaboration—Beyond partnerships with educational institutions, the team is looking to collaborate with industry, community and data practitioners in other cities to collectively establish best practices and advance the state of transportation data analytics. In 2016 the team hosted the Big

Transportation Data for Big Cities Conference in partnership with the UTTRI, attracting data practitioners and senior management from 17 large cities across North America. The conference offered an opportunity to set up a network of government and non-profit transportation big data practitioners across North America to enable faster sharing of knowledge.

In 2015, in partnership with Evergreen CityWorks, the team hosted TrafficJam, a 48-hour traffic data hackathon open to the public. The team assembled a large variety of datasets and encouraged participants to bring their own. On International Open Data Day,
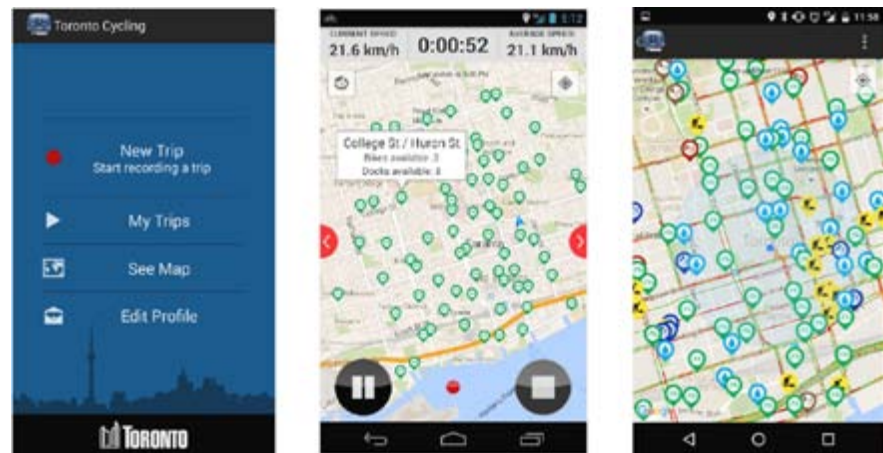
City of Toronto's Cycling App

March 5th 2017, the team participated in the Civic Tech Toronto's CodeAcross hackathon, at which it provided access to historical and real-time traffic speed data from Bluetooth sensors on city-controlled highways and some major streets in the downtown core. Participants were encouraged to combine these with other open datasets to build an interactive dashboard to describe traffic speeds in Toronto.

Toronto's Big Data Innovation Team is an example of how governments should look to the growing data science and evidence-based decision making trends to develop internal capacity with dedicated analytics teams. Centralizing data and committing staff resources to merge and analyze them can provide insights into long-term trends while building the capability to

Mapping the streets in Toronto with the least reliable travel time

PM Peak Period Coefficient of Variation
(SD Time / Mean Time)

0.05 – 0.13
0.13 – 0.16
0.16 – 0.25
0.25 – 0.32
0.32 – 0.38
> 0.38

provide faster, more meaningful input to policy evaluation. This is especially important with automated data collection technologies, which provide more data at a reduced cost, improved resolution, greater coverage and faster speeds.

The team's experience shows that assembling a group of skilled data scientists can provide practical insights and compelling visual decision-support tools to senior management and the public. As new transportation data collection technologies emerge and the collaborative community to analyze them grows, the team will continue to seek new ways to use data to enhance

decision making and our understanding of how our city's transportation system functions.

Jesse Coleman, P.Eng has led the City of Toronto's Big Data Innovation Team since its inception in 2015. Raphael Dumas graduated from MIT in 2015 with a Master of Science in Transportation and a Master in City Planning and he currently works as a research analyst within the Big Data Innovation Team. Daniel Olejarz is pursuing his Bachelor of Applied Science in Engineering Science, Infrastructure at the University of Toronto and is currently an intern with the Big Data Innovation Team.

Data-driven Planning

By Dr. Patricia McCarney

Cities are expanding and changing, and not just in terms of their population and spatial form but also in terms of their social and economic spheres of influence. Cities, regardless of their size, have evolving labor markets, real estate markets, financial and business markets and service markets. Cities are centres of innovation where information and communications technology converges to inform alternative futures, highly altered urban form and varied economic trajectories.

High-quality, standardized city-level data, generated by cities, is at the core of efforts to plan and build a smart and sustainable city system worldwide. ICT and high-quality data allow city and systems managers to gain clear insights on how to optimize performance and create efficiencies of rapidly evolving and complex systems. These increasingly complex functions demand more comprehensive and data-driven planning and a more robust data-informed governance framework to ensure integrated service delivery for prosperous, sustainable and inclusive futures for their citizens.

Data-driven planning

Now more than ever, with large infrastructure deficits and climate-related challenges, sustainable urban growth is dependent upon effective data-driven planning and management and evidence-based policy making. Cities need data to measure their performance in delivering services and improving quality of life. In addition, addressing global challenges and opportunities for sustainability and prosperity, the need for globally comparable city-level data has never been greater. The ability to compare data across neighbouring cities locally and other peer cities globally, using a globally standardized set of indicators, is essential for comparative learning and progress in city planning and development. Moreover, globally standardized city metrics guide more effective governance and innovation.

City-level data has been scarce, uneven and

non-standardized in terms of what is being measured (definitions), how it is being measured (methodologies), and has lacked consistency when it comes to city boundaries. Most data on cities and metropolitan areas does not attend to these common problems.

While country-level data is gathered by international agencies and by national level government bodies, there is a lack of information and comparable data on cities. As cities become more (and more) responsible for their country's economic performance, knowledge and understanding of these city functions are essential. This weakness in city-level data inhibits globally competitive positioning, sound infrastructure investment decisions and environmental and sustainable land use planning.

ISO 37120

The first international standard for cities—ISO37120 Sustainable Development of Communities - Indicators for City Services and Quality of Life (ISO, 2014)—was published May 15th, 2014. This standard includes a comprehensive set of 100 indicators within 17 themes that measure a city's social, economic and environmental performance. Its development was led by a team of researchers in the Global Cities Institute at the University of Toronto and by city leaders in Ontario, the United States and Latin America. As a result, the World Council on City Data was established to certify cities and provide an open data platform with standardized city-level data.

Two new complementary standards are being developed in ISOTC268, led by WCCD staff: ISO37123 on indicators for resilient cities and ISO37122 on indicators for smart cities.

The first cities now ISO 37120 certified are using this data to drive a more informed planning process. Several cities worldwide have integrated ISO37120 indicators into their planning strategies. Cities like London (U.K.), for example, are using their data to drive innovation. Transport for London is conducting a trial using Wi-Fi data from mobile phones as people move around the

city's transport network. It aims to establish whether the most common routes people take are the most efficient, and if people would take a slightly longer route in distance if it meant a more efficient journey on less stressed sections of the network.

City leaders, citizens and planners alike are increasingly asking: How safe is our city? How clean is my air? How does our level of safety compare to our peers? How green is my city? How connected is my city? The WCCD data, for example, helps show how peer cities compare globally in terms of hectares of greenspace, kilometres of bike paths and lanes and kilometres of public transport system per 100,000 population. The WCCD data portal featuring ISO37120 certified data is helping planners and city leaders and citizens alike answer many such questions and more.

Increasingly, a key role for cities and their planning functions lies in offering efficient and cost effective city services and time-effective mobility and transport. To achieve this, cities equipped with internationally standardized comparative data are able to drill down into case studies to understand and learn from other cities. For example, in the case of various Canadian cities such as Cambridge, Saint-Augustin-De-Desmaures, Shawinigan, Surrey and Vaughan, comparative transportation data indicates that a high proportion of these cities' residents commute to work

using a personal vehicle. Comparative data helps decision-makers plan for and target potential improvements by learning from these cases.

High calibre, and globally standardized data is essential for cities to plan and learn from each other and to be globally connected in building sustainable and prosperous cities into the future.

Professor Patricia McCarney is president and CEO of the World Council on City Data and the director of the Global Cities Institute at the University of Toronto. She heads the work at ISO on city metrics, developing the first ISO standards for city indicators – on sustainable cities (ISO 37120) and two new standards on resilient and smart cities.

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WCCD ISO 37120
The First International Standard for City Indicators

ISO 37120 INCLUDES a comprehensive set of 100 indicators—of which 46 are required for conformity—that measures a city's social, economic and environmental performance. The 100 indicators with definitions and methodologies published in ISO 37120 are divided into 17 themes representing key performance management fields in city services and quality of life.

Schematic Themes for ISO 37120

Economy	Recreation Safety
Education	Shelter
Energy	Solid Waste
Environment	Telecommunication
Finance	and Innovation
Fire and Emergency	Transportation
Response	Urban Planning
Governance	Wastewater
Health	Water and Sanitation

ISO37120 helps cities build a reliable foundation of globally standardized data and core knowledge for city decision-making, and enabling comparative insight and global benchmarking.

Benefits of ISO 37120 Indicators include:

- More effective governance and delivery of services
- Local and International benchmarking and targets
- Informed decision making for policy makers and city managers
- Comparative learning and sharing of informed practice across cities
- Leverage funding and recognition with senior levels of government and international entities
- Demonstrate transparency and open data for investment attractiveness
- Improve a city's credit and bond rating

With the publication of ISO37120, the World Council on City Data (WCCD) was created in Toronto, Canada to facilitate the adoption and implementation of ISO 37120 for cities worldwide. The WCCD hosts the Global RegistryTM and a system for certification of cities for ISO37120. The WCCD hosts an online open data platform at www.dataforcities.org.

Urban Informatics for Sustainable Growth

By Eric J. Miller, Judy Farvolden, Sara Diamond & Mark Fox

The *iCity* research platform is the creation of a team of multidisciplinary researchers, including transportation engineers, urban planners, computer scientists and experts in digital media. It supports an ambitious research program, combining an emerging new "science of cities" with informatics and visualization. The *iCity* platform will provide improved tools for policy analysis and decision-support with respect to the transportation infrastructure investment required if our cities are to meet current and future demands.

Some researchers in the emerging new city science believe big data, coupled with the tools of mathematics and computer science, will lead to a new theory of cities and a roadmap to optimal efficiency and productivity. By contrast, *iCity* researchers see cities as enormously complicated "systems of systems"—Jane Jacobs' famous "problems in organized complexity" (Jacobs, 1961). We believe mathematical models of this complexity are useful but they must be applied in the context of the knowledge evolved by urban planners over the past decades.

In this context, models help us to analyze how the design of any one component of the urban system, such as transportation, affects the urban system and all the other components with which it interacts: housing, the regional economy, etc. These systems, in turn have feedback effects on transportation demand. For example, shifts in population affect travel demand and transportation system performance.

The goal of *iCity* research is to provide improved tools, based on integrated models and analytics, which will enable policy experts to navigate this complexity with "what-if" analyses that untangle the intricate webs of cause-and-effect within our urban regions. This will help decision-makers understand the benefits and costs of alternative policies, particularly with respect to the infrastructure investment required if our cities are to meet current and future demands.

Informatics involves information processing, the acquisition, storage, management, curation, and analysis of data. A key aspect of iCity is the integration of datasets from numerous sources, including big data—the new, massive datasets gathered via smartphones, smartcards, and ever more ubiquitous sensor networks. Pervasive connectivity across social systems, allowing people to share their experiences in almost real time, and real-time sensor observations from the physical world are exponentially increasing, creating unprecedented opportunities for innovation.

This raises the problem of ensuring "semantic interoperability," that is that different models and analytics exchange data with unambiguous, shared meaning. Computer scientists address this with ontologies, models that describe the world in terms of types, properties and relationships among entities, ideas and events, with fixed vocabulary and definitions. A core component of *iCity* is the development of a transportation ontology that spans and integrates the many, many types of transportation data.

Visualization enables us to recognize patterns in these numerous and massive datasets and to understand the intermediate and final solutions produced by the integrated models and analytics. Most importantly, visualization of the "what-if" outcomes will communicate model results and policy analyses to the public and decision makers in understandable, compelling and impactful ways, thereby effecting a profound improvement in public policy making. Innovative visualization tools used to engage with citizens will improve governance and citizens' satisfaction. Integrated dash boards, combined with two and three-dimensional modelling can provide tools for planners, while visualization apps can support residents and travellers.

The iCity approach

Taken together, *iCity* provides a computational virtual lab for analysis and design in which powerful, comprehensive computer models simulate the evolution of urban spatial socio-economic systems (transportation, the regional economy, etc.) in response to a wide variety of scenarios and policies. Combined

Eric J. Miller

Judy Farvolden

Sara Diamond

Mark Fox

with equally advanced visualization capabilities, it provides the analytical environment needed to develop and test:

Practical solutions to specific problems that begin with the current metropolis and recognize that getting to a more resilient and sustainable place requires finding feasible pathways into the future.

A rich suite of performance measures, detailed benefit/cost distributions, etc., for comprehensively understanding the impacts of alternative policies.

Compelling, readily transmittable stories demonstrating the feasibility and efficacy of the solutions developed: why they are better than the status quo and how they can feasibly be realized.

Multidisciplinary teams performing the analyses ensure they are behaviourally sound and policy sensitive and that the designs tested are comprehensive and impactful.

The *iCity* platform is extendable to other urban systems (such as public health, water and waste systems) but the initial focus is on the modelling and design of urban transportation systems and closely-linked questions of urban-physical design.

Timeliness & relevance

Ontario's economic, environmental and social sustainability is intertwined with the design and functioning of our cities. It is not an exaggeration to say that Ontario has reached a near-crisis with respect to its transportation systems. The economy is already losing billions annually to the costs of congestion, which is experienced by people trapped in traffic and industries moving goods to market. And yet, our cities must grow to accommodate the rapid population expansion of the Greater Golden Horseshoe, Ontario's economic heartland. Transportation infrastructure investment on a large scale is required to support this growth if our urban regions are to remain productive and provide residents with a high quality of life

Moving Ontario Forward, the Province of Ontario's plan to implement the largest infrastructure program in Ontario's history, is an important opportunity to enhance Ontario's prosperity and quality of life. In its investment decisions, Ontario is committed to being guided by evidence-based, strategic planning. The evidence will be the result of research and analysis that demonstrate the impacts of investments on jobs and prosperity, as well as consideration of environmental protection and social benefits. Investments in public transit and transportation are among the priorities of this plan.

The *iCity* work is therefore timely and relevant. The holistic, comprehensive approach to urban system design, as envisioned by the *iCity* program, will support the Government of Ontario's

stated need for evidence-based decision making. Our ability to collect and analyze data on every aspect of urban life has never been greater, and the analytical power of modern high performance computers to discover new patterns and connections within these data offers boundless potential for understanding the complex dynamics of modern cities. While many groups worldwide are exploring big data opportunities, the *iCity* program is unique in its focus to merge these promising new datasets with cutting-edge simulation modelling, and the urban systems simulation models developed by *iCity* researchers are among the most advanced globally. System planners, designers and policy experts seeking advice on appropriate transportation infrastructure investments can use the what-if analyses to visualize and understand the impacts of candidate transportation infrastructure investments. The combination of advanced modelling methods, promising new big datasets, and sound strengths in urban design and economic analysis hold the promise to significantly improve urban transportation planning in Ontario and elsewhere.

The *iCity* program represents a critical contribution to growing Ontario's "urban informatics" industry. This is an emerging multi-billion dollar industry in which we have the skills and capabilities to be leaders.

Eric Miller is a professor of civil engineering, University of Toronto and director of the University of Toronto Transportation Research Institute. Judy Farvolden is the program director for the University of Toronto Transportation Research Institute. She recently completed a MScPl in the Program in Geography and Planning at the University of Toronto. Sara Diamond is president of OCAD University. Mark Fox is a distinguished professor of urban systems engineering at the University of Toronto.
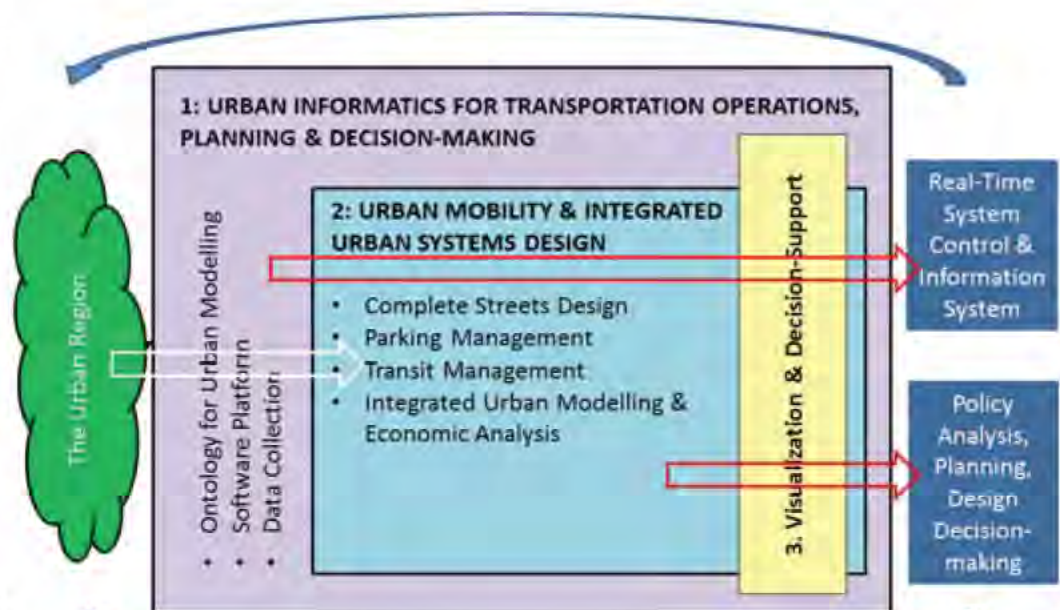
Integration of iCity research themes   IMAGE COURTESY OF THE AUTHORS

OBITUARIES

Steve Sajatovic, 1952–2017

Instrumental in the formation of the Ontario Professional Planners Institute in 1985, Steve Sajatovic served as the Institute's second president, 1986 to 1988.

Always thinking strategically, Steve was fiercely partisan for the community he adopted and in which he worked. Steve was a Northern Ontario boy, raised and educated in Sudbury, and, against the trends of the day, built his family and career in the North. From his early days with the provincial government criss-crossing Northeastern Ontario's small and larger communities, he eventually settled in North Bay, where he began a lengthy career as a municipal planner, economic developer and ultimately a senior municipal executive.

Steve's foresight ensured that the City of North Bay, his employer for almost 30 years, developed into a thoroughly modern city and a leader on the information highway. His achievements include a publicly accessible waterfront where rail yards used to be, offices and box stores where heavy industry previously existed, new housing where a railway embankment divided the city, and a NORAD facility that remained operational.

Steve was a mentor to many younger professionals in their early careers (including yours truly), had an abiding belief in the good work that planning accomplishes, and he absolutely loved getting a leg up on our friends in senior levels of government.

At 65 years young, it seems to be a much too early exit for a fellow who was such a character in all senses of the word. He was one of a kind, he was one of us, and he shall be missed.

~ Jeff Celentano, RPP

Mary Margaret Rose, RPP (Ret), FCIP, 1941–2017

Planner, architect, trendsetter. We have lost a unique individual.

Mary Rose was the first female planner/architect at the consulting firm of Marshall Macklin Monahan in Toronto, and later became principal planner and vice-president. In 1993, Mary established her own consulting company and in 2000 she was made a Fellow of the Canadian Institute of Planners in recognition of her contributions to the profession.

I met Mary in my very first job as a municipal planner for the Township of West Gwillimbury in 1989. She had been contracted to update the official plan and I was hired as a township planner. Being a true professional, Mary undertook the task of teaching me about official plans and continued to mentor me throughout my entire career. She never tired of answering my many questions, and taught me the principles of good land use planning. She was my sponsor when I applied to become member of OPPI, and ensured that my application went smoothly.

Most importantly, Mary taught me what it took to be a professional planner and the hard work and dedication that was required. She followed my career the rest of her life, and loved to hear what the most recent political firestorm was all about. Her sense of humour and love of life shone through at all times and I was very fortunate to count her as a dear friend.

~ Ruth Coursey

Peter Smith, RPP, MCIP, 1939–2017

Contributing over five decades of professional planning was a source of pride for Peter J. Smith.

After earning his planning credentials at the University of Leeds and University of Liverpool, England, Peter became part of the 1960s "British Invasion" (of planners), who immigrated to Canada to assist in managing post-war economic expansion. In 1996 he joined Weston Consulting where he practiced until his retirement in 2011.

Peter's career was defined by his service to his clients and profession. He will be remembered by many for his integrity, the generosity with which he shared his knowledge, mentorship of young planning professionals and, of course, his wry British humour.

An active member of OPPI, Peter served as a member of Council, chair of the Private Sector Advisory Committee, coordinator of the Excellence in Planning Awards and was a 2005 recipient of a Membership Service Award.

His professional experience was comprehensive. It spanned urban and rural planning, growth management, environmental planning, strategic policy, development planning, transportation planning, international development, and expert witness testimony.

Standing well over six-feet tall and ever appropriately dressed, while he may have appeared an imposing fellow, Peter was always courteous and good humoured. He will be missed.

~ Weston Consulting

BOOK REVIEW

New releases

By Dave Aston, RPP, contributing editor

Looking ahead to upcoming book reviews and Google searching for planning books, quickly confirmed the role and integration of the planning considerations at a global, national, regional and local scale. The range of topics for new releases in 2017 continue to reflect issues and opportunities in shaping our communities and understanding cities and their relationship with culture, heritage, greenspace, regeneration and design.

The following 2017 releases may be of interest to readers:

Seeing the Better City – How to Explore, Observe and Improve Urban Space (Charles R. Wolfe)

Streetfight - Handbook for an Urban Revolution (Janette Sadik-khan, Seth Solomonow)

Making Urban Nature (Piet Vollaard)

A New Urban Vernacular – Developing Sustainable Housing Prototypes for Cities based on Traditional Strategies (Terry Moor)

Planning for a City of Culture (Shoshanah Goldberg-miller)

Shaping Cities – Emerging Models of Planning Practice (Rahul Mehrotra)

Baltimore – Reinventing an Industrial Legacy City (Klaus Phillipsen)

How to Kill a City – Gentrification, Inequality, and the Fight for the Neighborhood (Peter Moskowitz)

Farmland Preservation – Land for Future Generations (Wayne J. Caldwell, Stew Hilts, Bronwynne Wilton)

Green Wedge Urbanism – History, Theory and Contemporary Practice (Fabiano Lemes de Oliveira)

The Past and Future City (Stephanie Meeks)

I encourage readers to share with me any books they come across that should be made known to other professional planners. We will attempt to share this information through this section of the journal. If you are interested in completing a full book review, please contact me at daston@mhbcplan.com.

Dave Aston, MCIP, RPP is vice-president with MHBC Planning, Urban Design & Landscape Architecture and has been completing book reviews for the OPPI Journal for numerous years.

LETTERS TO THE EDITOR Members are encouraged to send letters about content in the *Ontario Planning Journal* to the editor. Please direct comments or questions about Institute activities to the OPPI president at the OPPI office or by email to the executive director. Keep letters under 150 words. Letters may be edited for length and clarity.

Investing in knowledge

By Andrea Bourrie, RPP

Information is a strategic asset and, in the context of the planning profession, big data sets have the potential to help us make our communities more liveable. As planners we juggle lots of inter-related issues, using many different tools to anticipate the future and craft effective policies. Organizationally, OPPI is investing in professional knowledge and skills development using a rich blend of data and information.

The OPPI Planning Knowledge Exchange is premised on gathering the best of the best ideas and current research about planning initiatives and innovations. Uncovering trends and insights and offering policy and tactical solutions to challenges facing today's professional planners.

The INSPIRE OPPI strategic plan incorporates data to position the planning profession in Ontario to effectively prepare for future challenges. Real-time data—concerning member demographics, engagement preferences, value perceptions, volunteer time commitment—and some analytics helped Council predict the needs of the future and align the Institute with substantive priorities. The result is strategic directions that promote the public interest, support the profession and members and sustain the organization. Ongoing data collection and meaningful analysis will enable Council to keep the strategic plan current and relevant.

URBAN DESIGN

Policy vs. guideline

By Eldon Theodore, RPP

The role of design, from the rural context to the urban context, has been growing in importance as a positive contributor to land use planning. There is no greater evidence of this than the recent changes to the *Planning Act* which makes design a matter of provincial interest. Section 2 calls for "…the promotion of built form that is well-designed, encourages a sense of place, and provides for public spaces that are high quality, safe, accessible, attractive and vibrant." Design has a key role in ensuring our community building efforts achieve places that are healthy, safe, desirable and engaging for people of all ages.

But there is an ongoing debate as to which approach is most effective in achieving good design. Some in our profession believe a prescriptive approach through firm policy language is necessary to achieve those goals. Others believe a more flexible approach through guidelines is the more effective tool. The following explores the benefits and drawbacks of these two most commonly used tools to implement a desired design direction.

Design through policy

The benefit of the policy approach—directions enshrined in policy documents such as official plans and secondary plans—is the certainty it brings by articulating design principles that reflect the standard for local community building. Examples include elements such as building stepbacks from property lines, angular plane and street wall percentages. The policy indicates the direction's level of importance through words such as "shall" and "will" to reflect a requirement, or "should" and "would" to indicate an option and to offer flexibility. As the design principles are part of a statutory document, they represent applicable law so applications must demonstrate conformity. As a result, this approach tends to carry more weight than design guidelines at the Ontario Municipal Board, should disputes arise.
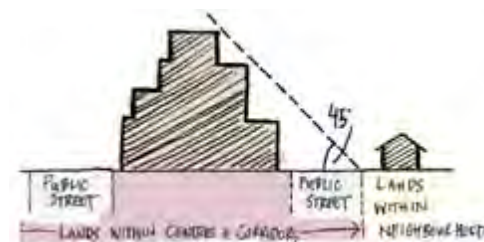
The drawback to this approach is the potential to over control the outcome within a community. Providing too much design direction in policy documents can create an inflexible policy regime that lacks the capacity to adjust to evolutions in the marketplace and emerging innovations in design. Every situation or context cannot be anticipated. Should unique proposals come forward, the need to amend policy documents may discourage community building opportunities, making it difficult for new and creative interventions to be considered.

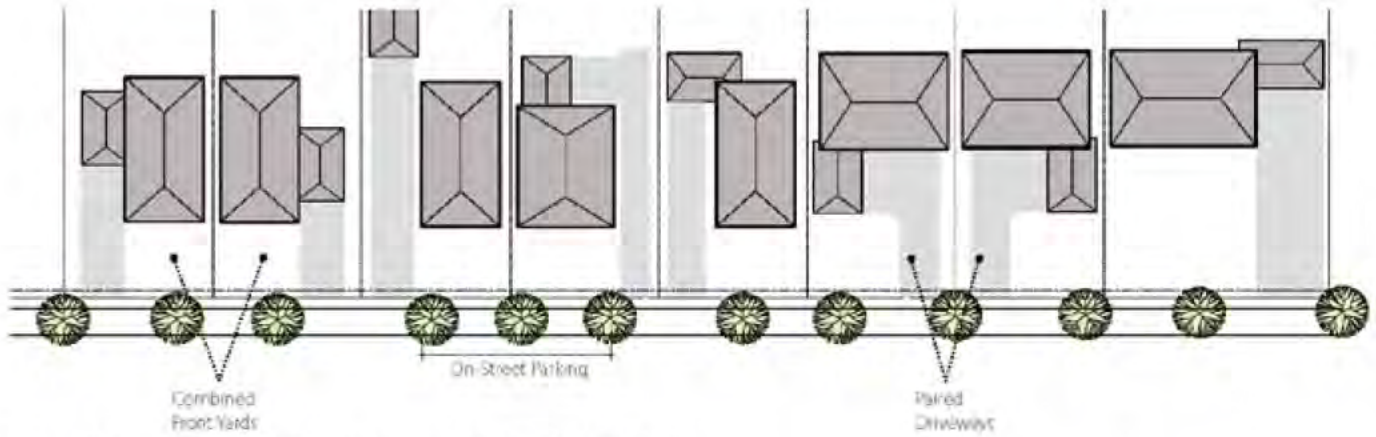**Example of angular plane policy from Richmond Hill Official Plan**

Design through guideline

The benefit of the guideline approach is the recognition that while good design is important, it can be subjective. Design guidelines offer direction on built form and site elements that help achieve a sense of place, local identity and compatibility with the surrounding context. They represent a standard from which the municipality and an applicant can work towards achieving a desired design vision and objectives. Guidelines

Example of driveway placement in architectural control guidelines by MHBC

can be stand-alone documents, crafted to fit a context (such as employment areas, unique neighbourhoods, or active corridors) or an element (such as tall buildings, townhouses or community parks). Guidelines tend to be less prescriptive, and are thus potentially receptive to new ideas and innovations as they emerge.

The drawback to this approach is that the guideline's success is largely dependent on collaboration between the municipality and the developer to achieve the design direction. Frustration can occur when developers do not adhere to the guidelines. In response municipalities can become rigorously prescriptive in their use of the guidelines. Similarly, frustration resulting from the prescriptive application of guidelines, or decisions to veer beyond the guidelines, can lead to rejection of the design direction by developers. When conflict occurs and the design direction is challenged, guidelines do not carry the same weight as policy documents at the Ontario Municipal Board.

Moving forward

The best way to implement great design is to strike a balance using both approaches: policies and guidelines. Key design principles should be enshrined as policy in statutory documents. But these should be limited to those design principles that achieve local identity goals and objectives, and reinforced with language that demonstrates they are non-negotiable. The details should be deferred to the guidelines, which allow variations in developments based on the realities of what is on site and in the surrounding context.

Continued conversations among all parties are essential to
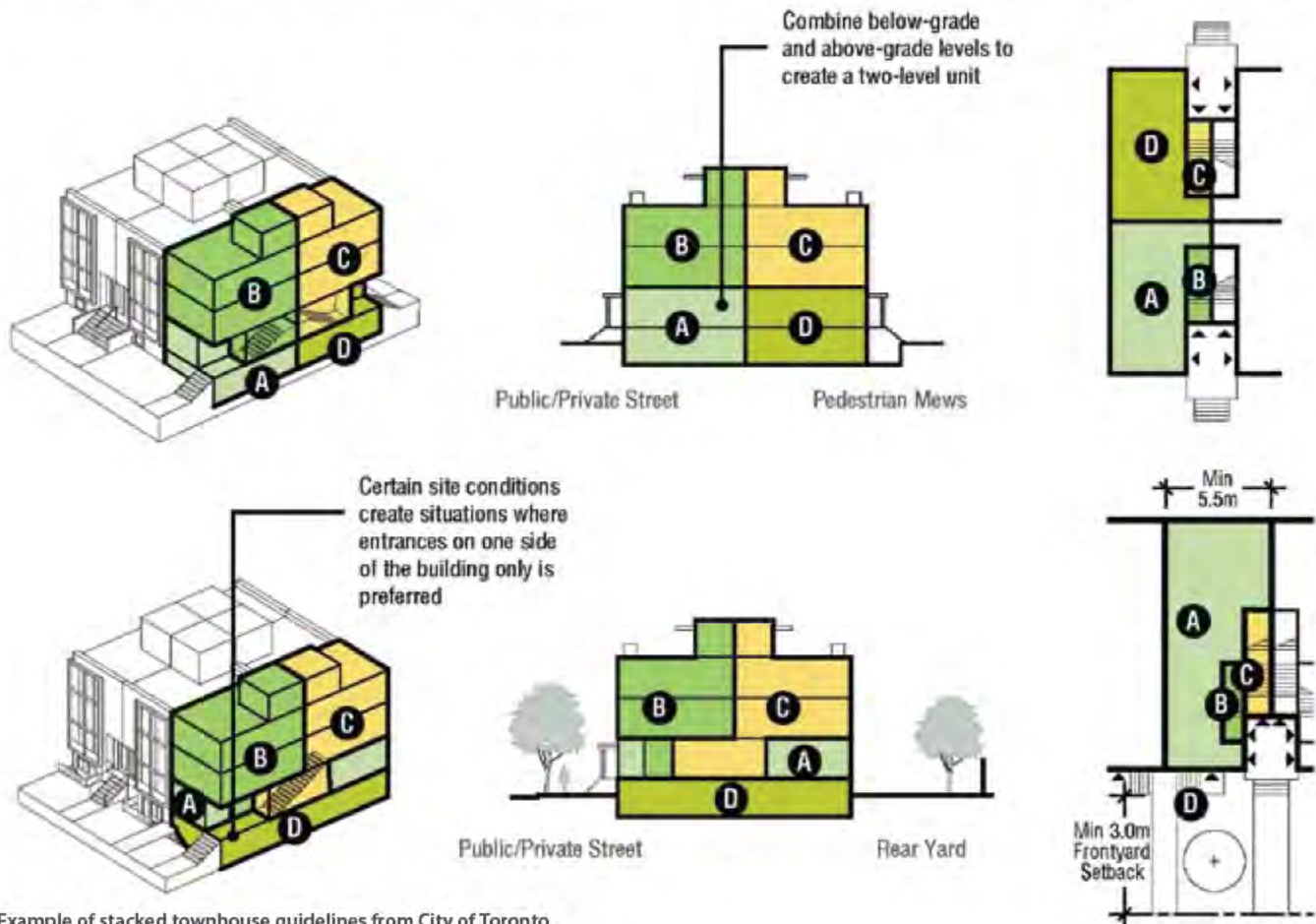
Example of stacked townhouse guidelines from City of Toronto

achieving municipal design goals, while leaving room for innovative opportunities to emerge. Programs that expedite approvals in return for meeting key design criteria, or celebrate efforts through annual design awards are just a few examples of ways to achieve shared objectives. Whether it is policy or guideline, good design should be the common goal and shared outcome on everybody's agenda.

Eldon Theodore, MUDS, MCIP, RPP, LEED AP is a member of OPPI and is a partner with MHBC specializing in urban design and sustainability. Eldon is chair of OPPI's Community Design Working Group and outgoing treasurer and director of the Congress for the New Urbanism's Ontario Chapter.

Work at play

By Rob Voigt, RPP, contributing editor

Play is a verb meaning to engage in activity for enjoyment and recreation rather than a serious or practical purpose. Not exactly what first comes to mind when talking about the planning profession. However, in my own practice I have been able to integrate play into planning with great success, as have others. While this is not a new idea, there is an overall lack of awareness about the many ways play can aid planning work.

Through play we can increase curiosity and creativity. By its very nature it is enlightening and supports problem solving, and in that respect is similar in many ways to the design process. Play involves iterative ideas and challenging the parameters that frame an issue, and it can also support collaboration. Depending on the tools used, play can also reduce barriers associated with language, expertise and age. For participants, the act of play can open up ideas and communication that adults often find difficult in professional group settings. When we add a component of play into our work it can also change the interpersonal dynamics of the collaboration and critique within groups. Play can simplify complex challenges making them easier to understand, and it gives people a less intimidating way of being open with sharing one's ideas.

Play has entered my practice in a variety of ways. I have used visual scavenger hunts (when disposable film cameras were the least expensive and portable option) and geocaching as ways of getting people to explore their communities or major redevelopment sites. I have designed a playing card deck where each card presents a different element of an active transportation plan and can be used to share the plan and develop various implementation strategies. I have created giant (3m X 6m) puzzles of neighbourhoods for people to build as part of design charrettes to increase awareness and collaboration. I have played with action figures in the mud and sand with city officials as part of what nature play expert and designer Adam Bienenstock and I call the Sandbox Charrette. With these and many other ways of integrating play into planning

work, not once have the results been less than professional, nor have the participants been disappointed with the results. In fact, projects that have included elements of play have been easier to manage, and more successful.

Another excellent example is the use Lego® building blocks as a planning tool. This was presented at the 2016 OPPI Symposium and at recent OPPI District events as well. In this form of play, the ubiquitous Lego® children's toy is transformed into a planning tool by ascribing specific meanings to the various building blocks and allowing the participants to tackle planning challenges by arranging the block as they see fit. There are also examples of adding technological components to this that provide more feedback and information for the participant. An October 16, 2015 article on CityLab.com, "Using Legos as a Legitimate Urban Planning Tool," describes a process where MIT is using a combination of interactive 3D table-top projection mapping and moveable Lego® pieces to simulate the effects of design decisions on a transportation system. Even with this added sophisticated technology the power of play is most profound as a way of bringing down barriers to participation.

Over recent years, there has been a significant increase in the availability of online collaborative games where players essentially create their own worlds. These are called sandbox games. The most widely used and successful of these is Minecraft. No doubt inspired by the Lego® play experience of building with interconnecting blocks, Swedish game designer Markus "Notch" Persson created Minecraft®. In Minecraft® players construct the elements of their online worlds out of 3D cubes. These cubes have various textures and properties; some mimicking the real world, others with magical attributes. In 2012, Minecraft® owner Mojang partnered with the United Nations Human Settlements Programme (UN-Habitat) as a way of working with citizens on planning and urban design issues.

Called Block by Block, the Mojang / UN-Habitat program is designed to involve youth in the planning process in urban areas by giving them the opportunity to show planners and decision-makers what they envision for their communities. Volunteers from the Minecraft® community build scale replicas of the study areas, then the participants adapt these models by removing, building and reshaping them to illustrate their design ideas for their community. This program has been used in communities in in Africa, Latin America and Asia. By using an online game, communication barriers have been broken down and professionals have been able to work more directly and collaboratively with members of these communities.

These are just some of the examples of how play can effectively be integrated into planning practice. By adding characteristics of enjoyment and informal structures to some of our activities, planners could be rewarded with more successful projects. A day at work could sometimes be a day at play.

Robert Voigt MCIP, RPP is a professional planner, artist and writer, recognized as an innovator in community engagement and healthy community design. He is a senior practitioner in Planning, Landscape Architecture & Urban Design at WSP Canada, chair of the OPPI Planning Issues Strategy Group, and publisher of Civicblogger.com. Contact: @robvoigt, rob@robvoigt.com.

Duelling Forecasts

By Kevin Eby, RPP, contributing editor

The province has embarked on a number of initiatives intended to update the policies managing growth in Ontario and, in particular, within the Greater Golden Horseshoe. The results of these initiatives, which include the Coordinated Land Use Planning Review—review of the *Growth Plan for the Greater Golden Horseshoe, Greenbelt Plan*, the *Oak Ridges Moraine Conservation Plan* and the *Niagara Escarpment Plan*—and a review of the Ontario Municipal Board, are expected to be released later this year. Any policy changes resulting from these initiatives will be reviewed here in upcoming issues by experts in the field.

While these provincial initiatives have the potential to significantly impact how growth is managed throughout the GGH, there is an issue with potentially even bigger implications that to date has not been part of the review. Municipalities are required to use the population and employment forecasts contained in *Schedules 3* and *7* of the Growth Plan "for planning and managing growth in the GGH."[1] The three primary uses for these forecasts include: completion of land needs assessments (determining the amount of land required to accommodate forecasted growth); development of infrastructure master plans (determining the infrastructure necessary to service the forecasted growth); and creation of development charge by-laws (determining how much growth should pay through development charges).

The Growth Plan forecasts, which were last reviewed by the province in 2012 and incorporated into the Growth Plan in 2013, represent trend-based extrapolations of demographic, immigration and migration data available for the GGH, with the resulting forecasted population being distributed across the GGH based on the policy objectives of the Growth Plan. However, these are not the only provincial projections of the amount of growth that is expected to occur within the GGH. The Ministry of Finance also issues growth projections for Ontario municipalities. The finance ministry projections reflect the same basic demographic and migration / immigration assumptions as the Growth Plan forecasts, but they do not reflect policy-based assumptions or preferences for the distribution of growth. MOF projections are updated annually, while the Growth Plan forecasts remain frozen in time until reviewed by the province.

The report, Plan to Achieve: A Review of the Land Needs Assessment Process and the Implementation of the Growth Plan[2], released by the Friends of the Greenbelt Foundation in July 2016, examined the relationship between the Growth Plan forecasts and the 2016 MOF projections.[3] It concluded that the Growth Plan's GGH population forecast for 2041 (13,480,000) exceeded the more up to date 2016 MOF population projection (12,994,000) by approximately 486,000.

If the City of Toronto is eliminated from the calculations, the Growth Plan forecasts a net growth in population of

3,812,000 for the remainder of the GGH between 2011 and 2041 compared to the corresponding MOF projection of 2,983,000. The contrast is even starker in the Outer Ring communities, where the Growth Plan forecasts 1,164,000 in net population growth from 2011 to 2041, as opposed to 636,000 in the MOF projections.

There are only two realistic options available to the province to facilitate achievement of the policy-related population distribution anticipated by the Growth Plan: significant investment in transportation and other infrastructure to make outlying areas more attractive to new businesses and residents; and imposing restrictions on land availability in other municipalities.[2] As I concluded in the foundation's report, "the province is not well positioned to accomplish either option."[2] This is due to the huge demands for infrastructure investment compared to available funds, the slower than expected growth within the GGH, and the fact that the majority of growth the policies seek to redistribute would otherwise occur in the City of Toronto or within the built-up areas of the Region of Peel and therefore be unaffected by land restrictions. While some growth may be diverted to the outlying regions due to the increasing cost of housing in the Inner Ring of the GGH, any benefits associated with lower housing prices in the Outer Ring may, to a great extent, be offset by longer and more costly commutes to work over time.

So what does this mean for municipalities? In the Region of Durham, the Growth Plan's forecast of net population growth between 2011 and 2041 exceeds the MOF projection by 251,000. If the MOF projection proved to be accurate, this would result in a shortfall of 44.6 per cent from the net population growth otherwise provided for in the Growth Plan forecasts. Similar shortfalls in forecasted net population growth would also be experienced in many other municipalities throughout the GGH, including the Region of Niagara (52.5 per cent), Region of Waterloo (43.7 per cent), Simcoe County (38.3 per cent), City of Hamilton (29.9 per cent), Region of Halton (17.6 per cent) and Region of York (6 per cent).

The amount of land needed to accommodate urban development and the quantum of development charges to be collected are relatively proportionate to the rate of growth. If the MOF projections were ultimately proven to be more accurate than the Growth Plan forecasts, municipalities would have collectively over-designated land for urban uses to 2041 by thousands of hectares, while at the same time under-collecting the development-related revenues that are required to pay for the servicing of such lands by several billion dollars. This could seriously impact both the province's efforts to contain sprawl and municipal efforts to achieve financial sustainability.

The recent release of the 2016 Census population and dwelling counts[4] provides an early indication that population growth is trending far closer to the MOF projections than to the Growth Plan forecasts. Overall, the GGH experienced population growth of 488,000 between 2011 and 2016, compared to forecasted growth of 635,000[5] (both net of undercounts). From 2011 to 2016, the regions of Waterloo, York and Durham and the City of Hamilton all experienced shortfalls in forecasted net population growth of between 35 and 40 per cent, while the regions of Halton and Peel, Simcoe County and the City of Toronto experienced shortfalls of between 10 and 15 per cent. In addition, although the corresponding 2016 Census data have yet to be released, it

would appear that many municipalities are experiencing similar shortfalls in relation to forecasted employment.

The Growth Plan requires the province to review the *Schedule 3* and *7* forecasts "at least every five years." With the recent release of the 2016 Census population and household data, and the corresponding release of the employment data planned for later this year, it would appear to be timely for the province to embark on such a review sooner rather than later.

Kevin Eby, B.Sc, MA., RPP is a member of OPPI and the new OPJ provincial news contributing editor and the former director of Community Planning with the Region of Waterloo. He previously worked on secondment to the province to help with the formulation of the original Places to Grow: Growth Plan for the Greater Golden Horseshoe.

Endnotes

1 Ontario Ministry of Infrastructure (2006). Growth Plan for the Greater Golden Horseshoe. June 2013 Consolidation.
2 Eby, Kevin, *Plan to Achieve: A Review of the Land Needs Assessment Process and the Implementation of the Growth Plan (2016). Friends of the Greenbelt Foundation.*
3 Ontario Ministry of Finance (2016). Ontario Population Projections Update 2015-2041
4 Statistics Canada. 2016 Census.
5 Hemson Consulting Ltd. (2013). Greater Golden Horseshoe Forecasts to 2041. Technical Report (November 2012). Addendum.

ELTO

Local appeal board process unpacked

By Ian Flett, contributing editor

Toronto's local appeal board is set to change how minor variance and consent appeals are heard. I had the chance to discuss what the new board will mean for planners in a conversation with the TLAB chair Ian Lord.

While planners who work in Toronto shouldn't expect much to change in terms of the evidentiary burden and providing acknowledgements of expert duties, they can expect to be learning a very different approach to how appeals are handled.

First, the board is expecting more work to be done "up-front" to avoid surprises. Lord says one of the issues that emerged from TLAB consultations was the inefficiency and unfairness of "trial by surprise." TLAB's process is intended to prevent last minute changes to applications and unannounced challengers showing up on the day of the hearing.

Shortly after a Notice of Appeal is filed, the board will issue a Notice of Hearing. Unlike the OMB's hearing appointments, TLAB's notices will be more akin to the OMB's Procedural Order. A TLAB Notice of Hearing will indicate a series of important dates to all the interested parties. These include a date when a final application concept will be "locked-in," thereby preventing changes to the application ahead of a hearing, a deadline for the

identification of parties and participants, followed by dates for exchange of witness and participant statements and reply materials. Lord is also pushing for a 30-day "cooling off" period ahead of the hearing, during which no motions may be filed with the TLAB.

The second major practical shift is that all materials are expected to be served and filed electronically. Those materials will be publicly available well ahead of a hearing. Lord sees the public record leading up to a hearing as an important step in ensuring the procedure is fair for the parties and one which may also help encourage mediated settlements.

During the hearing, materials will be called up electronically at the hearing by counsel or the witness. The board member will have access to the documents through a screen at his or her desk, screens will be available to each party and the witness. Lord indicated this degree of electronic integration is well ahead of most of Ontario's other administrative tribunals. It presents some technical challenges and Lord says he has looked for help from the courts that already have electronic filing procedures in place for document-heavy matters. Bringing new documents to the hearing to be marked as exhibits will be frowned upon (but there are provisions to make the technology capable of entering documents during a hearing). Lord says TLAB is nevertheless aspiring to be a "paperless" tribunal.

Lord indicates the heavy reliance on technology introduces challenges and opportunities with respect to accessibility. On the one hand, some tools will make material more universally accessible by providing visual and audio enhancements. On the other hand, parties getting involved in a hearing will need to have access to a computer and have a degree of comfort with computer technology to effectively participate in the preparation and hearing of a matter.

Unlike the OMB where hearing transcripts are rare unless arranged by a party, all TLAB hearings will be digitally recorded and made publicly available. With that said, the decision-maker's notes will be confidential.

Considering the verbatim recording of evidence and its widespread availability, planners may consider providing a more detailed articulation of the analysis underlying their opinions to avoid having their words read back to them from another hearing with the suggestion they have changed their opinion on a given question.

The current TLAB members are receiving extensive training from the Society of Adjudicators and Regulators. That training runs the gamut from primers in administrative law, decision writing skills and mediation skills development.

A major focus of TLAB members will be to review cases for their settlement potential and direct that parties meet with a board member for an attempt at mediation. While parties may terminate the mediation session without an agreement, parties will be expected to meet for an assisted negotiation.

There are also some legal aspects of how the TLAB and the OMB will interact. If a matter triggers overlapping jurisdiction between the TLAB and OMB, then the OMB will hear the matter. For example, a zoning amendment application that might include a severance, would be considered exclusively by the OMB.

Despite TLAB's intention of limiting the surprises that dogged hearings at the OMB, one surprise remains: The identity of the member assigned to an appeal will be announced on the day of the hearing.

Ian Flett practices municipal and administrative law at Eric K. Gillespie Professional Corporation. Ian dedicates his pro bono hours to better cycling infrastructure in Toronto.

Showcase your skills

DON'T BE LEFT BEHIND! Join the more than 80 per cent of OPPI Members who list their skills and expertise in OPPI's database. Listing these in your OPPI Member Profile allows Members to search and find you based on your specific skills. OPPI is also often looking for subject matter experts to provide input and advice on the development of educational content, policy work and building communities of interest. Log into your Member Profile, click on "Specialties and Skills" in the "About Me" section, and select the relevant skills. To search for other Members by skill, click on "Find a Member."

And hire a Summer Student!

Summer is fast approaching, and it's time to start thinking about employing a summer student or intern. Support student planners along their professional journey. Contribute to the future of the planning profession.