Smart Cities: Toronto & Portland

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ABSTRACT
Smart cities are the world's innovative answer to numerous areas of need in society today. They focus on providing affordable housing to treat homelessness and the population boom, technological enhancements in transportation for safety and accessibility, a new aesthetic of a what a beautiful city of innovation could be, and much more. In this paper, we discuss one of the reasons for building a smart city that has not been extensively promoted: climate change. As conservative estimates for the climate change continue to underestimate the rapidity of the warming, climate change has become ever more present in the conversations and policies of cities.

We then look at Sidewalk Toronto, Google's smart city project to build a smart city from the ground up in Toronto, Canada. Sidewalk Toronto's transportation plans aim to reduce the number of private vehicles in the city, leading to many benefits (including climate change), but the project is overshadowed by concern. Data collection and use is a large concern surrounding Sidewalk Toronto. How will Sidewalk Toronto address this issue? It would seem that this great concern has yet to be given a clear solution by Google. Thus, the public concern does not end, and the data concerns continue to outweigh the other innovative plans set out for Sidewalk Toronto.

After discussing Toronto, we examine a city that has already begun implementing smart city initiatives: Portland, Oregon. Contrary to Toronto, Portland has integrated smart city implementations into the pre-existing city. Many of these initiatives have appeared in the form of new means of transportation. In addition, Portland has taken a different approach to smart cities and data than Toronto. While in Toronto, there was the scenario of technological companies taking the lead on planning and collecting data without working with the public and government, Portland has come alongside the people. In acknowledging the importance of data privacy, Portland has come up with seven principles to ensure that the city works with data in a positive way for both technology and the public.

In summation, building or integrating smart cities could potentially provide numerous benefits for society today. As described previously, climate change is one aspect that smart cities could aim to improve. Smart cities in Toronto and Portland have shown through their transportation plans how such greener plans are possible. However, these smart cities must be careful to approach data carefully, as Portland did, coming alongside the public to find sustainable solutions.

KEYWORDS
Smart city, Climate change, City beautification, Accessibility, Population, Homelessness, Safety, Transportation, Sidewalk Toronto, Data privacy, Portland, SmartCityPDX

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1 Introduction

Smart cities are the world's innovative answer to numerous areas of need in society today. It focuses on providing affordable housing to treat homelessness and the population boom, technological enhancements in transportation for safety and accessibility, a new aesthetic of a what a beautiful city of innovation could be, and much more. One issue that we discuss in this paper is climate change, an increasingly prevalent problem in today's society around the world. For such a large problem in countries around the world, climate change is not emphasized in reasons for building a smart city. We thus hope to discuss the issue and how smart cities could help remedy it in depth in this paper.

We also plan to discuss two smart cities in particular: Toronto, a smart city that will be built from the ground up in a section of the city, and Portland, a city that has already begun implementing smart city initiatives throughout itself. We will focus on the transportation plans/implementations, in order to provide an example of smart cities, as well as illustrate the reasons for building a smart city outlined in previous sections.

2 Climate change

City life is no longer a lifestyle of just city-folk, as rural communities are abandoned and urban sprawl is replaced by big

development and dense populations. In fact, Rural areas cover 97 percent of the nation's land area but contain 19.3 percent of the population (about 60 million people), (US Gov 2016). As we near the first quarter of the century, scientists and political pundits have acknowledged and demanded we act responsibly in how we develop these urban environments. Climate change is not a hoax.

Figure 1: Scientific consensus on human caused global warming, and published climate research.

So if climate change is indeed happening, and caused by human activity, what is being done to stop it? Currently, there is a worldwide Paris Climate Accord which took place in 2015 in an effort to coordinate the global goals and efforts to curb and reverse climate change (Brief 2018). Although the US currently has no plans for carbon neutrality (which is necessary to reverse climate change), many US cities have anyway promised carbon neutrality, or 80-100% reduction, by 2050 (Alliance 2018). Other government actions, such as Climate Emergency (HuffPo 2019) and the Green New Deal (Merkley 2018) sponsored by Oregon Senator Jeff Merkley and introduced by Portland, Oregon congressman, Earl Blumenaur, respectively, call for even more immediate action, but have not yet passed through enough government red tape to become federal law. Toronto and Portland, Oregon are both partners of the Carbon Neutral Cities Alliance.

2.1 Public demand is increasing

Even as city officials scramble to meet the demands of the world's scientists, public opinion is reaching a tipping point as well. Organizations like Greenpeace, The Sunrise Movement and most recently, Extinction Rebellion have globally mobilized to amplify the voices of marginalized victims and refugees, and future victims of climate change. They plead for the government officials to heed scientific voices, such as the IPCC, which is there to inform policymakers but is largely being ignored. They claim to want to put an end to the toxic system that has led to what most scientists are saying is an irreversible collision with 1.5 degrees Celsius global warming. Led by sometimes younger voices, like Greta Thunberg, 16 at the time of this writing, who has now spoken at the United Nations Climate Change conference, and has made so many waves, she won the Ambassador of Conscience Award from Amnesty International. The public demand is increasing, with obstructions in London that amounted to 6000 climate activists shutting down 5 bridges, amassing 85 arrests. (BBC 2018). This has rippled to our city, Portland, where hundreds of protesters shut down the streets around city hall for 4 hours on the 21st of June, in 2019. (Fox 12)

Figure 2: Fox 12, Oregon reports on the climate protest live.

2.2 Promises of no new fossil fuel infrastructure unkept.

You'd think over this growing public interest, the least city officials would be able to do is keep their promises, such as the popular expression, "No new fossil fuel infrastructure." which was indoctrinated as an official resolution in Portland in 2015. But these promises are not being kept, at least in Portland Oregon, where the Zenith Tar Sands Project is set to expand production efficiency four fold. (Sierra 15)

2.3 The Zero-Carbon City

A leader among the Extinction Rebellion movement has some ideas regarding how cities of the future might evolve to reverse climate change. Paul Chatterton, in a chapter 27 of "This is Not a Drill" says there are four main areas we need to address to attain the Zero-Carbon City.

2.3.1 Distribution of Power

First, we have to address the distribution of power. We can do this with local smart grids, solar and off-shore wind energy, and constellations of distributed and highly connected zero-emission energy providers.

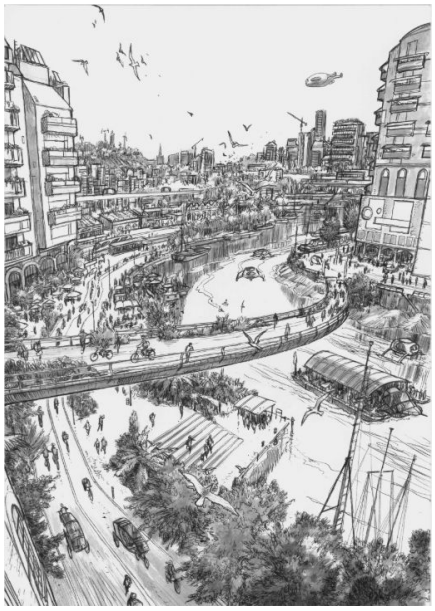

Figure 3: Unlocking Sustainable Cities - The Car Free City, pg 16.

2.3.2 Car Free City

Second, is the area of transport. The city's population must break free from fossil fuel powered single person transport vehicles. The low hanging fruit of bike lanes and mass transit are great, but cities must move toward commonly owned zero-emission transport. In his book, Unlocking Sustainable Cities, Paul devotes an entire chapter to this, calling it the Car-Free City. He describes how we are placing ourselves further away from our destinations simply by building increasingly larger roads and parking lots. (Sustainable 19)

2.3.3 Bio City

Third, is the Bio City. Cities by their nature tend to be wasteful and non-regenerative, often creating seemingly endless amounts of pollution in the air, water and lands, while seldom providing their own resources, such as water or food. In order to rethink the urban nature so that people can feel more connected to what gives life, the natural world, Paul mentions we can use biomimicry inventions such as living walls, farming rooftops, vertical sky gardens and breathing buildings. With these ideas and more, it's possible people will be able to reconnect with the natural world while living in an eco-friendly, and safe environment. More ideas may be drawn from the 12 Principles of Permaculture by David Holmgren, pictured below (Holmgren 2009)

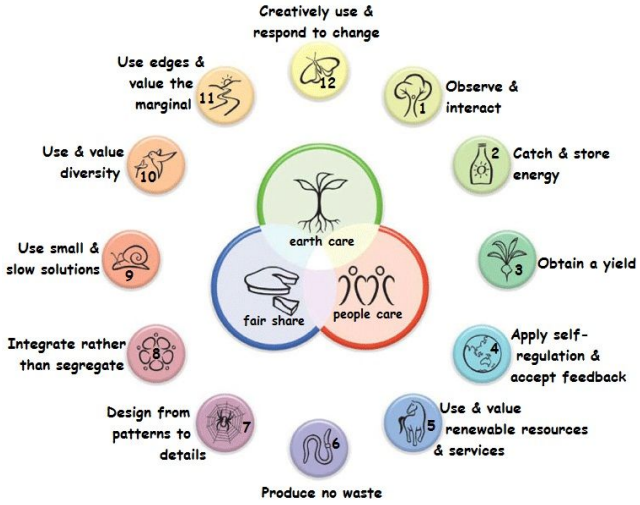

Figure 4: The 12 Principles of Permaculture by David Holmgren

2.3.4 Common City

The fourth area of action that Paul mentions is the Common City. In order that each city lives up to its potential, it should provide more common ownership, solidarity movements, community wealth, citizen forums, civil disobedience and efforts to reclaim high streets (main street) and reclaim land. The concentration of wealth and power can corrupt a city and bend it to the will of the few, and powerful, who may not even live in the city itself. (XR 27). We are all familiar with how corporate brands such as Nike and Starbucks have extended their reach into high streets and malls across the world. The New Economics Foundation in the UK has tracked this creeping corporate takeover of high streets (main streets) through its 2007 report, Clone Town Britain, documenting how the increasing domination of large chain stores is leaving communities and high streets vulnerable to economic shocks. (Sustainable 92)

An example of a city struggling to regain its power, would be Portland in July of 2019 suddenly permitting an exboriant hotel to build on a cultural landmark. Portland suffered the invasion of the The Ritz-Carlton Hotel Company, LLC who plans to build a 35 story, luxury condo / hotel where a lot of food trucks once stood, in a vibrant downtown area. The tradeoff was the LLC putting eight million dollars towards affordable housing. Though at first glance this seems like a fair trade-off, it would not be worth the 600 million dollar building, according to many citizens, who could probably afford to pay such a price without the displacement of so many food trucks and the environmentally unsanitary construction of a building in an already crowded downtown area. (Ritz 19). Given the choice, it'd be obvious to most people that this was not a good deal for common citizens of portland, 99% of whom would never be able to enjoy a Ritz hotel

stay or luxury condo home, but could have easily enjoyed the culturally diverse cuisine at the food truck site. This is also a major lost opportunity for new businesses to be born and thrive in the area. One of the great successes of Portland, and an important part of its culture, is the graduation of many food trucks into eventual brick and mortar buildings as their nourishment wins the hearts of the populace. (Ritz 19)

Figure 5: Ted Wheeler with developers breaking ground at the food truck site. (Ritz 19)

In another example, Portland shows its cracks in public involvement when its newly elected city commissioner becomes outraged when she finds over a million dollars worth of boulders are being placed in public areas in order to deter homeless.

Figure 6: Boulders placed to deter homeless in Portland. Willamette 19.

Here's a quote from an article, "Hardesty, a first-term commissioner and longtime activist, suggested the Department of Transportation spend those funds on shelter for the homeless instead: "ODOT, how about providing some tents? How about some tiny houses?" (Hardesty 19).

2.4 Thriving in a crowded, climate conscientious city

Ultimately, whether or not a city succeeds in its goals of becoming climate neutral, will depend on its citizens. This quote from Jeff Holden, CFO of Uber, says a lot: "The number one factor that determines whether or not someone can escape poverty is not schools, or crime, it is commute time" (Future 2016).

3 Toronto

Toronto, Ontario, Canada is one of the latest cities to join the smart city initiative. In 2018, plans were released for the "Sidewalk Toronto" project to be built on a 12-acre lot in an area at the waterfront of Toronto. Sidewalk Toronto is a Google-run collaboration project between Sidewalk Labs, a Google-affiliated company, and the city of Toronto. It is a project to build a smart city from the ground up. While the 12-acres of land, to be called Quayside, will be the location of the initial Sidewalk Toronto project, Sidewalk Labs hopes to continue their innovation project in the east 800-acres of an area called the Port Lands (pictured below in Figure 7).

Figure 7: Outline of Sidewalk Toronto location, where the filled in portion is Quayside, and the rest is the east 800 acres of the Port Lands

3.1 Sidewalk Toronto's Transportation Plans

Sidewalk Toronto has released numerous plans and goals for their smart city transportation. Their hope is to create a "people-first" system that would, among other goals, aim to reduce the number of private vehicles in the city (Mobility). These innovations would align with the reasons for having a smart city outlined in Section 2, with decreasing numbers of vehicles in the city hopefully reducing emission levels. The following section will highlight some of these plans and goals, while emphasizing smart city motivations and this general schema.

3.1.1 Increasing the use of public transit

The first transportation goal of Sidewalk Toronto is to increase the use of public transit. Using real-time transit data, e.g., arrival or

departure times, etc., Sidewalk Toronto hopes to increase convenience and accessibility of public transit such that citizens choose public transit over their private vehicles as a means of transportation. In his article, "The real benefits of real-time transit data," Eric Jaffe of Sidewalk Labs states that they hope for "...a future where integrated real-time data from transportation options enable a true mobility system that rivals private car use on convenience" (2018). By utilizing real-time transit data, Sidewalk Toronto intends to make public transit a much more accessible and desirable option for citizens. In this way, as the use of public transit increases, the number of private vehicles within the smart city will decrease.

3.1.2 Decreasing the use of private vehicles

To continue their overall theme of reducing private vehicles in the city, Sidewalk Toronto has made plans to make the option of driving a private vehicle much less desirable for the average citizen. The first plan is the use of a robot to surveil a city block. If a driver stops at a curbside on the block, or parks anywhere on that block, the robot will take note of the vehicle. Depending on the length of time or even the decision to stop or park on that block, the driver could be charged with an expensive ticket by the robot.

Another plan is to keep a "real-time map of road pricing" (Jaffe 2018). If a citizen drives a personal vehicle into the city, Sidewalk Toronto would use a "road-pricing" map of the city in one of two ways: 1) depending on the time of day, the driver would be charged based on the number of miles driven within the city. For example, driving during rush hour would cost much more than driving at non-peak hours. The other option would be as follows: 2) the driver would be charged depending on the route taken in the city. Some roads in the city could cost more than others, possibly depending on the amount of pedestrian and cyclist traffic on each road.

In both solutions of city block surveillance and road pricing, Sidewalk Labs hopes to make driving a private vehicle into the city a much less desirable option by adding monetary consequences. Driving a personal vehicle into the city could become a much more expensive option compared to public transit. Thus, citizens would hopefully lean towards alternative forms of transportation in Sidewalk Toronto, leading to a number of benefits for society within the city.

3.1.2.1 Other benefits of reducing private vehicles

There are numerous possible benefits to decreasing the use of private vehicles in the city. Apart from the reason emphasized in this paper, climate change, reducing the number of private vehicles could lead to narrowing roads. If the number of cars on a road is reduced, the road need not have as many lanes as it did originally. If the number of lanes in the roads are reduced, more space becomes available for other beneficial uses such as room for natural greenery or homes to treat homelessness or population growth. Figure 8 below depicts an example of this, with the left and right sides showing possible "Before" and "After" scenarios of reducing private vehicles. In the "Before" left side, there are four lanes for vehicles, with parking lots and other structures for restaurants and shopping lining the sides. There is no greenery to be found. On the "After" right side, however, after reducing the number of private vehicles, the number of vehicle lanes decreases to two. Plentiful amounts of greenery and parkland fill the right side, with parking lots removed and other structures (restaurants, shopping, etc.) limited. Reducing vehicles and increasing nature within the city will also hopefully help to improve the climate in Toronto.

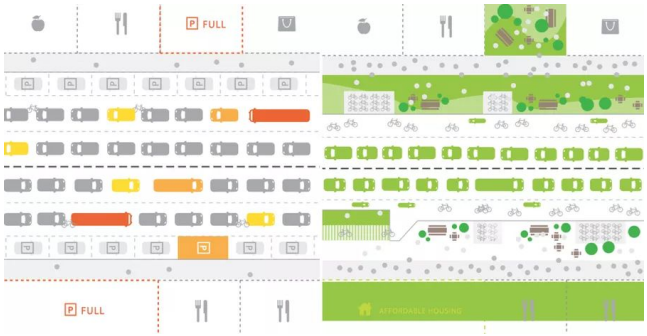

Figure 8: Example before and after illustrations of reducing the number of private vehicles in the city

3.1.3 Promoting Cycling and Walking

As part of their effort to reduce private vehicles as a common mode for transportation, Sidewalk Toronto hopes to promote cycling and walking in the city as well. This proves to be an interesting goal for the city of Toronto, which has a variety of weather conditions during the Fall, Winter, and Spring seasons such as heavy rain and snow. For cycling, they have introduced the idea of heated, lighted bike lanes. Not only will these bike lanes dry rain and melt snow to allow cyclists to bike in all seasons, but they will also provide a bright path for safe travel at all times of the day. Sidewalk Toronto hopes to thus have biking become a much more realistic and safe option for cyclists in all seasons.

For pedestrians, Sidewalk Toronto has introduced the idea of "building raincoats." These are described as a sort of structure attached to the sides of buildings within the smart city that will shield pedestrians from rain and snow. A prototype of a "building raincoat" is seen in Figure 9.

Figure 9: Prototype of "building raincoat" for Sidewalk Toronto

3.1.4 Increasing Safety

In promoting cycling and walking year-round, an issue Sidewalk Toronto would need to address is the safety of pedestrians and cyclists. In many cities today, traffic incidents are a prevalent issue. With the bustle and business inside the city, especially during peak hours, pedestrians and cyclists are susceptible to being hit by cars.

To address this issue, Sidewalk Labs came up with four principles to follow when they design and build the streets of Sidewalk Toronto. The list of their principles is below:

1. Tailor streets for different modes.
2. Separate streets by speed.
3. Incorporate flexibility into street space.
4. Recapture street space for the public realm, transit, bikes, and pedestrians (Ng 2019).

Sidewalk Labs then implemented their principles into their designs for four different Sidewalk Toronto streets.

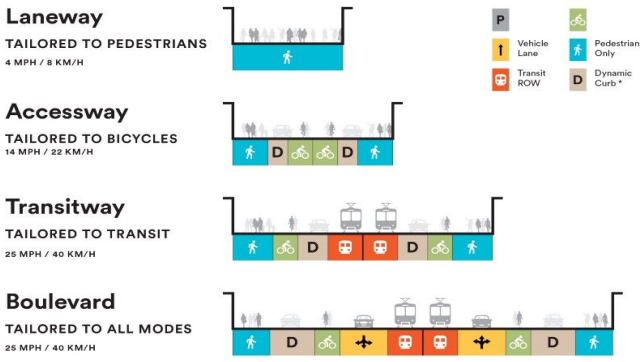

Figure 10: Sidewalk Labs' designs for different types of streets in Sidewalk Toronto

As seen in Figure 10 above, Sidewalk Toronto will include four different types of streets that are tailored towards pedestrians and cyclists. The "Laneway" is solely for pedestrians, while the "Accessway" includes bike lanes and lanes called "dynamic curbs." Dynamic curbs are flexible lanes that can be used for pedestrians or cyclists most of the day, and for vehicles during rush hours. The "Transitway" includes lanes for public transit, and the "Boulevard" has permanent lanes for vehicles. As seen in these four designs, only one street, the "Boulevard," has permanent lanes for vehicles. The rest of the streets cater specifically to pedestrians, cyclists, and finally public transit systems (Ng 2019).

These street plans, as well as the previous plans and goals described previously, all point towards a larger focus to have fewer private vehicles on the road, and increase the use of public transit and other methods of transportation. This overarching theme has numerous benefits as described previously, including our emphasized reason in this paper: climate change.

3.2 Sidewalk Toronto and Data

One of the Sidewalk Toronto project features greatly anticipated by Google's Sidewalk Labs is the data aspect of the smart city. This could come in the form of sensors installed throughout the city for data gathering, or "central identification management cards" that each citizen of Quayside would have to be able to use any public service within the city (Kofman 2018). Google hopes that Sidewalk Toronto will be a "hub for technological innovation" (Garfield 2018). However, many have not received the plans for Sidewalk Toronto with the same anticipation.

3.2.1 Concerns and Controversy

From its announcement, Sidewalk Toronto has been surrounded by concerns and controversy. People worry that their personal data will be gathered within city limits--once they are in the city, anything they do can and will be gathered as data. Afterwards, would Google (through Sidewalk Labs) use their personal data commercially, or sell it to a third-party?

To fuel the controversy further, numerous stakeholders have resigned from the Sidewalk Toronto project, claiming that data privacy will be an extreme concern in the city. One such stakeholder was Ann Cavoukian, a leading Canadian expert in privacy. She found that third-parties would have access to personal information from Sidewalk Toronto--information that could be traced back to the individual. Cavoukian resigned from her position, stating her fear that the city was turning from a "Smart City of Privacy" to a "Smart City of Surveillance" (Kofman, 2018). Cavoukian was among many stakeholders to quit because of their concern that data would be used to profit Google.

Due to the controversy, Sidewalk Labs' plans to build past Quayside into the Port Lands have become precarious. In an

attempt to maintain their larger-scale building plans, Sidewalk Labs has outlined a "step-by-step" timeline, planning and building smaller areas one at a time after Quayside (Summers 2019). However, with the controversy ongoing, it is unclear how far they will be able to build. Sidewalk Toronto, while outputting numerous, extravagant plans for innovation and benefit in the smart city, is now a city of controversy.

3.2.2 A possible solution

In response to the public backlash, Sidewalk Labs came up with the idea of a "civic data trust" (Kofman 2018). All data collected in Sidewalk Toronto would be placed in the trust, and could be owned by "no one" (Kofman 2018). Instead, companies would have to obtain licenses to use the data.

While an interesting idea to address the data privacy concerns, Sidewalk Labs has not been transparent about how they will maintain anonymity in the data, what they will do with the data, and much more. And how will one data trust be able to focus on the many different aspects of data use, like medicine versus transportation? Because Sidewalk Labs' initial proposal for the data trust seems to lack so much information, the idea of it has been dismissed as "an afterthought and insufficient (McFarland 2019). Until Sidewalk Labs can come forward with a clear explanation and set of plans to address the data privacy concerns, the public continues to disapprove of the Sidewalk Toronto project (Kofman 2018).

Furthermore, recently in August 2019, Waterfront Toronto came to the decision to warn Sidewalk Labs about the controversial issues of Sidewalk Toronto. If Sidewalk Labs could not fix their problems by October, the Sidewalk Toronto project would be shut down as a whole (Deschamps 2019). While the plans for the city are full of innovation and benefit for society, Sidewalk Labs' difficulty and failure to be transparent about data has overshadowed the project as a whole.

3.3 Standing alone

Sidewalk Toronto is unique in that it is a Google-run project to build a completely new city full of technological advancements. Many other smart cities have innovations integrated throughout existing cities to bring improvement to those cities. To compare such a city with Sidewalk Toronto, we also looked at Portland, Oregon, to compare its transportation plans and implementations with that of Toronto's.

4 Portland

To contrast from Toronto, Portland has been implementing smart city initiatives for a few years now, from traffic safety sensors to the recently new Smart Autonomous Vehicles Initiative (SAVI) initiative. Even a new tower construction in Portland uses smart city thinking by using mass timber to reduce the weight of the building by 75%. Throughout the city, smart city initiatives are popping up everywhere and Portland wants to be the leader and model of a smart city that is done right. However, data collection comes with concerns about data privacy and how the data is being used.

4.1 Portland's Smart City Transportation Model

Portland's main focus for its smart city is how people move about and around the city. This is done by creating a variety of transportation options that residents can use. All of these transportation options also includes a vast amount of data that the city of Portland collects to analyze to better improve and plan for transportation and construction options in the future.

4.1.1 Smart Transportation Options

Portland began their smart city run during 2015 with a group of city government, the local university, and private sector individuals. The city joined small programs to learn how to improve the quality of life for its residents. The representatives joined smart city programs such as the National Institute of Standards and Technologies (NIST), Global Cities Team Challenge (GCTC) and the MetroLab Network to help start the initial smart city projects for the city of Portland to improve the lives of its residents. After a few starter smart city initiatives, Portland now have an array of smart transportation options for its residents to choose from. For example, sharing a mobility asset is a great way for the city to reduce the number of cars on the road. So a bicycle-sharing called Biketown started operation in 2016 under the direction of PBOT. At launch the system had 100 stations and 1000 bicycles around the city.

Figure 11: E-scooters parked on the sidewalk in Portland

Another shared mobility option are the e-scooters, these are emerging technology in mobility services and in 2018 the city did a 4 month long trial run to see if they're viable as a transportation mode in the city. They were reintroduced this year with some regulation and requires scooter companies to submit an application for a year long operation of leasing their scooters to the public.

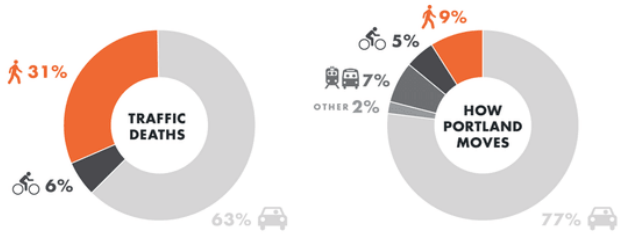

Figure 12: A graphic from the Portland Bureau of Transportation's site on Vision Zero, an initiative to reduce traffic fatalities.

Another example of a smart city initiative in Portland are smart traffic sensors. These make it easier to collect data on how people move around in the streets of portland. This technology helps detect potential danger zones and PBOT staff will use this information to improve safety at dangerous locations.

4.2 Portland's Data Collection and Privacy

In the data-driven technology age, people are vulnerable to their data being misused, especially marginalized communities. Portland's principles of data privacy highlights the steps that the City uses to safeguard people's data. To build trust from organizations and people, the city needs a robust privacy protection plan in place. These can be important foundation to create better policies to guide the city of Portland on the use of technologies such as up and coming Artificial Intelligence.

Widespread problems like homelessness, growing traffic congestion, renewable energy, and safe spaces for everyone will require the work of multiple local and statewide agencies and communities to freely exchange data. With concrete policies and resources to manage all these data and information, the city of Portland can gain valuable information on its residents and how it can help propel Portland into the new era of smart cities focusing on improving the lives of its people

4.2.1 The seven principles of data privacy

The City of Portland can collect data that may put certain communities or certain group of individuals at risk if it doesn't manage the data correctly. Portland has to build trust so the data it collects from the public has to have security as its number one priority. This is why Portland created the seven principles in data privacy collection and management to enforce the safe handling of its data storage and collection, pictured in Figure 13.

The seven principles focus on:

1. Transparency and accountability
2. Full lifecycle stewardship
3. Equitable data management
4. Ethical and non-discriminatory use of data
5. Data openness
6. Automated Decision Systems
7. Data Utility

Figure 13: Portland's seven data principles' representative symbols

4.2.1.1 Transparency and accountability

Transparency and accountability is how the city will manage the data it collects and what it does when it has possession of that data. A clear documentation process that logs who has access to it and when they accessed it.

4.2.1.2 Full lifecycle stewardship

Throughout the ownership of the data, the city will promise the data that the data will be secured and protected. From the start of the collection process to the disposition of the data, the city will make sure that throughout the process, the data is handled correctly.

4.2.1.3 Equitable data management

Portland will make sure to manage the data collected in a way that promotes equality for all involved.

4.2.1.4 Ethical and non-discriminatory use of data

Portland will have an ethical responsibility on the data it collects. It will follow non-discriminatory protections and make sure due diligence is understood by the people who manage and access the data.

4.2.1.5 Data openness

Portland will provide an open framework on the data it collects. The city and third parties that collect this data will comply with legal requirements to not expose any confidential, restricted, private, and personal information that may put the data at risk. In

addition, throughout the whole collection and disposition of the data, there is transparency.

4.2.1.6 Automated Decision Systems

Automation will be key when the city creates procedures for reviewing, sharing, and accessing the vast amount of data. The city will create a seamless flow that will be quick, and not hamper access to the data it has in possession.

4.2.1.6.1 Decision System Tools

These tools will help in equity, fairness, transparency, and accountability of the data, and will incorporate technologies like artificial intelligence and machine learning.

4.2.1.7 Data Utility

The city will focus on creating value for its communities when it collects the data. It will try to collect only the minimal amount of information, but enough to create data that will serve the community now and in the future.

4.3 Data Openness

In 2009, Portland became the first city in the United States to adopt an Open Data Resolution (Resolution No. 36735) to encourage the expansion of the technological community by promoting open data and partnerships between City government and the public, private and nonprofit sectors, academia, and labor.

In May of 2017, Portland formally adopted an Open Data Policy and Program to expand upon the work completed as a part of the 2009 Resolution. This is led by Smart City PDX (logo shown below in Figure 14).

Figure 14: Logo from Smart City PDX website

Open Data Policy establishes to commit the publication, accessibility, and equitable and widespread sharing of data collected and generated by all City bureaus and by private sector companies, non-profit organizations, academic universities and other parties working on behalf of the City. The City will also strive to make data open by default.

5 Conclusion

Smart cities are coming whether we want them or not. Technology continues to evolve, and cities are investing in increasingly complicated strategies to fight climate change, crime, traffic and homelessness. But will it be enough? Sidewalk Labs certainly provides a blue-print, but what we've learned from ideas of permaculture and the Paul's sustainable city is that to become a green city that fights climate change, and sets an example for the rest of the country, it must do so by making many small changes as well, and not necessarily always big changes. "The greenest building is the one that's already built," Richard Moe (Unite 19).

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