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Stantec

**Case Study for Transportation Planning
Winnipeg Transit Master Plan**



Case Study for Transportation Planning

Stantec:
Winnipeg Transit Master Plan

Stantec's project study to provide recommendations and guidelines on increasing Winnipeg's transportation network and public services efficiency.



Winnipeg, Canada

LOCATION OVERVIEW

Winnipeg is the capital and largest city of the Manitoba province in Canada. Known as the "Gateway to the West", Winnipeg is a railway and transportation hub with a diversified economy.

Officially, Winnipeg consists of 236 neighborhoods. Downtown Winnipeg is the city's financial center and economic core. It covers about 1 square mile (2.6 km²) and is the fastest-growing high-income neighborhood in the city. More than 72,000 people work downtown, and over 40,000 students attend classes at its universities and colleges.



Target Goals

INCREASE THE EFFICIENCY OF THE CITY TRANSPORTATION SERVICES

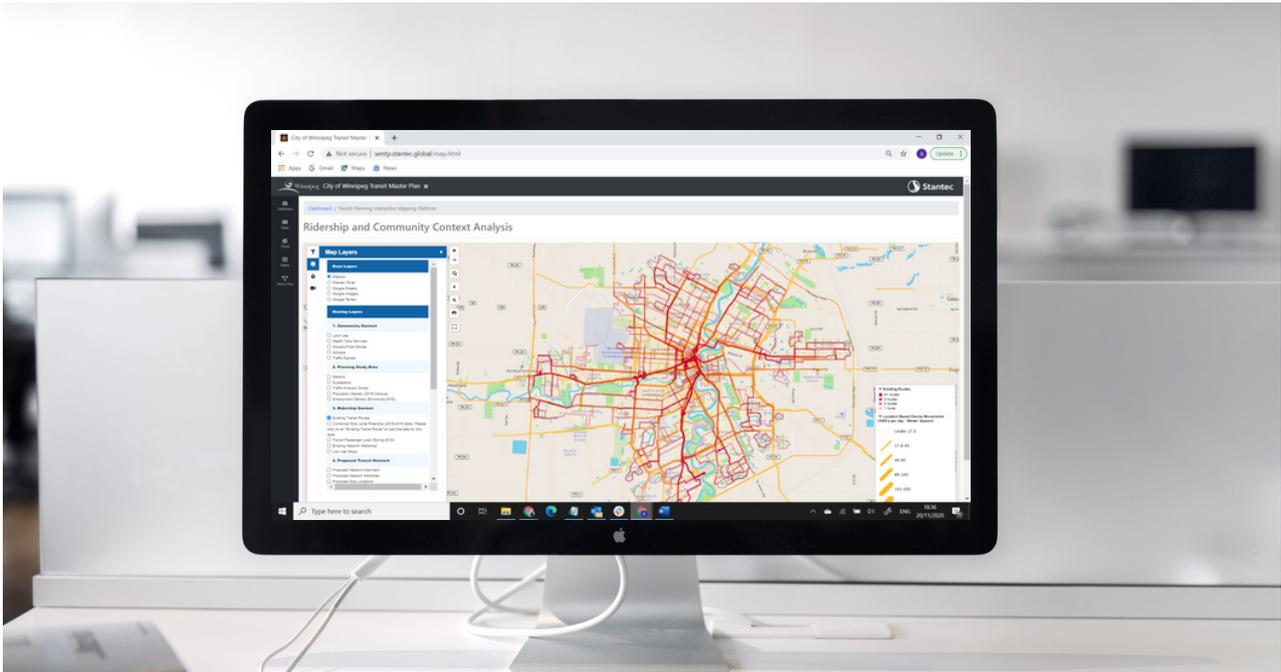
Over the last decade, the city of Winnipeg and its population grew significantly. Therefore, as part of the city's development, the city administration frequently conducts studies of their transportation network's efficiency.

In 2019 Stantec led a project to provide recommendations and guidelines on increasing the efficiency of Winnipeg's transportation network and associated public services such as transit, parking, and traffic management.

The initial assumption of the city authorities was that Winnipeg's downtown needs to increase its incoming and outgoing traffic capacity.

Solution

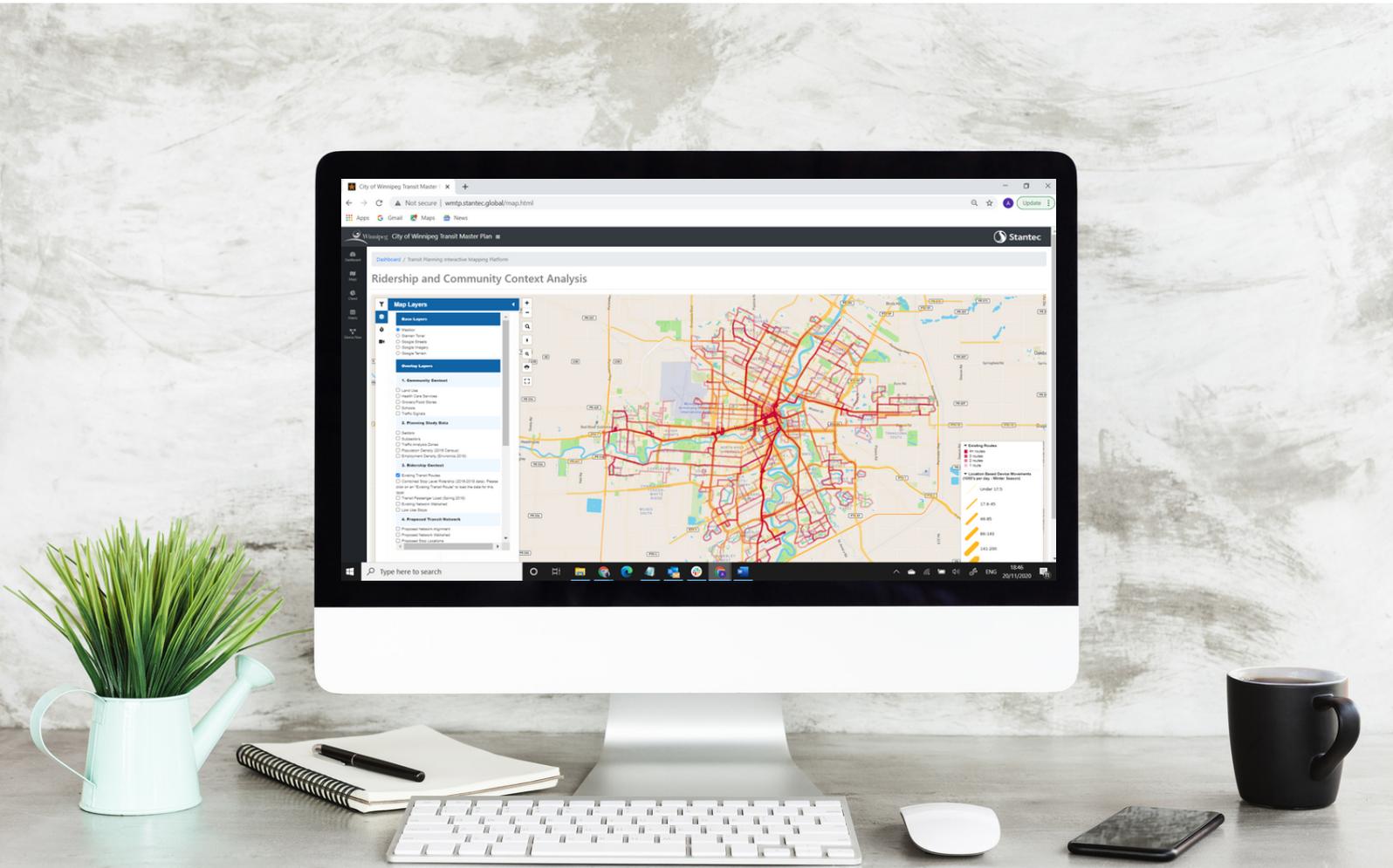
Using mobile data for transportation planning



In 2019 Stantec purchased four (4) months of AirSage activity density point file data for 1,152 origin-destination zones. The main focus of Stantec was on the city and transit services.

The purchased data represented four seasons: Winter, Spring, Summer, and Fall. Using AirSage data and professional programming languages such as SQL, Javascript, HTML and data visualizations and dashboard with R, Shiny, and D3.js., Stantec created a custom web-based dashboard for its client.

To complement the AirSage dataset and increase transportation planning effort, Stantec integrated transportation analysis zones (TAZs), geographies, zoning, land use, population, employment, grocery stores, schools, medical facilities to their dashboard.

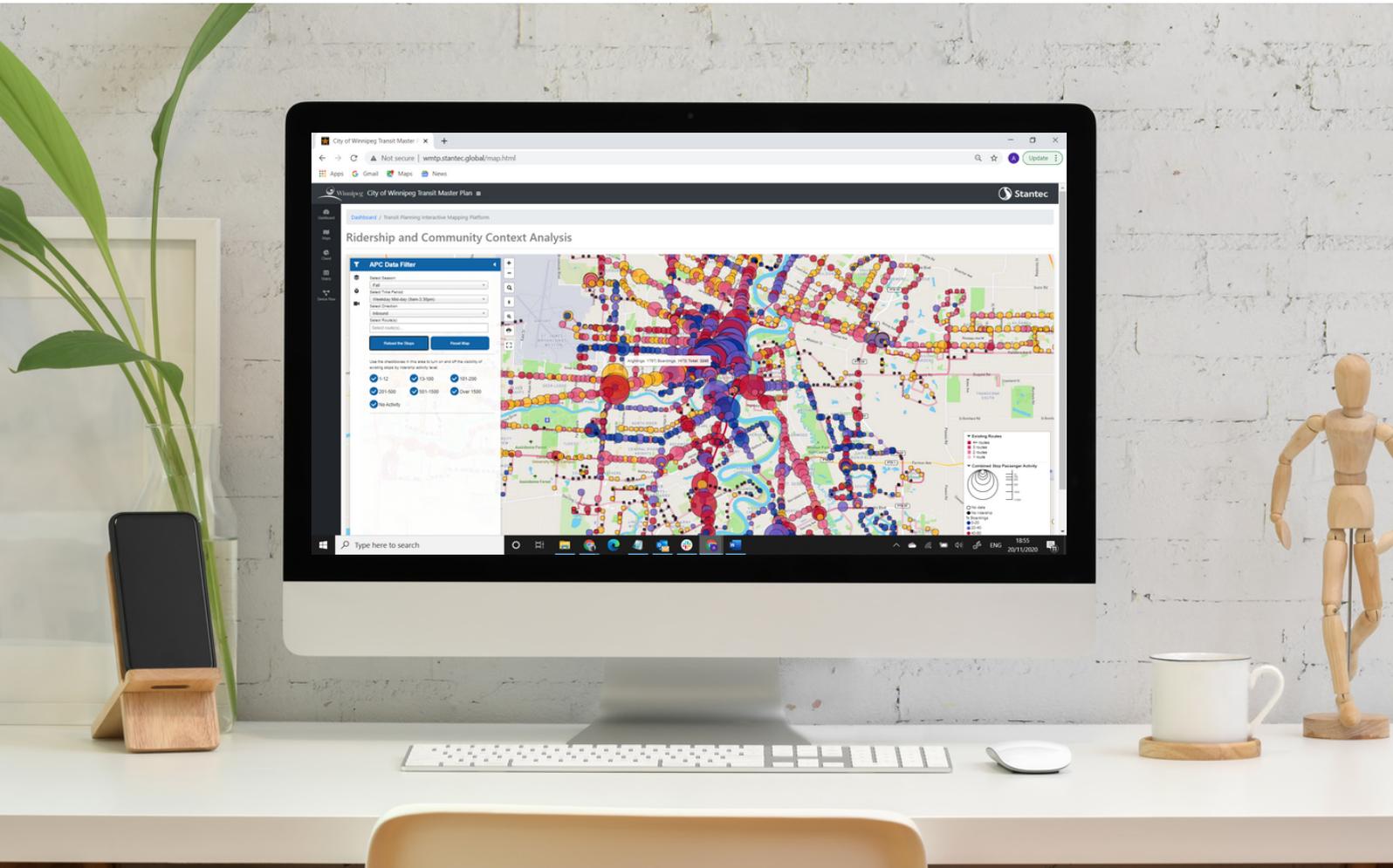


Ridership Analysis

IDENTIFYING THE CORRELATION OF PEOPLE MOVEMENTS AND EXISTING CITY SERVICES

Ridership analysis shows the layering of the device counts data with transit routes extracted from AirSage. This was especially helpful in identifying the routes where people are moving but where there currently is no service.

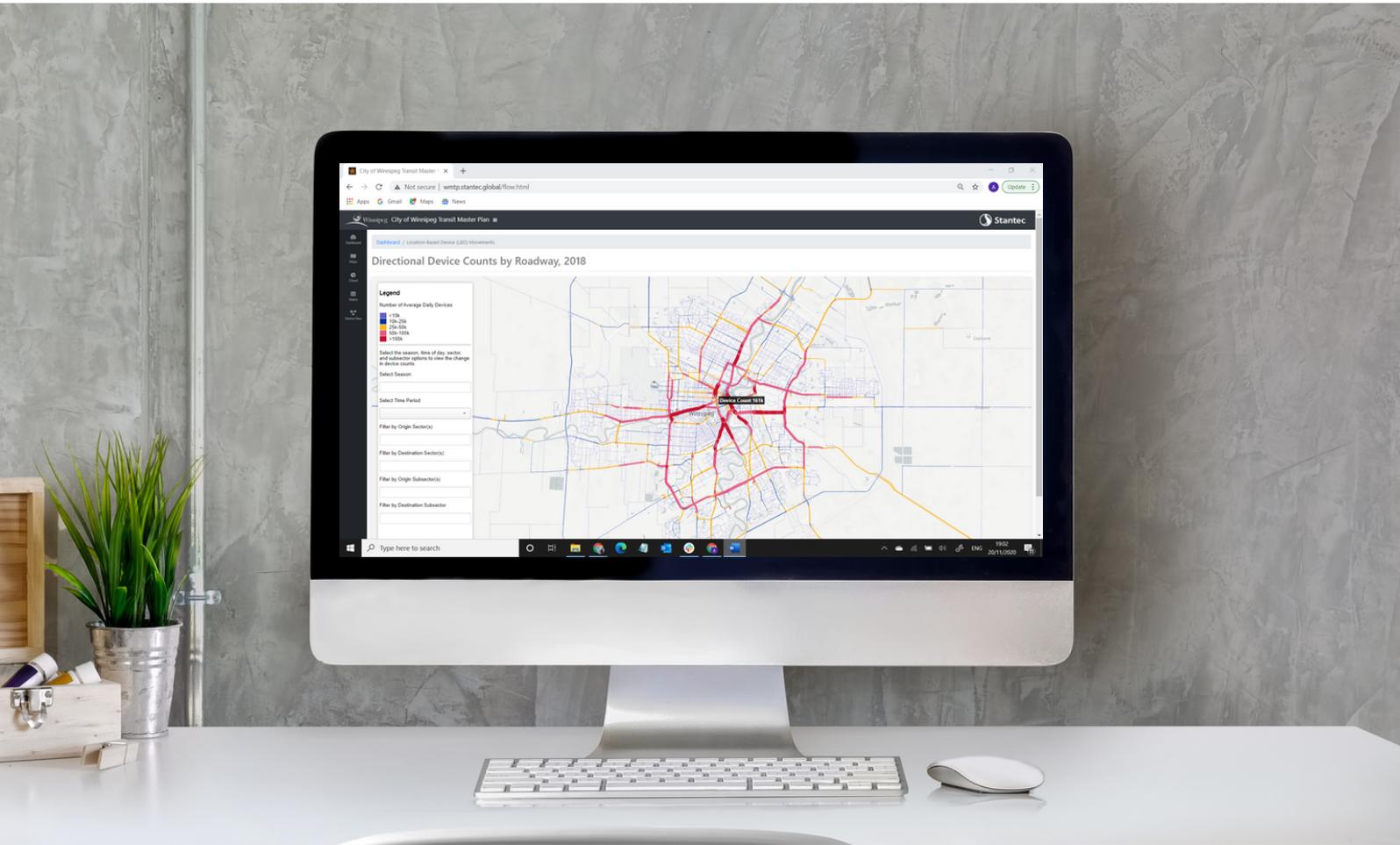
Thus, Stantec conducted an analysis of the automatic passenger count and AirSage people movement data. The results exceeded the expectations: the data demonstrated that the currently used transit system in Winnipeg doesn't match its citizens' travel needs.



Ridership and Community Context Analysis

ASSESSING THE EFFICIENCY OF THE PUBLIC TRANSPORTATION SYSTEM

Ridership and community context analysis present automatic passenger count data for boardings and alightings on every public transportation stop. It visually represents the magnitude of passengers and relativeness of boardings than alightings on every stop. For deeper analysis, one can zoom in and add layers to understand the factors contributing to its high or low ridership. The insights can be filtered based on season, time of the week, time of the day, and destination. A detailed overview is available for each displayed stop.

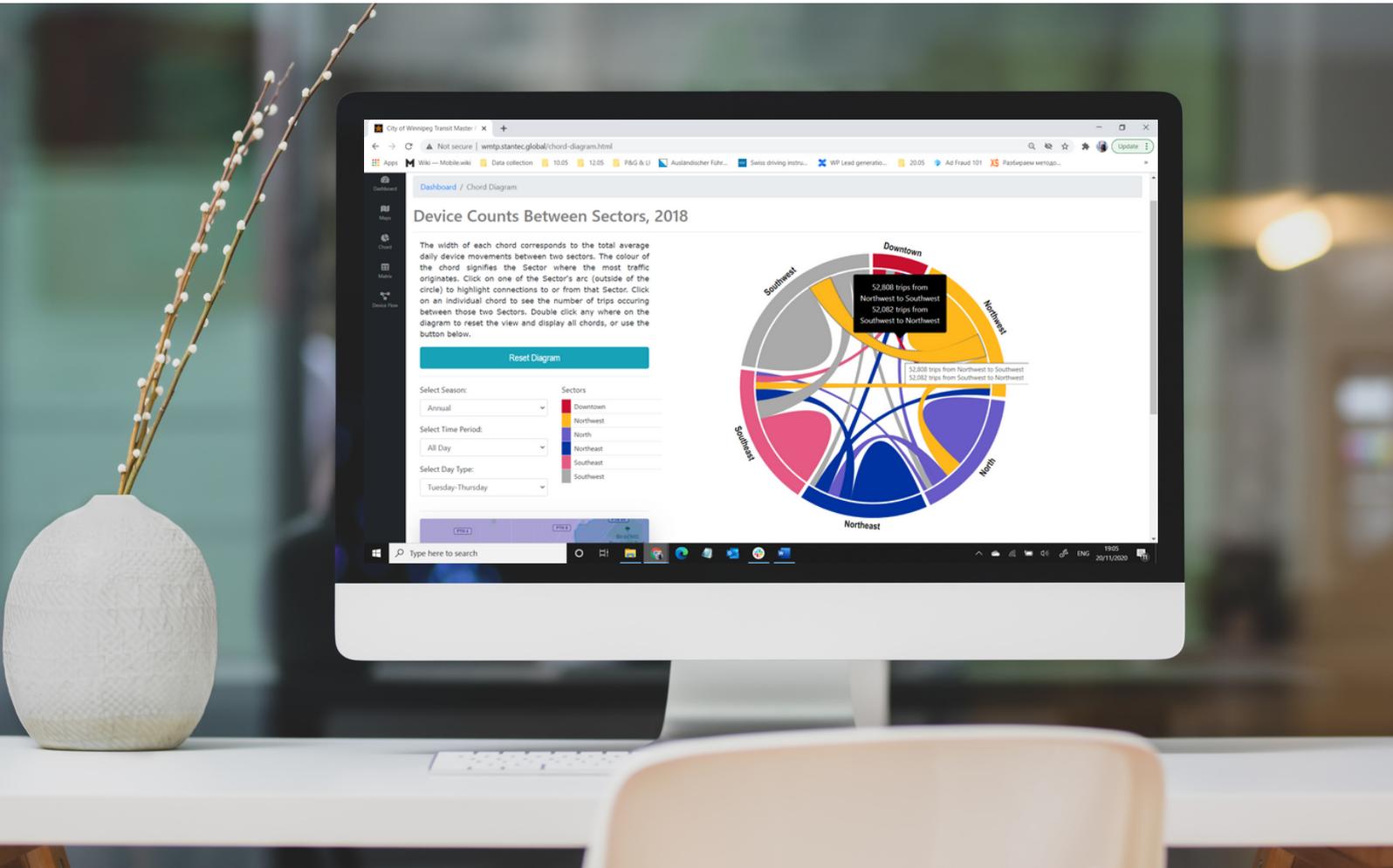


Directional Device Count by Roadway

IDENTIFYING PEOPLE MOVEMENT PATTERNS' INFLUENCING FACTORS

Using AirSage data by TAZ, Stantec has been able to create desire lines along with the road network that totaled 1.3 million individual data segments. All 1152 TAZs were aggregated into six (6) regions (or sectors) and 67 neighborhoods (or subsectors) for additional filtering.

The aggregated data allows filtering the insights by seasons, time periods, weekdays, specific origins, and destinations. Hovering over specific areas retrieves people counts, and zooming in shows movement counts by direction. This data visualization allows for extracting meaningful insights into the people's movement in Winnipeg.

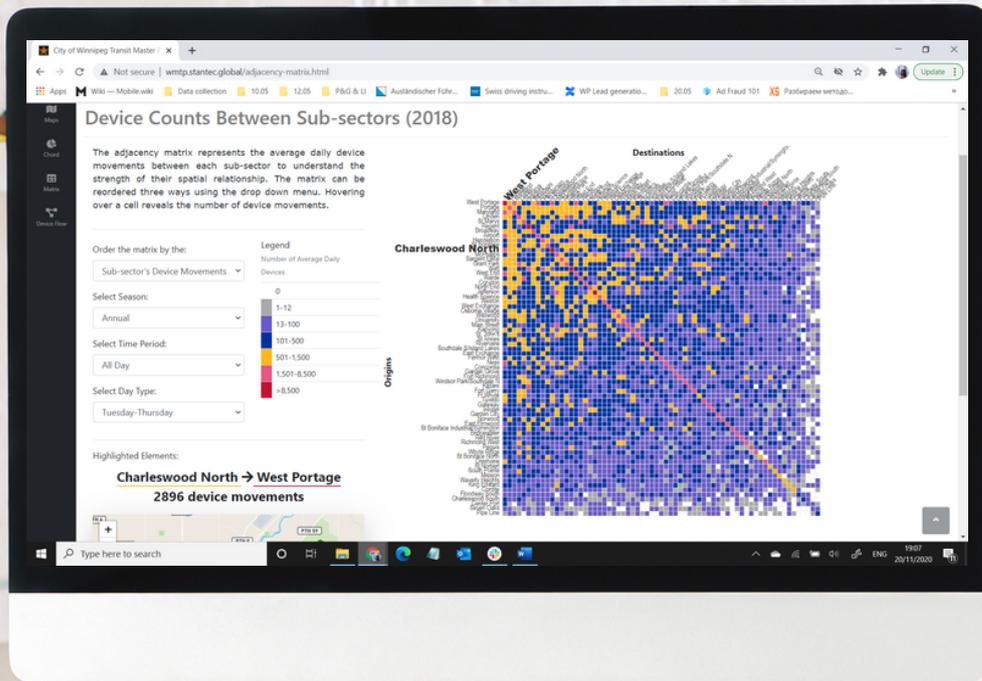


Device Count Between Sectors

QUANTIFYING THE PEOPLE'S MOVEMENT BETWEEN THE MAIN CITY DISTRICTS

This dynamic chord diagram is illustrating the device count between the defined six (6) sectors. The width of each chord corresponds to the total average daily device movements between the two sectors. The color of the chord signifies the sector where the most traffic originates.

The city authorities were very surprised to see the result of the device movement chord diagram analysis. The diagram showed how small the proportion of downtown Origin-Destination (OD) trips actually are. Quite the opposite of the initial hypothesis, it was identified that most OD trips are happening between the Northwest and Southwest sectors of the city.



Device Counts Between Sub-sectors

QUANTIFYING THE PEOPLE'S MOVEMENT BETWEEN THE SUB-SECTORS

The adjacency matrix represents the average daily device movements between each sub-sector to understand the strength of their spatial relationship. The matrix can be reordered in three ways using the drop-down menu. Hovering over a cell reveals the number of device movements.

The OD with yellow, pink, and red report high numbers of device movements between sub-sectors. This matrix helps to understand and analyze the capacity of the mobility services that are available between certain sub-sectors.

Results

Reliable people movement insights for better city viability



The results of this project have exceeded the expectations of Winnipeg's city administration. It has proved that insights extracted from anonymous mobile device movement data can help city administrations understand how people move throughout their cities and optimize the available services to increase urban life quality.

The main takeaway for the Winnipeg administration was the fact that the people movement data analysis has refuted their hypothesis concerning increasing traffic flow in and out of the city downtown. It was determined that there were insufficient options to meet the demand for North-South transportation zones in and out of the city.

The interactive dashboard helped update the Winnipeg Transit Master Plan and ensure the transportation system supports quality of life and economic vitality through safe, efficient, connected, and barrier-free people's movement.



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