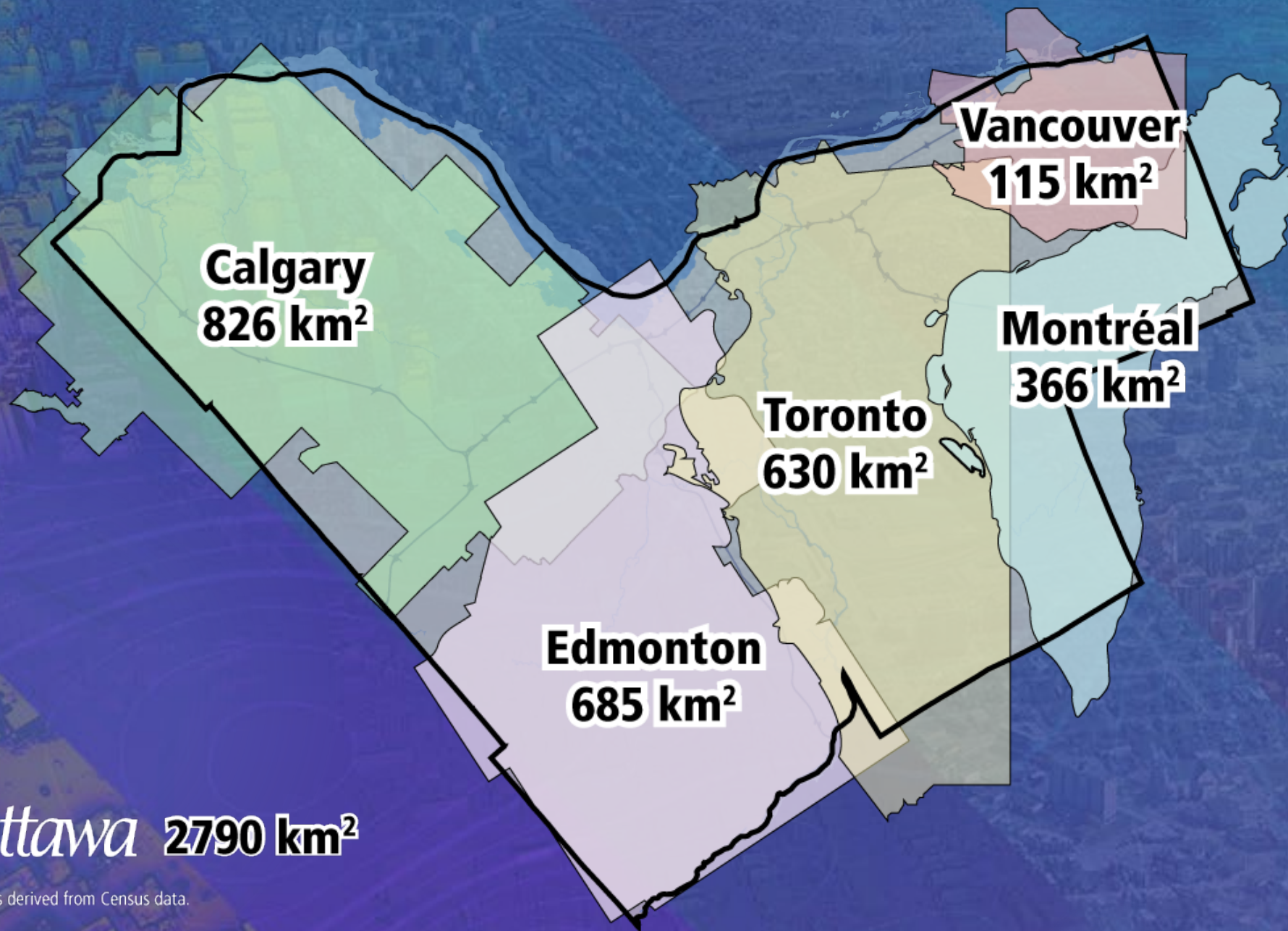


# Digital Twin: 3D geospatial model of Ottawa

Randal Rodger, Program Manager  
Jean-François Dionne, Geospatial Strategist

Geospatial Analytics, Technology and Solutions Branch



 **Ottawa 2790 km<sup>2</sup>**

Land areas derived from Census data.

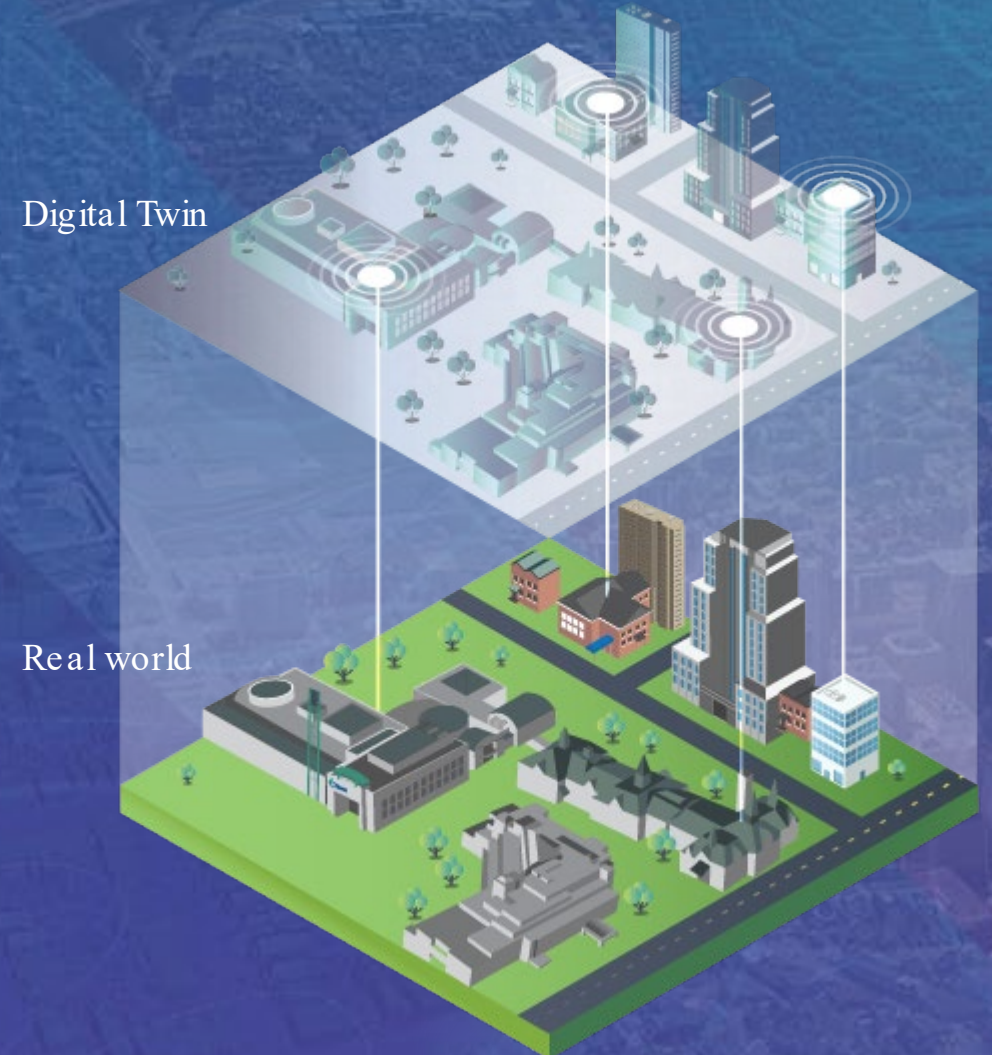
# Geospatial Analytics, Technology and Solutions (GATS)



# **OTwin** - Ottawa's Digital Twin

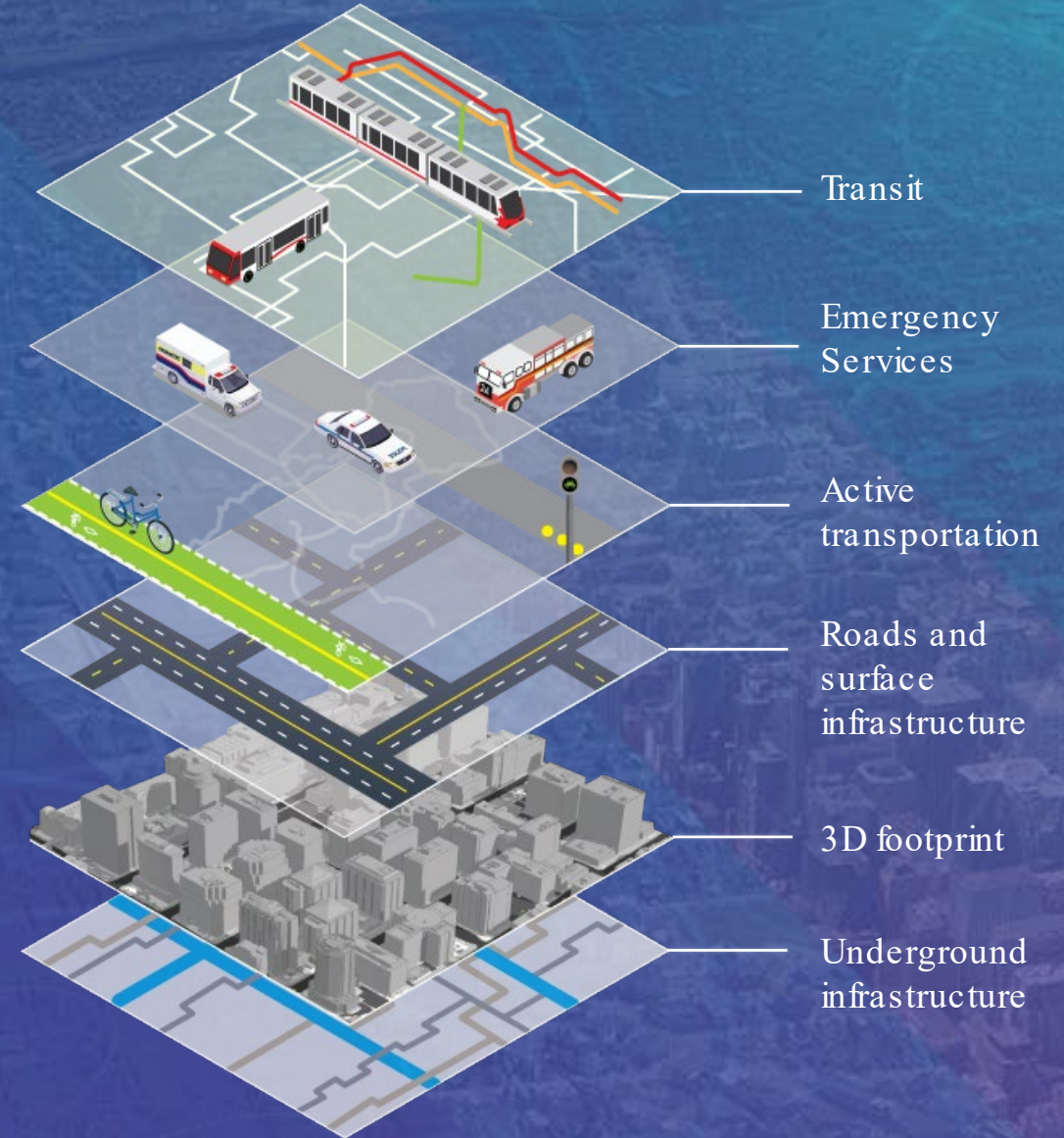
GATS is developing a transformational Digital Twin, a 3D model of Ottawa, a new geospatial system to support the development of the New Zoning Bylaw Consolidation project and the policies of the new Official Plan.

Providing transformational capabilities for numerical modelling and visual analysis



# Digital Twin Goals

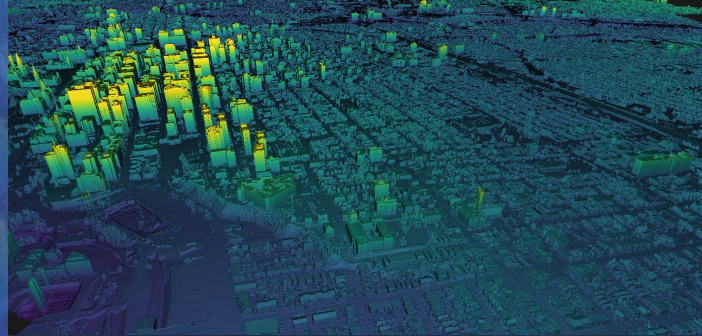
- ▶ Advanced tools and analytics to support development of the New Zoning Bylaw Consolidation
- ▶ Meet Official Plan targets
- ▶ Predict capacity and trends
- ▶ Support City building initiatives
- ▶ Enhance development applications submissions
- ▶ Allow the public to better visualize the City's goals and projects
- ▶ Predicting climate change and changes on infrastructure
- ▶ Strengthen emergency operations



# Reality Capture and Data Intelligence Program



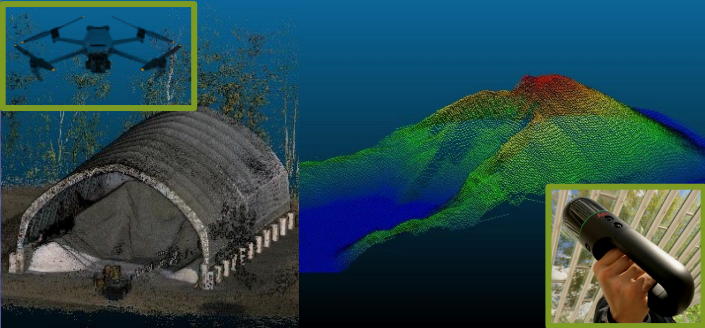
City-wide high-resolution imagery



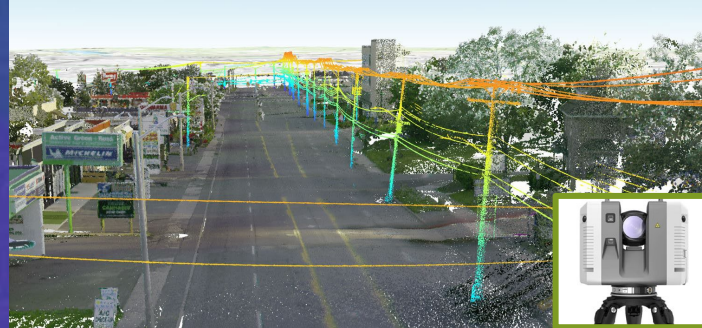
LiDAR Point Cloud



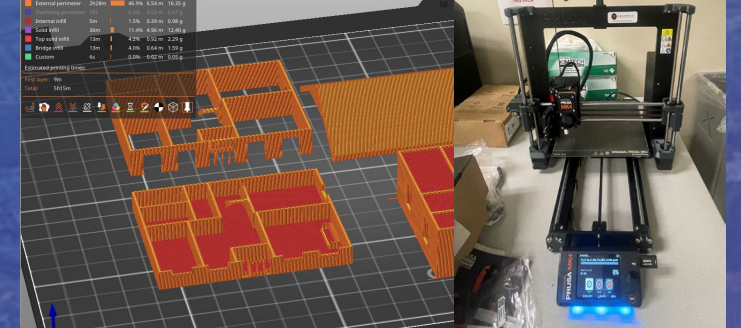
Photorealistic mesh



Drone and mobile handheld  
3D laser scanner



Terrestrial 3D laser scanner



3D printing

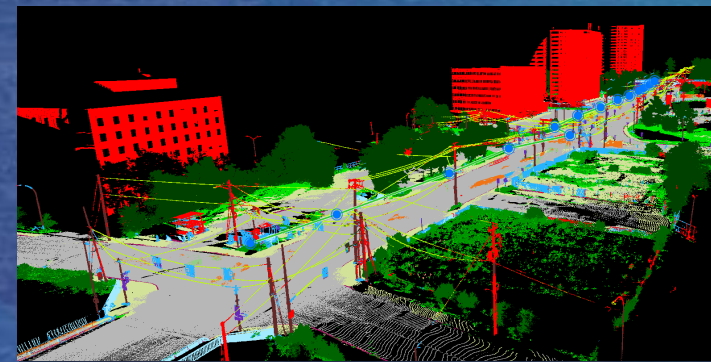
# Mobile Mapping Systems – AI/ML



Mobile Mapping



Mosaic 51 Camera



LiDAR classification



Oriented imagery

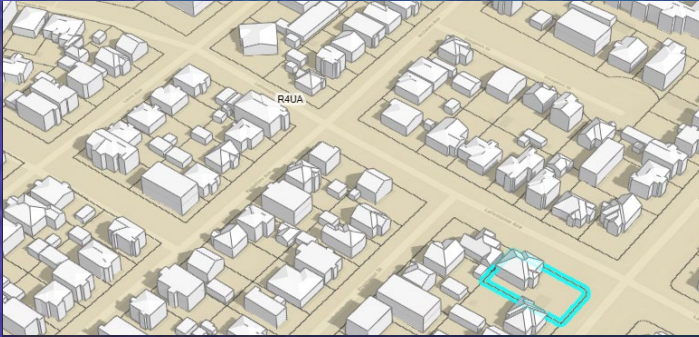


Crack detection



Iron works detection

# Digital Twin: Enabling and integrating transformational change



Suitability Parcel



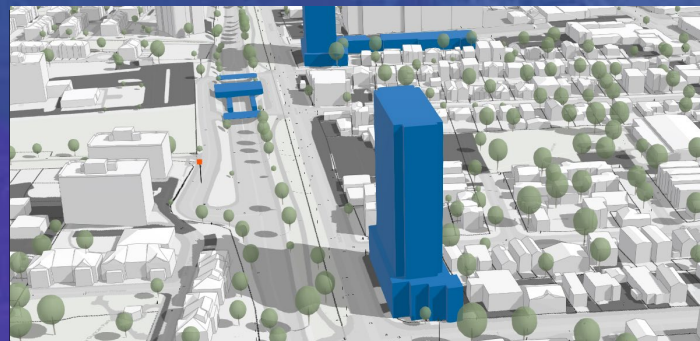
Zoning Analysis



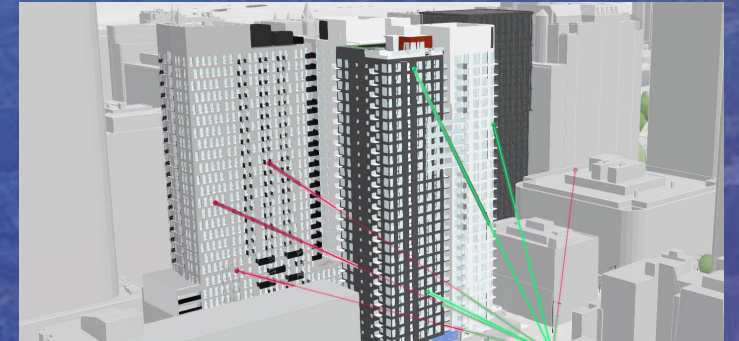
Scenario Modeling



Shadow and Solar analysis



Building Information Models



Development Sightlines

# Digital Twin: Taking us from a static to a dynamic 3D geospatial approach

Transect	Official Plan Policy Reference	Designation	Height Category and Details
Downtown Core Transect	5.1.3(1)	Hubs	High-rise and High-rise 41+: between 10 storeys and 40 storeys and 41 storeys plus, through criteria and area-specific policy
	5.1.4(1)	Hubs	Low-rise, Mid-rise and High-rise: minimum 4 storeys and maximum 40 storeys
	5.1.4(3)	Mainstreet Corridors	Low-rise and Mid-rise: minimum 2 storeys and maximum 9 storeys
	5.1.4(4)	Minor Corridors	Low-rise and Mid-rise: minimum 2 storeys and maximum of 9 storeys
	5.1.5(1)	Neighbourhoods	Low-rise: minimum 2 storeys, generally permit 3 storeys, allow a built height of up to 4 storeys where appropriate
Inner Urban Transect	5.2.3(1)	Hubs	Low-rise, Mid-rise and High-rise: minimum 3 storeys and maximum 40 storeys
	5.2.3(2)	Mainstreet Corridors	Low-rise and Mid-rise and High-rise: minimum 2 storeys and maximum 40 storeys dependent on road width and transition
	5.2.3(3)	Minor Corridors	Low-rise and Mid-rise: minimum 2 storeys and maximum of 6 storeys
	5.2.4(1)	Neighbourhoods	Low-rise: minimum 2 storeys, generally permit 3 storeys, allow built height of up to 4 storeys where appropriate
Outer Urban Transect	5.3.3(1)	Hubs	Low-rise, Mid-rise and High-rise: minimum 3 storeys and maximum 40 storeys
	5.3.3(3)	Mainstreet Corridors	Low-rise, Mid-rise and High-rise: minimum 2 storeys and maximum 40 storeys, dependent on road width and transition
	5.3.3(4)	Minor Corridors	Low-rise: minimum 2 storeys and maximum of 6 storeys
	5.3.4(1)	Neighbourhoods	Low-rise: no minimum and generally, zoning will permit at least 3 storeys but no more than 4 storeys

Enhancing the Official Plan using 3D model derived from policy table (Table 7)

## Minimum and Maximum Heights in 3D based on Official Plan Policy



Vanier South – Between Montreal Rd and McArthur

# Massing Models Submissions (BIM)

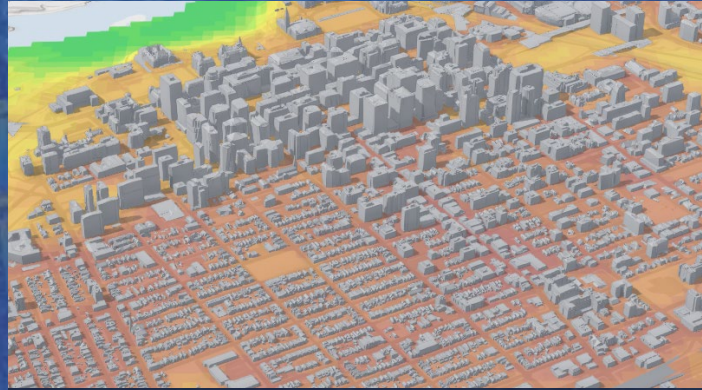


3D Shadow and Solar analysis

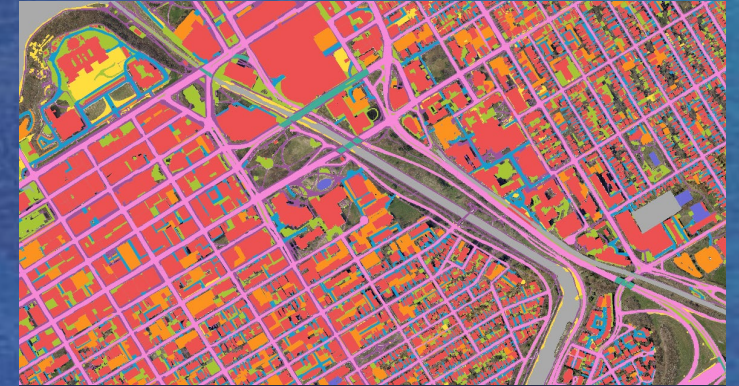
# Digital Twin is collaboration



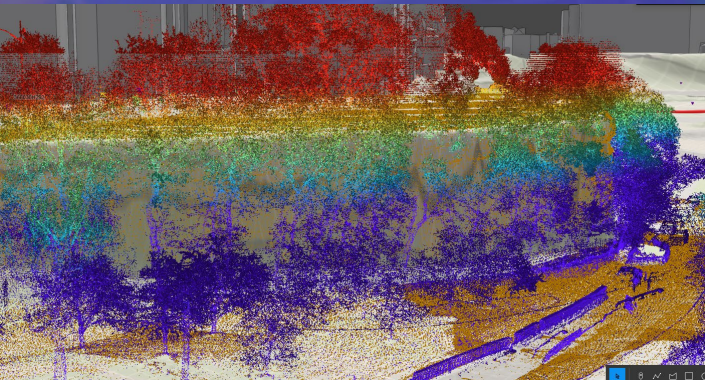
Solar capacity on rooftops MWh per year analysis for the Climate Change unit



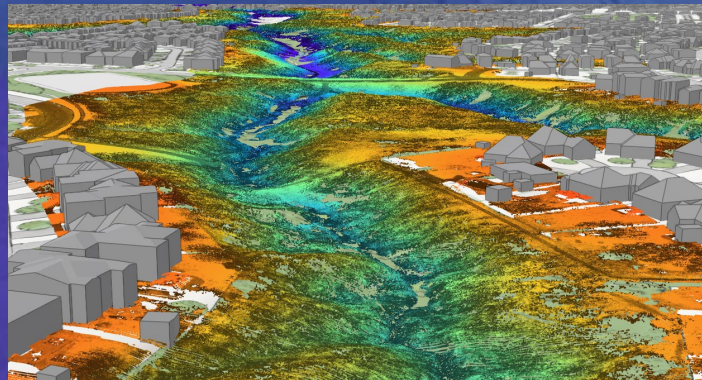
Heat islands 3D mapping for Ottawa Public Health



Impervious surface analysis



Terrestrial mapping with the NCC

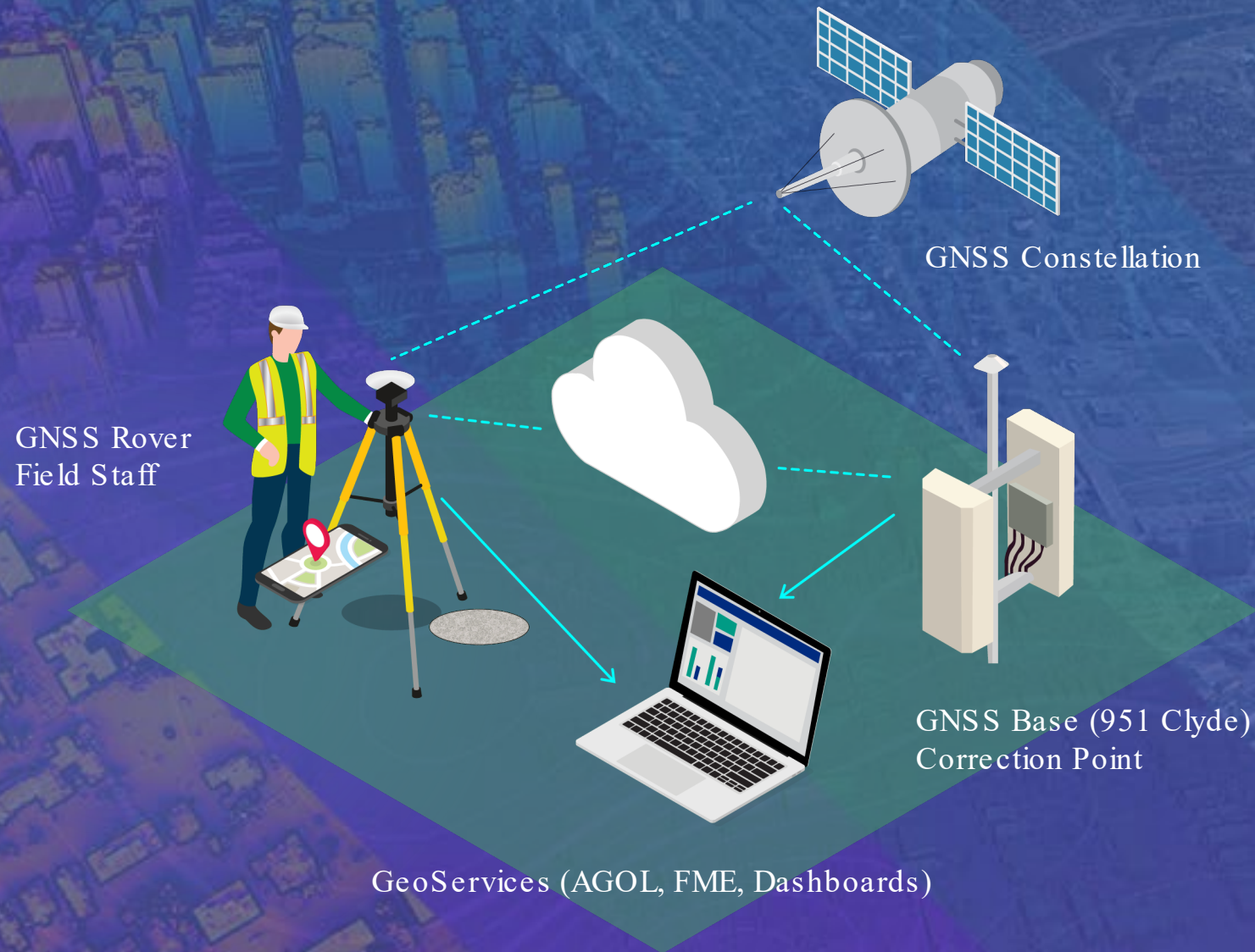


Slope stability and erosion LiDAR scan for Bilberry Creek with Asset Mgt



Comparing permitted building envelope for current zoning vs New Zoning

# Near Real-time Mapping

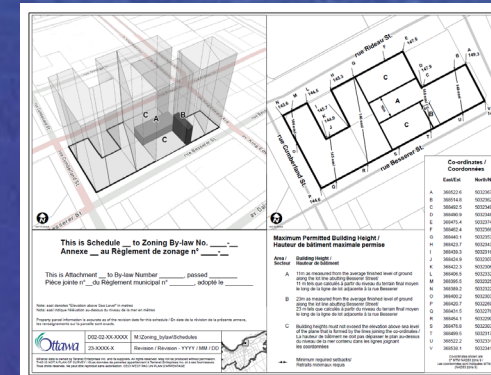
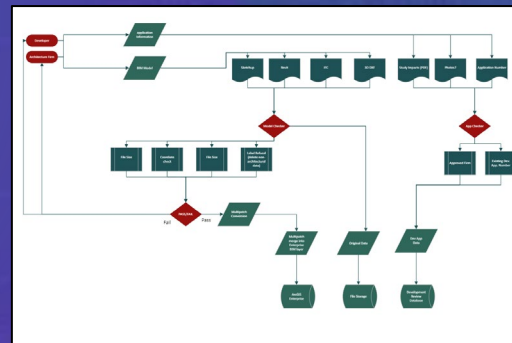


Fast RTK GNSS NTRIP Base and Caster

# RPAS Operating procedures



## 3D Zoning Height Schedules



# Digital Twin Road Map

Foundation

Current

Future



Building the  
Digital Twin  
foundation



ArcGIS Enterprise  
and Portal  
Deployment

Developing the  
Digital Twin  
environment with IT

Draft 2  
NZBL

Public-facing user  
interface for public  
engagement

Integration  
of Approved  
NZBL

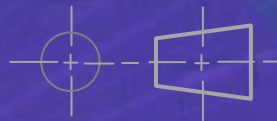
WE ARE HERE

Reality Capture and Data  
Intelligence Program



Draft 1 for the  
New Zoning Bylaw  
(NZBL) release

Corporate move to  
Canadian Spatial  
Reference System



Big Data  
Storage



Mobile mapping  
collection

Real-time  
IoT

**FME**  
by Safe Software

