



# Adopting Emerging Technologies for A Smart City

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Information Technology  
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# Disclaimer

**This presentation is NOT generated by AI**





# We're in IT for Calgarians

A look at where Information Technology at The City is going and how we're getting there

## What we're focused on:



### PEOPLE AND CULTURE

All employees are **equipped with the right tools to encourage experimentation, innovation, and collaboration** across organizational boundaries.



Colleagues in **IT** have the resources and autonomy to do fulfilling, interesting technology work in a safe and supportive environment.



### GOVERNANCE

We champion intelligent technology investments that **modernize municipal service delivery** with an eye on value and security for citizens.



### INNOVATION

We're the **heart of innovation**, where everyone can come for the tools and knowledge needed to deliver innovative solutions to our community.



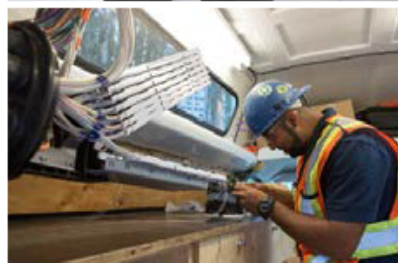
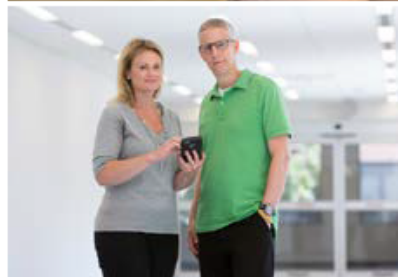
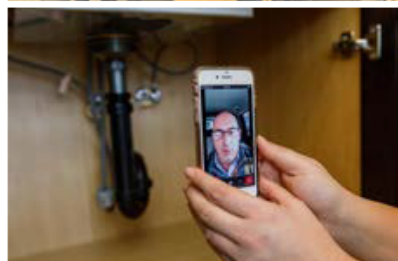
### APPLICATION & INFRASTRUCTURE MODERNIZATION

We advance modern technology at The City to shape the future of our organization and our community.



### RELATIONSHIPS

Our technology experts work side by side with City colleagues to **find new ways** to make life better for Calgarians every day.



22-002/2517 ADN-16952

## Where we're at now:

MyID Accounts:

**657,216**

Citizen users

**43,400**

Business users

**910**

Fibre connected sites

345 buildings  
565 field locations  
650 km of fibre

**2697**

Wirelessly connected fleet vehicles

**12**

BOTS

Over **650**

IT supported business applications



**90,659**  
IT Service Desk Calls in 2021

**79**

City locations with free public Wi-Fi



**257**

online City services



**17,000**

mobile devices  
smartphones, iPads, cellphones, aircards, modems



over **49,600** monthly online meetings held



**16,000**  
computers



**108**  
Internet of Things sensors



**31,471**  
network devices

## We're in IT together

Read the full IT Strategic Business Plan

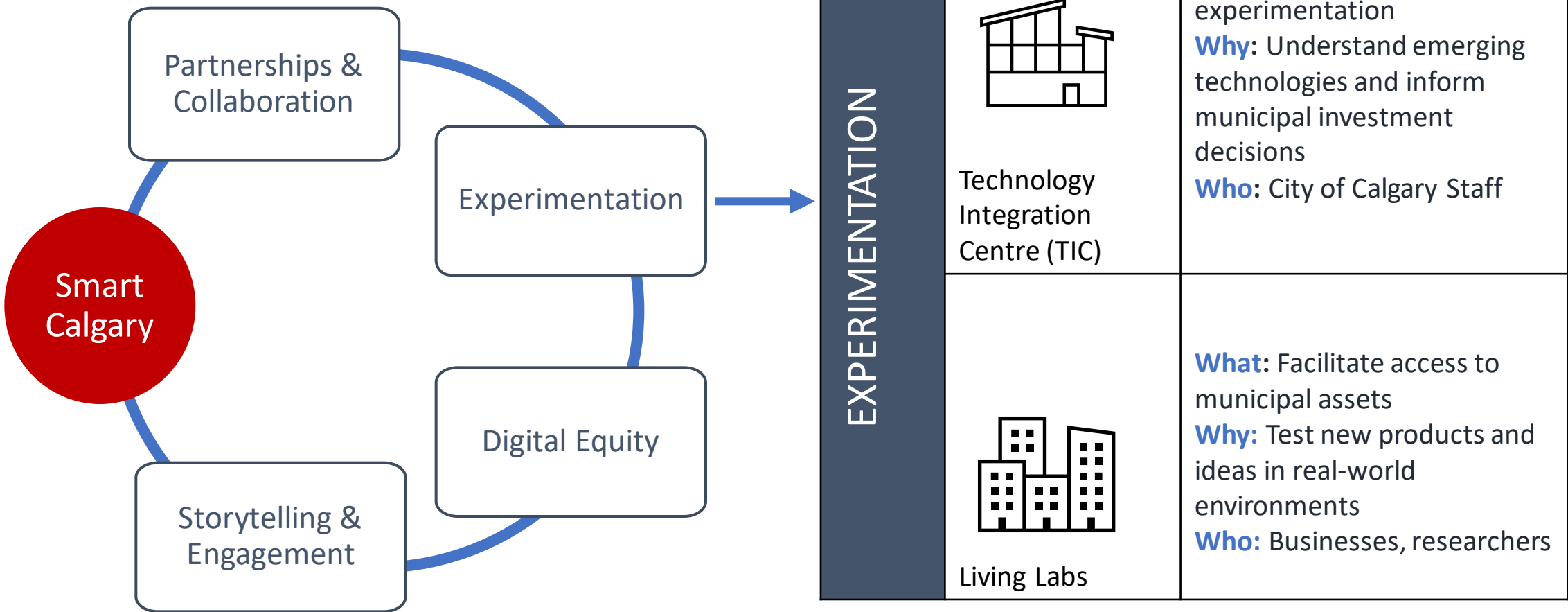
[mycity.calgary.ca/IT](http://mycity.calgary.ca/IT)

INFORMATION TECHNOLOGY FUTURE FOCUSED | TECH SAVVY | INNOVATIVE

A nighttime photograph of a city skyline viewed from under a bridge. The bridge's concrete structure is visible in the upper left corner. The city skyline features several illuminated buildings, including a prominent cylindrical tower. The lights from the city and the bridge reflect on the calm water in the foreground. The sky is a deep blue with some clouds.

# Smart Cities Program

# Experimentation



# Living Labs



The City of Calgary's Living Labs program offers researchers and business owners access to City-owned assets to test and try out new ideas and products in a real-life environment.



**25** Open  
projects

**67** Current  
Collaborators  
(Internal & External)

**120+** Projects  
Since 2019

# Digital Equity

## What are the digital gaps for Calgarians?

### Hardware

- tools
- right for user

### Access

- affordable
- reliable
- adequate infrastructure

### Education

- skills
- knowledge
- training

### Sustainability

- ongoing support
- troubleshooting
- monitoring



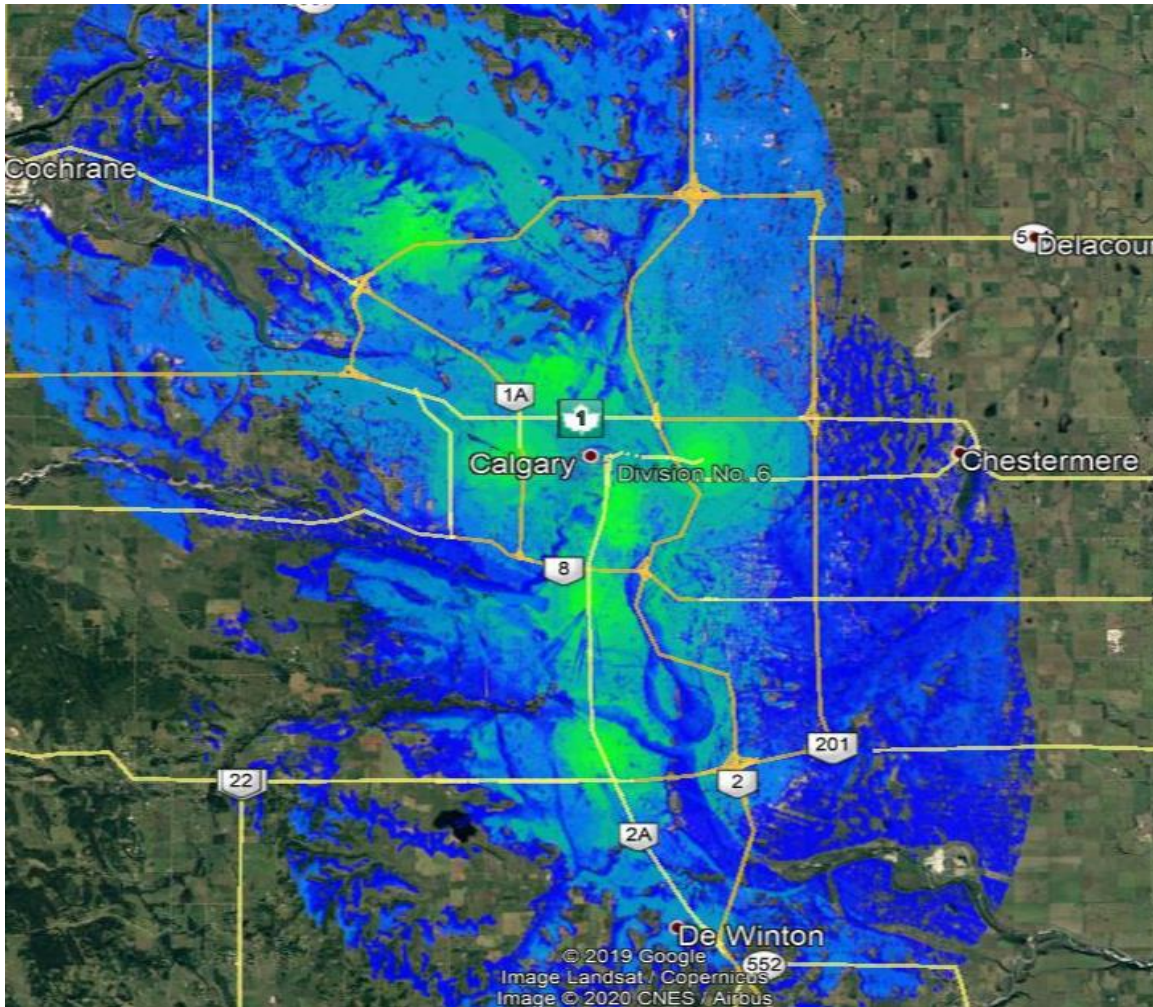
A wide-angle photograph taken from under a large concrete bridge at dusk. The bridge's underside and a support pillar are visible on the left. In the background, a city skyline is reflected in a body of water. The skyline includes a prominent cylindrical tower with a glowing top, several other lit-up skyscrapers, and a smaller tower with a circular observation deck. The sky is a deep blue with some clouds, and the water shows a long-exposure blur effect.

# Internet of Things



# A City-Wide IoT Wireless Infrastructure

Calgary



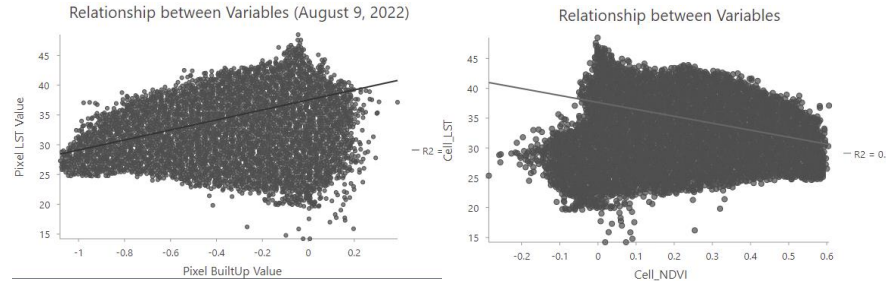
## Long Range Wide Area Network (LoRaWAN)

### Key Characteristics

- Sends bytes periodically
- Transmission at least 5km device to radio non-line of sight
- Battery powered
- Security built into specification
- Provisions for digital control with latency ~ 1s
- Resilient and immune to interference

# IoT Use Case – Urban Heat Models

## Satellite data analysis



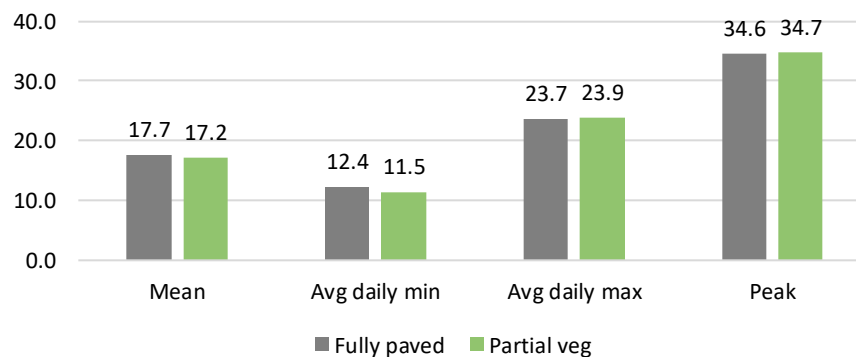
Built infrastructure can induce a 30% increase in Temp,  
**Vegetation can reduce temp by 20%.**

## Sensor data analysis

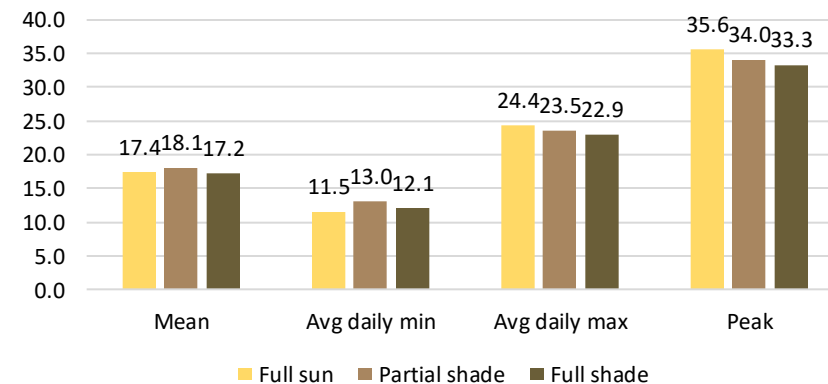
**Vegetation reduced mean and min temp.**  
**Vegetation did not reduce daily max and peak temp.**

**Shade did not reduce mean temp.**  
**Shade reduced daily max and peak temp.**

Influence of Pavement/Vegetation on Downtown Ambient Air Temperature (Aug 3 to Sept 23 2023)



Influence of Shade on Downtown Ambient Air Temperature (Aug 3 to Sept 23 2023)





# IoT Use Case – Waste Collection

Calgary



## Parks Garbage Service Requests (SRs)

Parks Garbage SR's Totals	
Years	Total
2018	2202
2019	2516
2020	3874



Twitter

311 Calgary on Twitter: "Opened Garbage in a Park request via web..."

Visit

Images may be subject to copyright. [Learn more](#)



Calgary



Garbage Bin

Location

Community

BRIDGELAND/RIVERSIDE

### Percentage Filled



### Distance (cm)





## Sound Classification

- air conditioner
- car horn
- children playing
- dog bark
- drilling
- engine idling
- gun shot
- jackhammer
- siren
- street music



A nighttime photograph of a city skyline viewed from under a large concrete bridge. The bridge's underside is visible in the upper left corner. The city skyline features several illuminated skyscrapers, including a prominent cylindrical tower. The lights from the buildings and the bridge's structure are reflected in the calm water in the foreground. The sky is a deep blue with some light clouds.

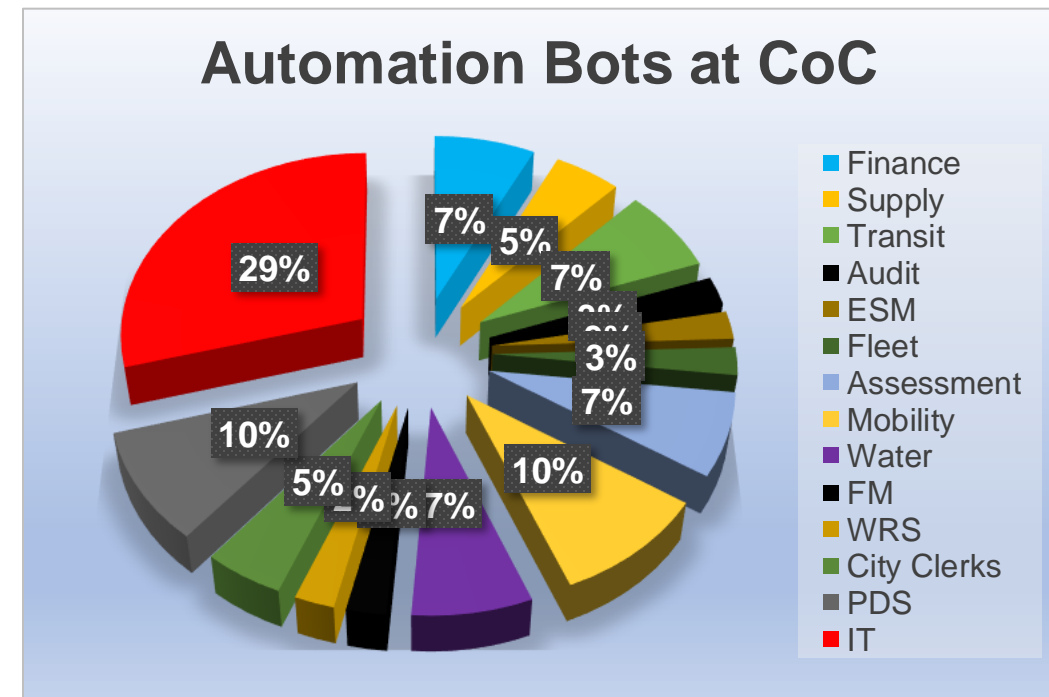
# **Robotic Process Automation (RPA)**

# Robotic Process Automation

Automation in Progress (since April 2021)						
	# of BU using RPA	Process Analysis & Assessment	Development & Testing	In Production & Support	Enhancement (for existing bots)	New Intake
# of bots	14	3	2	41	1	6

***“Take care of what is important, automate the rest.”***

- Support multiple automation technologies
- In-house development
- Highly reusable bots
- provide automation governance, development and sustainment for the corporation.





A nighttime photograph of a city skyline, likely Vancouver, viewed from under a large concrete bridge. The bridge's structure is visible in the upper left corner. The city skyline features several illuminated skyscrapers, including a prominent cylindrical tower. The lights from the buildings and the bridge's support structure are reflected in the calm water in the foreground. The sky is a deep blue with some light clouds. The overall scene is a blend of urban architecture and natural elements, captured in a long-exposure style.

# **AI & Machine Learning**

# Canada Day Crowd Counting

Estimate max people count between 10:52:30pm – 10:57:30pm

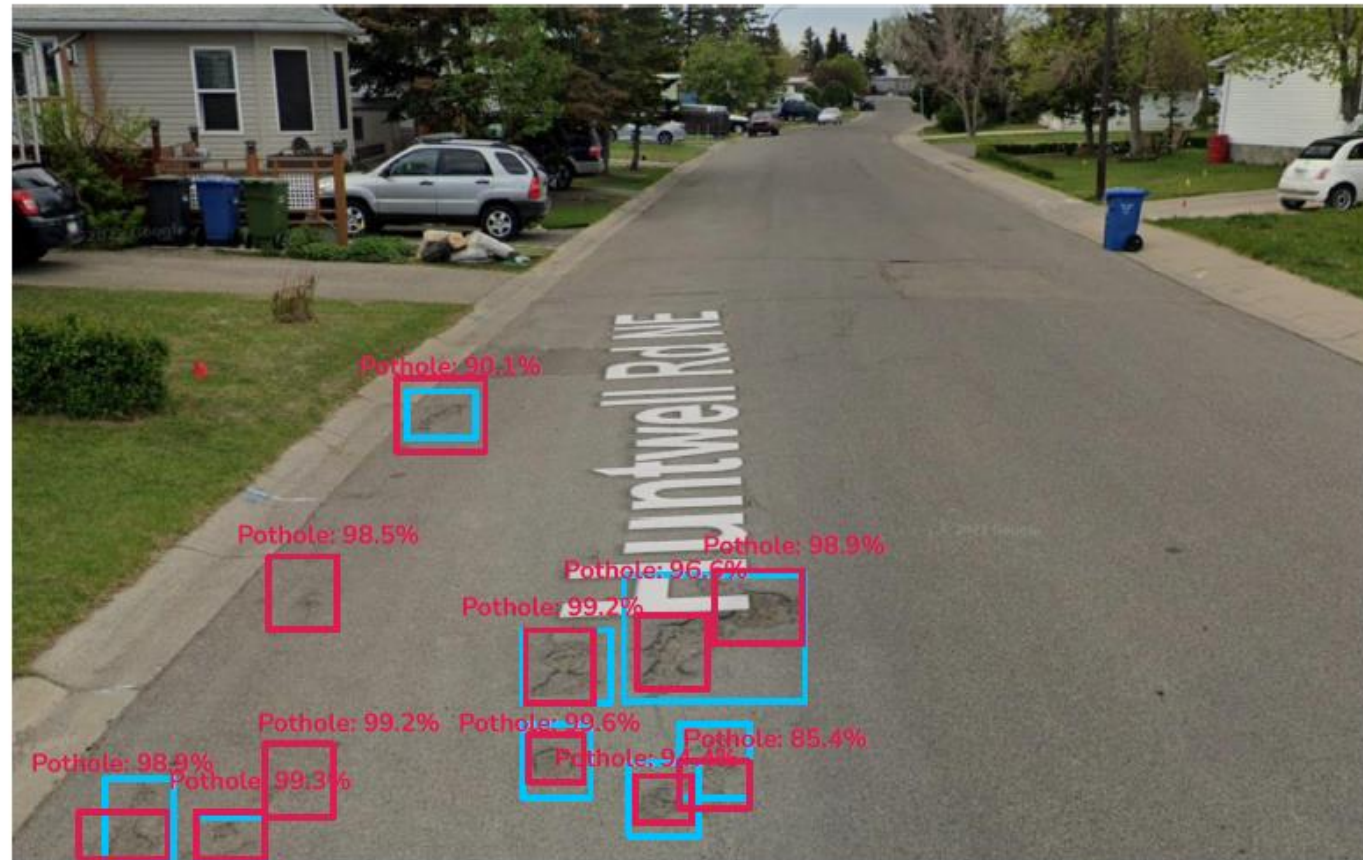
Without Preprocessing	With CLAHE	With CLAHE + Sharpening
1,098	1,245	1,146



Approx. people count **1,200**



# Mobility - Pavement Condition Assessment



Ground truth labels



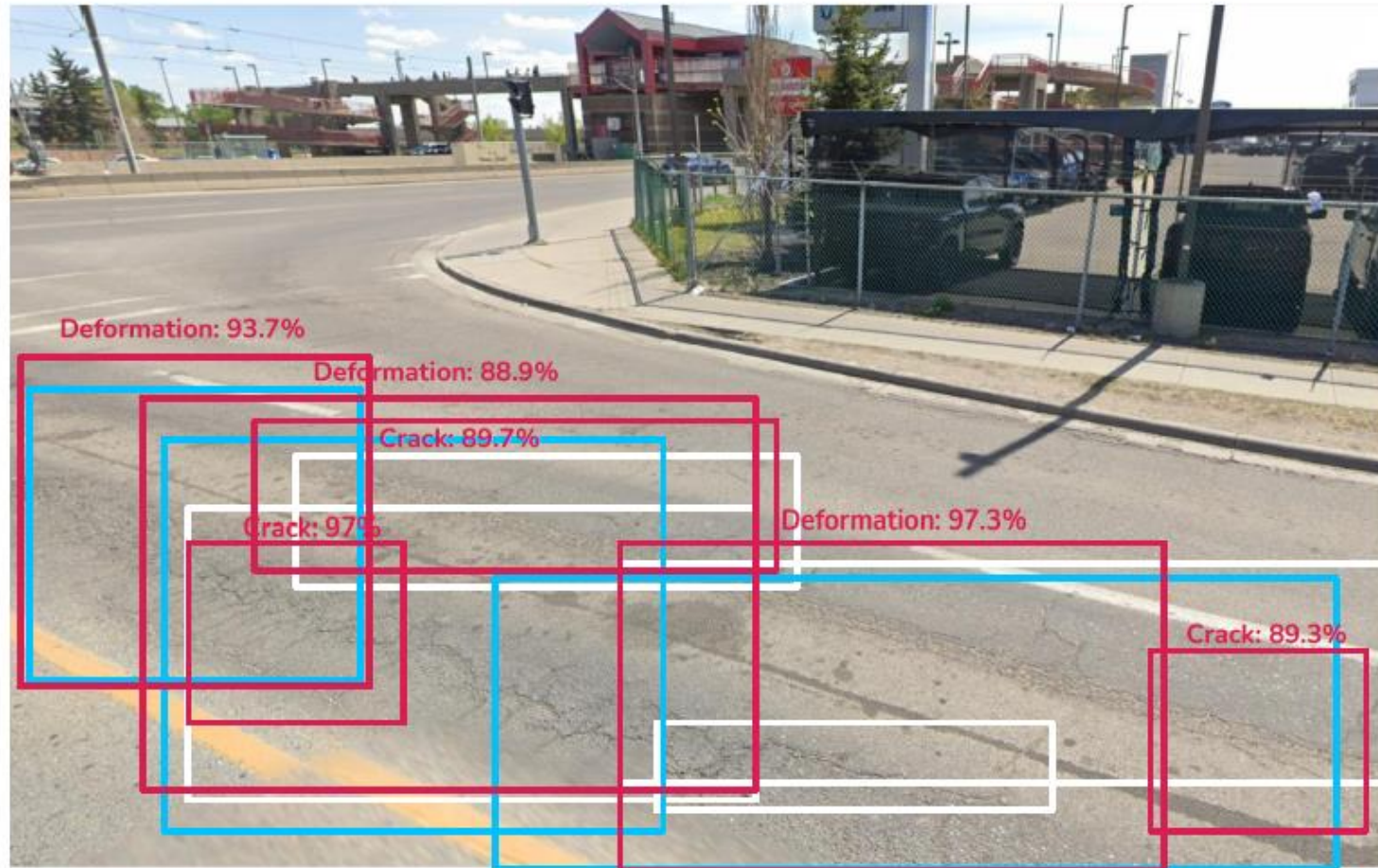
Pothole



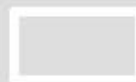
Prediction



# Mobility - Pavement Condition Assessment



Ground truth labels



Crack



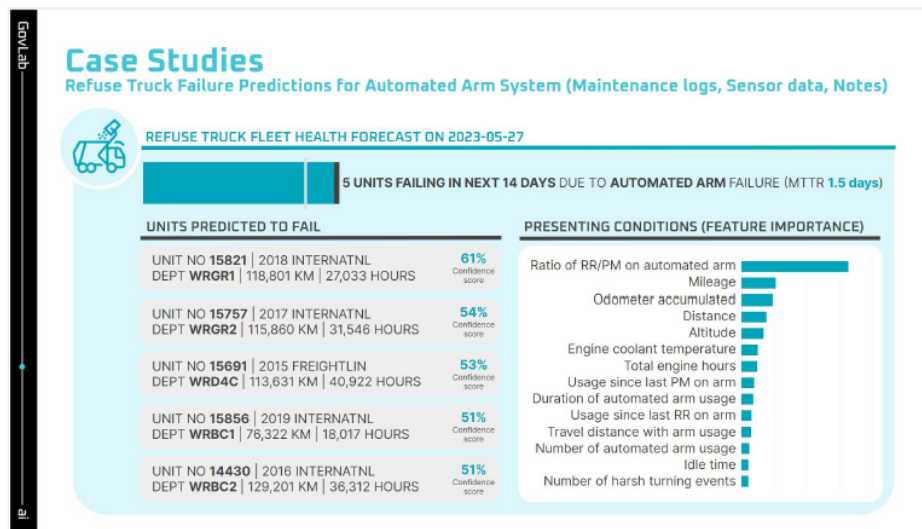
Deformation



Prediction

## Asset Servicing with Fleet Health Predictions

City of Calgary | Fleet Maintenance



Targeting **reliability efforts** is a very manual process, driven by overall costs and word-of-mouth complaints. Mobile assets are subject to unpredictable human factors and varying environmental conditions.



The ML solution experimented with historical fleet maintenance logs, vehicle sensor data, and weather data to **identify patterns in and predict fleet failures**.



Further data collection and model development will enhance identification of failure modes in root cause failure analysis and **proactive fleet health management**.



### Opportunity

- Optimize asset servicing
- Cost reduction



### AI/ML Solution

- Classification
- Natural language processing



### Impact

- Reduce maintenance costs
- Reduce operational downtime

# Facility Mgmt Work Order Classification

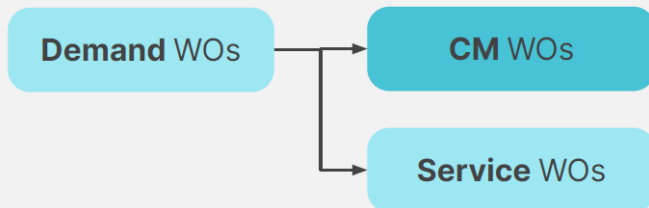
## Business Context

Goals for this Cohort



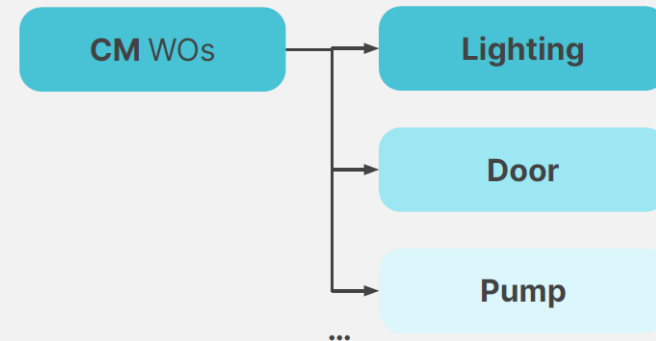
### PRIMARY GOAL

Develop a machine learning classification solution, to **automatically classify Demand WOs** as **Corrective Maintenance (CM)** or **Service**, so that we can develop a more accurate Preventative Maintenance (PM) ratio.



### SECONDARY GOAL

Develop a machine learning classification solution to **automatically classify the equipment for each Corrective Maintenance (CM) WO**, so that maintenance engineers can manually evaluate equipment-specific PM plans for improvements.



Deliver a classification model that can **categorize historical work orders** extracted from Enterprise Asset Management (EAM) for the Municipal Building.



## Access code information

[Request Assessment Search access code](#) >

An access code is a secure code associated with a specific property. Each property has a unique access code. You will need the property roll number and its associated access code to view detailed assessment information by logging into [Assessment Search](#).

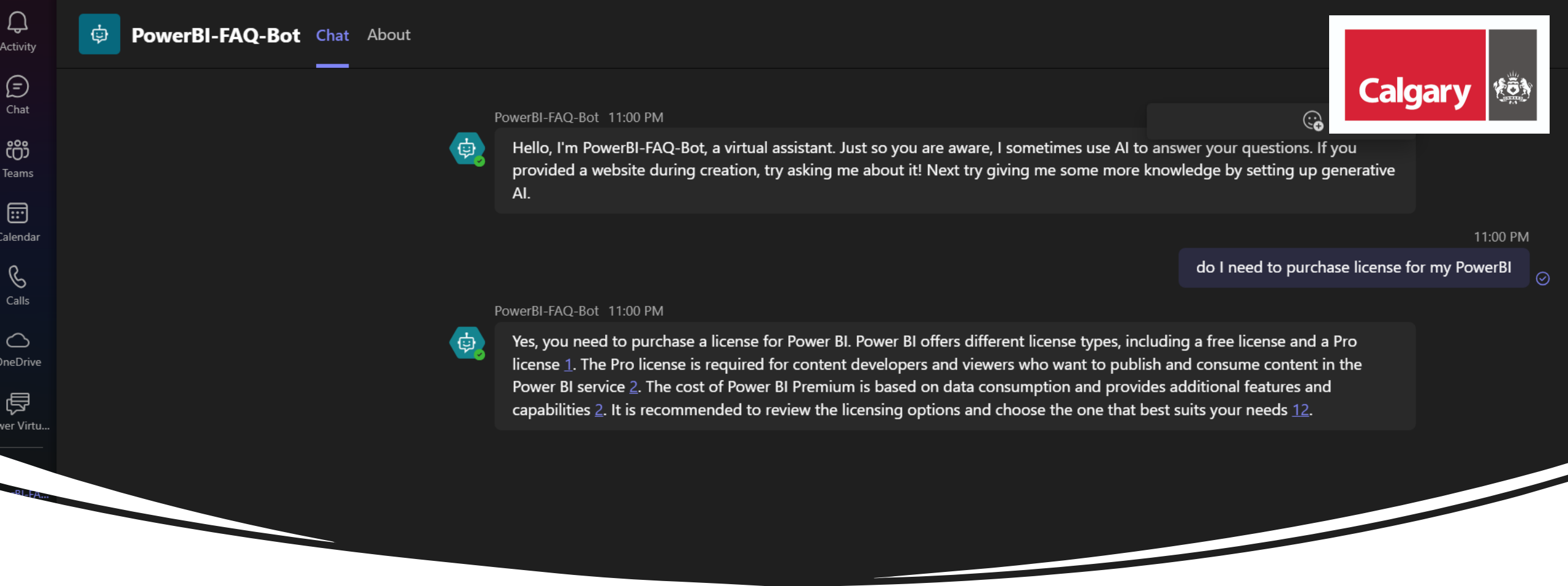
Your confidential access code is found on the front of your mailed, paper copy of the annual assessment notice. If you lose your assessment notice that has your access code, you can request a copy of your access code by completing [this online form](#) and we will email it to you within 3-4 business days. Assessment notices accessed online in Assessment Search will not show an access code, instead displaying "xxxxxx". An access code is not required on the assessment notice if you can already view it online, and you do not need to request a new one as your account is already set up.

Once you have linked your myID account with your assessment information using

## Assessment Search

Assessment Search is The City's online assessment resource. It can be accessed once you have a City [myID account](#). It is worth accessing as you will be able to do the following:

- Review the assessed value of any property in Calgary.
- Conveniently review your property details, including area, renovations



# City's AI Chatbots

- PowerBI chatbot
- [PDS - building code chatbot](#)
- [PDS - land use bylaw chatbot](#)
- [Mobility – Right of Way Chatbot](#)



THE CITY'S FIRST AI HACKATHON

# Blaze the TR(AI)L

We're excited to share the first of many City artificial intelligence (AI) collaboration opportunities for employees – **Blaze the TR(AI)L, coming Oct. 18 and 19, 2024 (dates to be confirmed)**. City IT and industry partners will be joining the adventure as our guide to explore how AI can be used to benefit the organization and our community.

You're invited to lace up those hiking boots and help mark the way for the successful adoption of AI at The City.

## Why participate?

Participating in The City's TR(AI)Lblazers event will be fun, informative, and rewarding. Here's why you should totally do it:

- **Get in on the action:** Take part in leading edge technology experimentation at The City!
- **AI 101:** Learn the ABCs of AI best practices and principles.
- **AI speed run:** Put on your trail running shoes and fast-track your AI learning.
- **AI tools at your fingertips:** Roll up your sleeves and get your hands dirty with AI tools!
- **Be The City's AI hero:** Help create AI tools that'll let you and your team tackle those tricky City problems.
- **Idea to implementation:** Take pride in seeing your innovative ideas turn into real-world applications post-hackathon.

## Choose your own adventure

## Sign up

Just submit your proposal using the submission form. We'll check out all the submissions and if yours is chosen, you'll be invited to participate in the TR(AI)Lblazers hackathon event. **The deadline for submissions is July 31, 2024.**

Submit your proposal >

## Questions?

Contact [aihackathon@calgary.ca](mailto:aihackathon@calgary.ca)



# Choose your own adventure

You know your work, experience the challenges and are already coming up with solutions every day. Now, we're asking you to consider how technology could help, specifically, AI. Employees are invited to submit challenges they think can be addressed using artificial intelligence technology.

## Questions?

Contact [aihackathon@calgary.ca](mailto:aihackathon@calgary.ca)

We're looking for challenges where The City can harness AI to help in one of these areas:



### City Summit Trail

Reach new heights in improving city processes.

**Example:**

Automate processing of public space reports – Netherlands



### Service Delivery Ridge

Navigate the path toward improved service delivery.

**Example:**

Create AI chatbot for social service requests – Helsinki



### Strategic Expedition Pass

Blaze a trail toward council's priorities of economic, social and climate resilience.

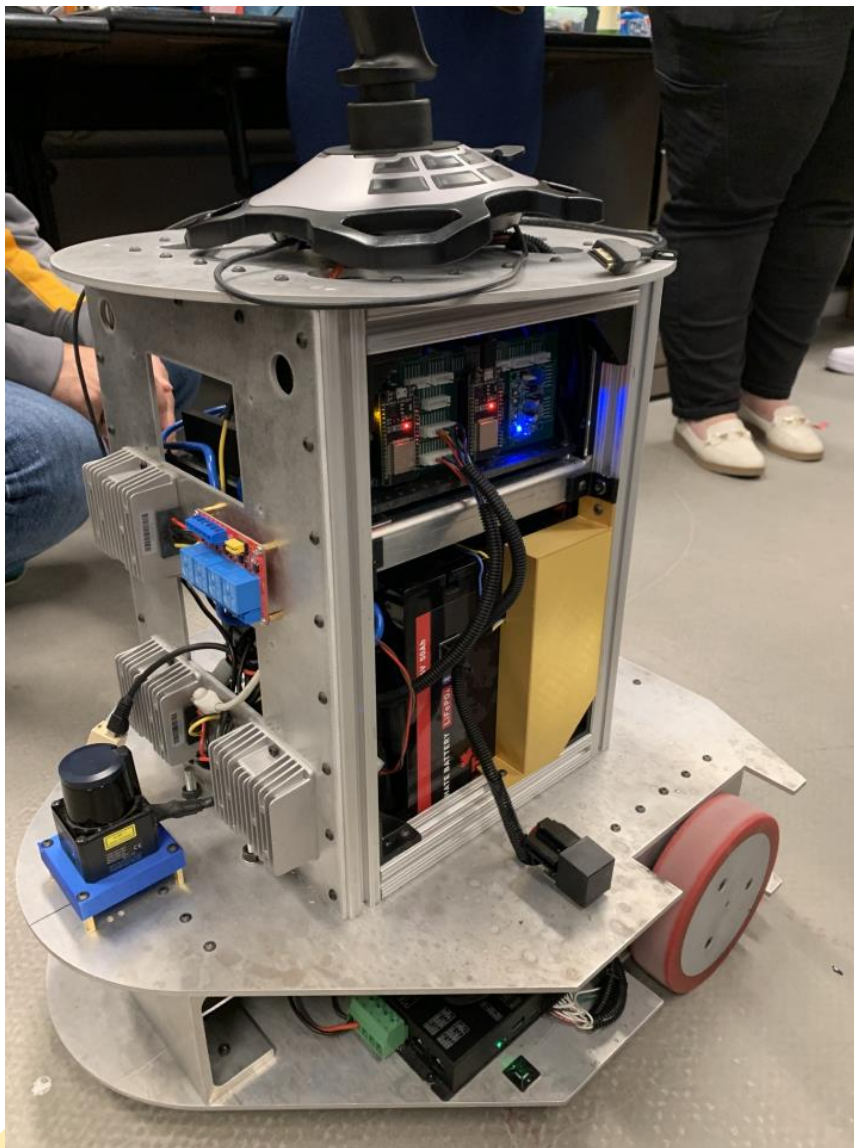
**Example:**

Use AI to understand and address air quality – Los Angeles

A wide-angle, long-exposure photograph of a city skyline at dusk, viewed from under a large concrete bridge. The bridge's underside and a support pillar are visible on the left. The city features several illuminated skyscrapers, including a prominent cylindrical tower. The CN Tower is visible in the distance on the left. The city lights reflect on the calm water in the foreground. The sky is a deep blue with some clouds.

# Robots





# The YYC Robot

6/4/2024

Presentation



A long-exposure photograph of a city skyline at night, viewed from under a bridge. The bridge's concrete structure is visible in the upper left corner. The city lights are reflected in the water below. The sky is a deep blue with some clouds. The text "Lesson Learned" is overlaid in the bottom left corner.

# Lesson Learned

# The “Magic Bullets”

**Copilot:** Certainly! Here are five strategic “magic bullets” for enterprises to successfully adopt emerging technologies:

1. **Play the Devil’s Advocate:** Before adopting a new technology, critically assess its alignment with your business objectives. [Ask probing questions to understand the potential impact and challenges it may bring<sup>1</sup>.](#)
2. **Establish Clear Priorities:** Determine which technologies align with your company’s strategic goals. [Prioritize those that offer the most value and address the most pressing business needs<sup>1</sup>.](#)
3. **Balance Agility and Reliability:** While being agile allows you to adapt quickly to new technologies, reliability ensures that these technologies can be trusted to perform consistently<sup>1</sup>.
4. **Invest in Learning:** Allocate time and resources for your team to learn about new technologies. [This includes training and staying updated with the latest trends and best practices<sup>1</sup>.](#)
5. **Experiment and Prototype:** Encourage a culture of innovation by experimenting with new technologies in controlled environments. [Prototyping allows you to test the feasibility and refine the technology before full-scale deployment<sup>1</sup>.](#)

These strategies can help your enterprise navigate the complexities of technology adoption and leverage emerging technologies for competitive advantage. Remember, the key is to integrate these technologies in a way that supports your business strategy and adds value to your operations.





Calgary



# Innovate With A Strategy

## Artificial Intelligence (AI) Strategy

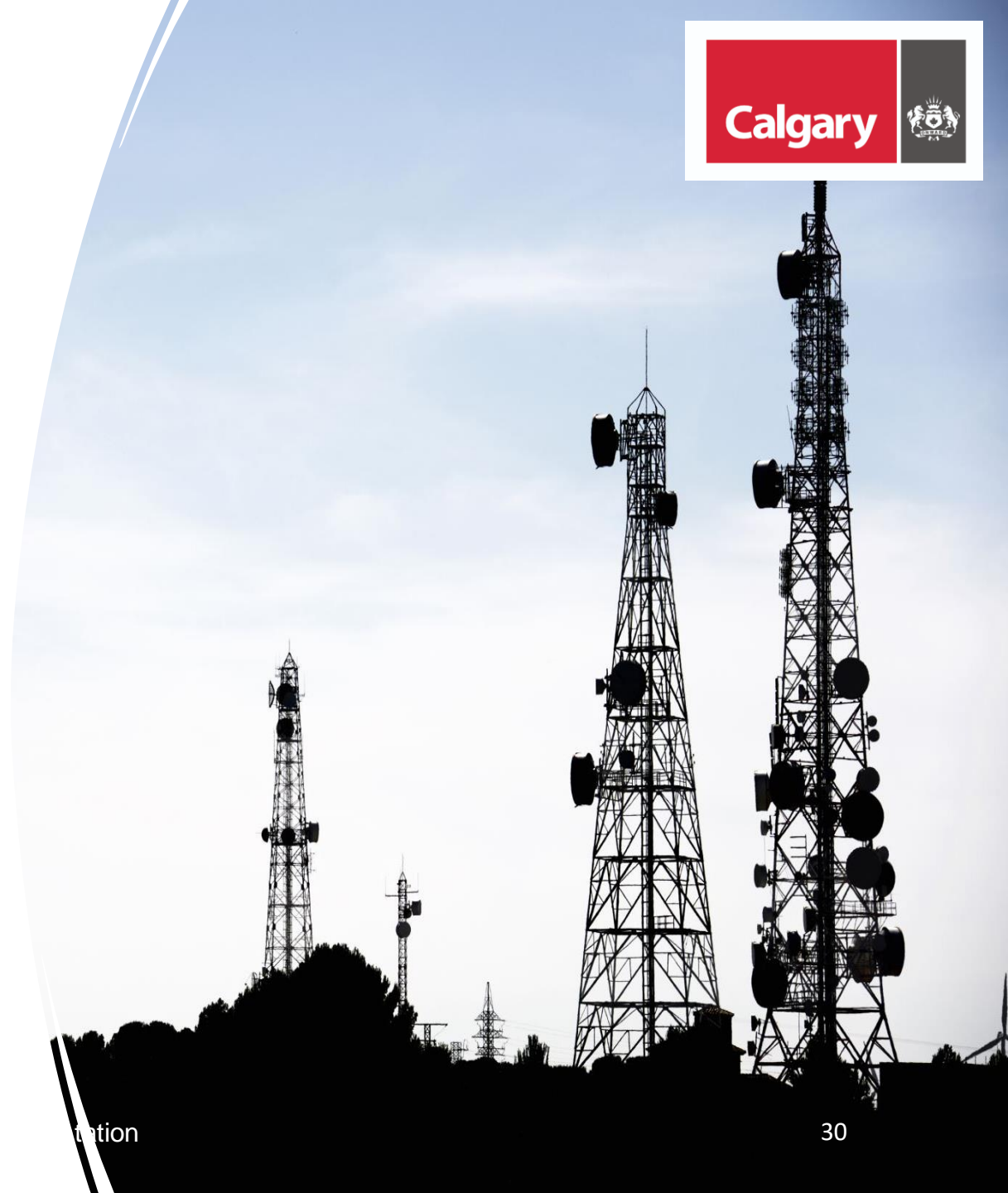
Information Technology, The City of Calgary

September 25, 2023



# The City of Calgary AI Strategy

- Governance
- Technology Platform – Microsoft Azure AI
- Risk management
- Audit and review
- AI upskilling and training
- Success metrics
- Enterprise data strategy
- Third party AI







**Innovate  
with A Purpose**



Innovate  
With  
An  
Impact

## Work Order Job Worksheet

CITY OF CALGARY - TRANSIT

Report Printed: 12/22/2021 17:42:36 By User: JMACDONALD1



Work Order Location:  
SGDS

Work Order: 1169330

Unit No: 0388

WO Location: SGDS SPRING GARDENS DIESEL SHOP Total Job Count: 1  
WO Reason: UNPLANNED Unit Description: 2014 CHAMPION CHALLENGER  
Date Opened: 12/22/2021 17:42:14 By: JMACDONALD1 License No: BSG0900 Using Dept: ACCESS CAL  
WO Status: Open Unit Status: A Serial No: 1FDEE4FL2EDA89291  
Promised Date: Where Parked: Tech Spec: BHBCHA14 MCC: 220  
Meter 1: K 293,613 Life Use 1: 293,613 In-Service Date: 08/24/2015  
Meter 2: N 0 Life Use 2: 0 Contact: Ashraf Mithani 4035377998

### Work Order Instructions / Complaint:

(JMACDON) Incident Notes: Driver reported a front passenger side flat tire. Tow is needed



18-15-020 -  
TOW/RECOVER TIRE R/FRONT

Job Reason: CHANGE OFF Job Location: SGDS SPRING GARDENS DIESEL SHOP  
Job ID: 6720925 Opened Date: 12/22/2021 Status: WFA  
Work Req No: 54216401 Due Date: 12/23/2021 Est. Job Cost: \$0.00  
Campaign No: Scheduled: Warranty: N Std. Labor Hrs: 0.0  
Assigned To: Priority: 5 Shift: Est. Labor Hrs: 0.0  
Accident No: External Data:

### Job Instructions and Notes:

(JMACDON) Driver reported a front passenger side flat tire. Tow is needed

Complaint:

Cause:

Trip # 114591

Correction:

Completed Date: DEC 22 2021 Signature: J. MacDonald Employee Number: 129900  
Close Date: Signature: Employee Number:

Calgary



### Status of Scanned Workorders



PowerAuto No Reply

To Thankakrishna, Sabari

This message was sent with Low importance.

### Status of workorders updated in M5

1152987 - Workorder does not exist in M5  
1164873 - Workorder Successfully updated in M5  
1158415 - Workorder Successfully updated in M5  
1179402 - Workorder Successfully updated in M5  
1169330 - Workorder Successfully updated in M5  
1169278 - Workorder Successfully updated in M5  
1169318 - Workorder Successfully updated in M5  
1181667 - Workorder Successfully updated in M5



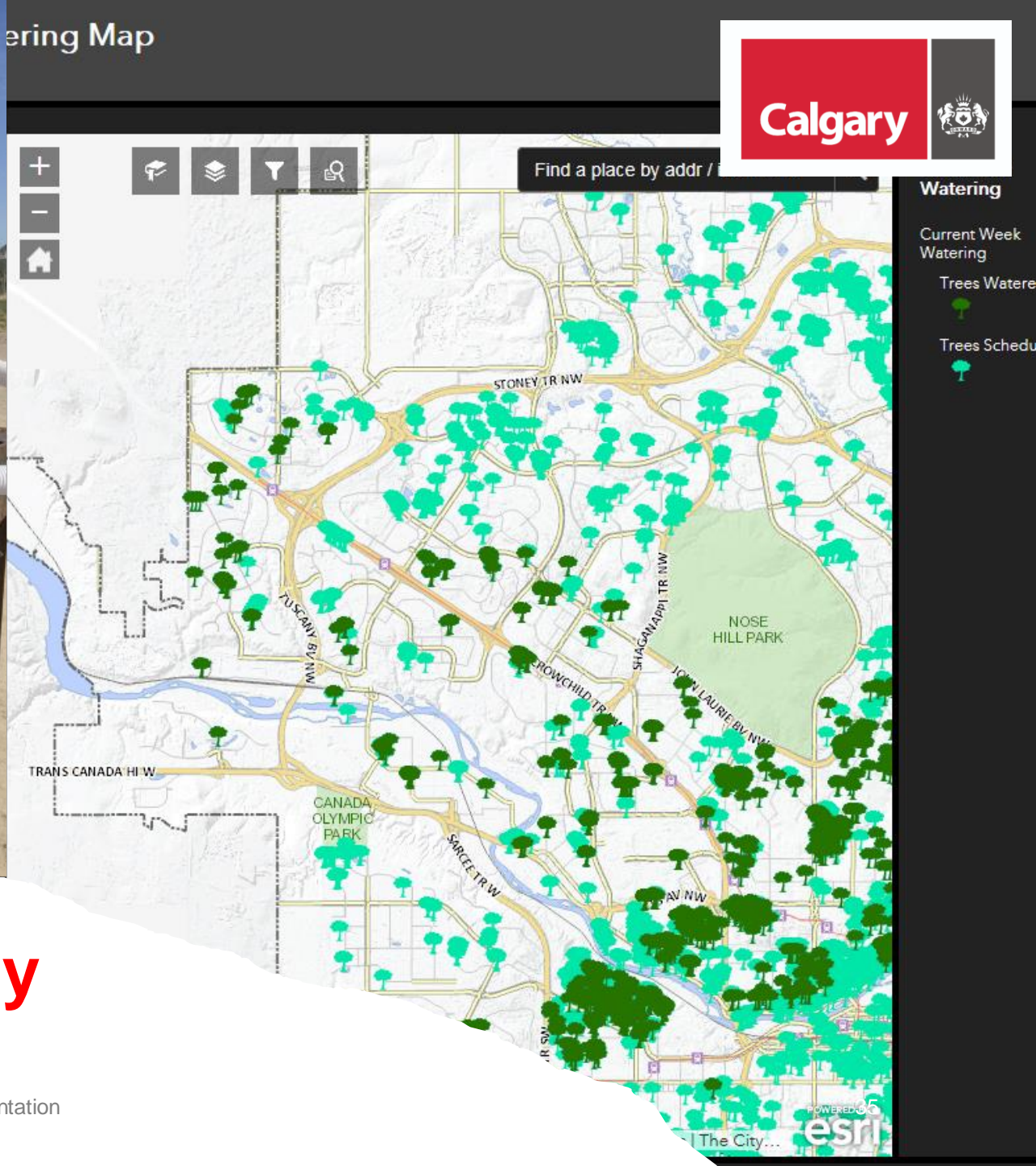
# Innovate with A Vision





**Fail Fast, Not Fail Often**





# Innovate Beyond Technology





**Let's Connect**



Let's Synchronize  
our neural  
networks and  
exchange  
thoughts

- "AI"

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# Thank You

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