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AI 101 and Emerging Trends

May 14, 2025

Prepared For: Society of Local Government Managers
Presented By: Chantal Ritcey

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Desired Outcomes

What's the #1 thing you're hoping to get out of today's session?

2

What can you expect from today's session?

Agenda

- What is AI?
- Emerging trends in AI
  - GenAI
  - Responsible AI
- AI in the Public Sector
- Municipalities around the world
- Art of the Possible - Activity
- Adopting AI in the Public Sector

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Who We Are

100+
Team Members

1/3
Of Our Team Holds a PhD or Masters

400+
Use Cases Developed

90+
Organizations Using Our Solutions

AltaML is a developer of artificial intelligence (AI)-powered solutions.

Working with organizations that want to use AI to leverage their data to develop solutions that drive tangible business results, AltaML empowers partners to create operational efficiency, reduce risks, and generate new sources of revenue.

Offices based in Edmonton, Calgary, Toronto, and Waterloo.

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What We Do

We offer a variety of services to meet client needs:

Education and Advisory: AI foundations—executive education, ideation and prioritization, assessing AI maturity, and establishing AI governance and strategy.

Individual Use Case: Taking a single, defined use case through the AI development life cycle.

AI Lab: Programmatic delivery model working through a funnel of strategic and prioritized use cases.

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Mission

Solving public sector problems by leveraging the rich data of the public sector and the speed of industry to build AI solutions to benefit citizens and governments.

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Objectives

Improved Services to Citizens
Efficiencies gained are transformed into additional transparency, better quality, and faster turnaround for service delivery.

Innovation Ecosystem
Strong partnerships in public and private sector allow the public sector to take a lead role in AI/ML adoption.

Talent Attraction and Retention
Upskill/reskill public sector workforce in AI/ML, and attract students to consider public sector employment.

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The Opportunity

- **Upskill and reskill** the public sector workforce in AI/ML and digital transformation.
- **Attract students and recent graduates** to public sector jobs by highlighting the opportunity to impact many lives.
- **Create operational solutions** to save costs, enhance efficiency, test new services, and improve service delivery.
- **Create a public sector peer network** to enhance knowledge and information sharing opportunities.
- **Use emerging technologies** to create new intellectual property and strengthen the local economy.

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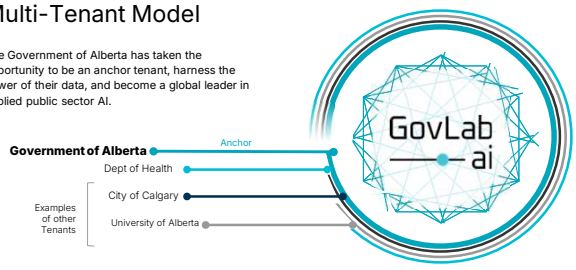
About GovLab

Multi-Tenant Model

The Government of Alberta has taken the opportunity to be an anchor tenant, harness the power of their data, and become a global leader in applied public sector AI.



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What is Artificial Intelligence (AI)?

Understanding the Foundations

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Fact or Fiction

Myths About AI

Myths	Facts
AI can solve any problem	Some problems are better for alternative solutions
AI will steal my job	AI will complement roles and create new ones
AI is a "black box" and cannot be trusted	Using special techniques we can build trust in AI models

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The Age of AI

By the end of the decade there will be two kinds of companies: (1) Those who fully utilize AI; and, (2) Those who are Out of Business.[1]

Peter Diamandis, MD – Founder & Chairman of the XPRIZE Foundation and Recognized By FORTUNE as One of the "World's 50 Greatest Leaders"

The development of AI is as fundamental as the creation of the microprocessor, the personal computer, the Internet, and the mobile phone… Entire industries will reorient around it. Businesses will distinguish themselves by how well they use it.

Bill Gates – "The Age of AI Has Begun", March 2023

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Understanding Artificial Intelligence (AI)

Who Is This Man?

How Did Your Brain Do That?

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Traditional Programming Vs. Machine Learning

Highlighting a Key Difference

Traditional Programming	Data Rules	→	Answers
Machine Learning	Data Answers	→	Rules

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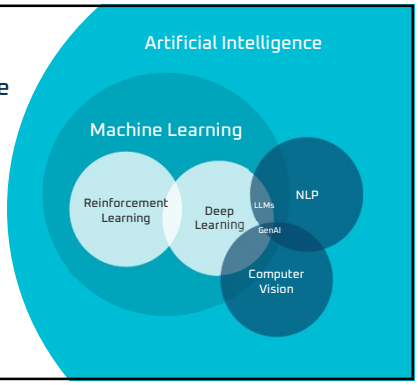
Different Types of Artificial Intelligence



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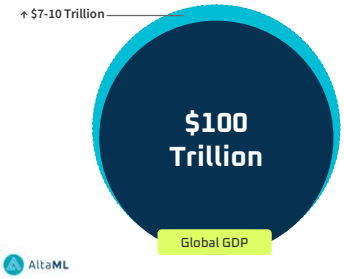
Impact of AI on the Economy



"AI will increase global GDP by ~10%."
- Microsoft

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Source: YouTube 15

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Impact of AI on Jobs

"63% of jobs will be complemented by AI."

- Goldman Sachs, March 2023

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Source: Goldman Sachs 16

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Questions on AI generally?

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Emerging Trends in AI

Exploring the Latest Developments and Innovations

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Areas to Pay Attention To

Emerging Trends

Generative AI (GenAI)

AI systems which create various forms of media including text, images, and videos.

Responsible AI (RAI)

Ensuring AI systems are developed and deployed ethically and without bias.

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Generative AI

Exploring the Latest Developments and Innovations

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What is Generative AI?

Generative Artificial Intelligence (GenAI)

Generates new text, images, or other media that resembles human-created content by learning patterns and structures of its input training data using deep learning and natural language processing techniques.

Human-Like Outputs
Used to generate free form text, image, video, and code.

Sounds Human-Like
Trained on billions of data points, including large amounts of data written by people.

Accessible
Underlying deep learning architecture developed in 2017, easily accessible through a chatbot like interface.

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Tasks where GenAI excels

GenAI is versatile and can take on a broad range of tasks across enterprise

Summarization	• Find key action items from meetings • Summarize articles and research papers • Summarize code documentation
Entity Retrieval	• Extract key information from large repository • Search regulatory documents to identify changes
Transformation	• Translate text • Format code in line with standards • Personalize design
Augmentation	• Impute missing values with synthetic data • Auto-complete • Enrich response with sentiment
Q&A	• Respond to specific natural language queries • Chat with your data
Net-new Creation	• Create marketing images • Generate reports • Generate code from natural language description

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What is ChatGPT?

OpenAI

AI research and deployment company, on a mission to ensure that artificial general intelligence benefits all of humanity.

Reads, Summarizes, and Translates Text
Predicts future words in a sentence.

Generates Human-Like Speech and Writing
Based on a large language model (LLM) for text called Generative Pretrained Transformer Version 4 (GPT-4).

One of Largest Language Models
GPT-4.5 is composed of trillions parameters.

Create Unique Images
DALL-E generates creative and contextually relevant images from textual descriptions.

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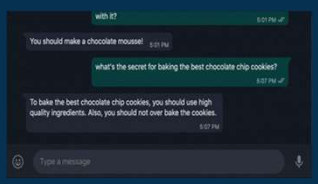
Real World Examples

Using GPT at Home



Using ChatGPT in November 2022

Using GPT-driven apps in 2024

Source: Youtube

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Real World Examples

Advances in Image Generation

Comparison of images generated using Midjourney version 5.2 (June 2023) and version 6 (December 2023)

Key advances:
- More realistic and detailed portraits
- Ability to generate text in the image

Prompt: "portrait photography of a young woman with her mouth sealed by a tape labeled "Status Quo", symbolizing the suppression of her voice in society, dark background"

Source: NextCypher.ai X

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Real World Examples

Advances in Video Generation

Prompt: "Will Smith eating spaghetti"

Video generated April 2023

Google announces Lumiere video generator January 2024

Source: Youtube

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GenAI Risks and Mitigation

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Real World Examples

Understanding Risks of GenAI

- Difficulty for consumers to differentiate real from fake
- Increased concern of global political implications and IP ownership
- Call for improved regulation and protection

January 2024 – Audio generated of Joe Biden encouraging voters not to vote in the New Hampshire primary

Source: The Telegraph

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Risks of Generative AI

Hallucinations & Immaturity

What if the model produces false information? How do you know if a model is "good enough" for your use case?

Privacy & Compliance Concerns

How can you keep your data safe?

Brand Reputational Risk

What if your model outputs biased information? What if it makes racist or sexist claims?

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Adapted from Chip Huyen, Claypot AI

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Hallucinations & Immaturity

Risk

Incorrect but convincing information. Limitations of the current technology.

Mitigation

Form cross-functional team of experts.

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Privacy & Compliance

Risk

Data privacy. Putting sensitive data online. Release of PII.

Mitigation

Create clear governance and policy frameworks.

- Educate and Empower
- Protect all Stakeholders

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Brand Reputation

Risk

Models may produce bias or unethical information.

Mitigation

Consider Responsible AI (RAI) implications throughout the development lifecycle.

- Reliability & Safety
- Transparency
- Inclusiveness
- Privacy and Security
- Accountability
- Fairness
- Awareness and Empowerment

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Selecting the Right Model

Open-Source Model

Benefits

- Customization and Flexibility
- Transparency and Security
- Accelerated Innovation

LLaMA by Meta | Hugging Face

Closed-Source Model

Benefits

- Extensive Capital
- Support Service
- Usability

Google | OpenAI

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Questions on GenAI?

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Responsible AI

Exploring the Principles and Regulatory Landscape

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The Numbers Don't Lie

82%

of businesses believe they practice RAI. However, only **24%** had actual measures in place.

- CSIRO Australia

52%

of companies practice some level of RAI, but **79% of those say** their implementation is **limited in scale and scope.**

- MIT Sloan & BCG

43%

of study participants **do not conduct** reviews with respect to bias and discrimination. **Only 26%** indicated that unfair bias is used as a measure of model success in their organization.

- SAS

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What is Responsible AI (RAI)?

Responsible Artificial Intelligence (RAI)

Prioritizes ethical considerations, fairness, transparency, and accountability throughout the AI development and deployment lifecycle.

- Reliability & Safety
- Transparency
- Inclusiveness
- Privacy & Security
- Accountability
- Fairness
- Awareness & Empowerment

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Digging Into Explainable AI (XAI)

Explainable Artificial Intelligence

Provides transparent and interpretable outputs, enabling users to understand how the AI system reaches conclusions and decisions, thereby increasing trust in the model's outputs. Explainable AI is a key requirement for Responsible AI.

Interpretable Models
Prioritizing the use of simplistic models that are well understood rather than more complex "black box" models which are difficult to understand.

Transparent Outputs
Generates results accompanied by explanations so that users without specialized AI knowledge understand *how* the model made a prediction.

Accountable Development
Understanding the model results, specifically those concerning ethical and bias considerations, ensures accountability of the development team.

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AltaML's Commitment to Responsible AI

Educate and Empower

All AltaML employees participate in RAI training. We have a dedicated team-led RAI practice to stay on top of evolving guidelines and adjust our processes.

RAI Above All Other Metrics

Developing fair models supersedes model performance in all cases. We work only with clients who share this belief.

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Questions on Responsible AI?

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AI in the Public Sector

Harnessing AI for Public Good

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AI for ESG in Municipalities

Studies suggest that there is a potential to save

~15-20%

by deploying AI for energy management:

1. Optimize energy usage in buildings
2. Adopt concepts like microgridding and long-duration energy storage systems for renewables

Additional use cases for municipalities aspiring to ESG targets:

- Sustainable product & manufacturing process design
- Climate change modeling
- Agricultural optimization for municipal-adjacent Agriculture

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Listening to the Data

75+

of 176 national government are using AI surveillance. Use cases include smart/safe cities, facial recognition, and smart policing.

- Carnegie Endowment for International Peace

84%

of local governments think AI is important for achieving their mission in the next five years.

- Deloitte

$939B

of additional value in productivity and impact returned from taxpayer dollars from use of AI.

- Accenture

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48%

of governments are **still considered beginners** in their AI journey

- World Bank, 2021

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Benefits to Municipalities

Transportation	• Emergency vehicle routing • Public transit optimal route planning • Collision predictions	• Optimize traffic flow • Maintenance prediction for roads and other infrastructure
Emergency Services	• City flooding predictions • City and provincial firefighting response • AI voice assistance for 311 or 911 calls	• Simulate emergency situations • Predict impact of natural disasters • Emergency response planning
Capital Planning	• Capital planning location prediction for schools, parks, facilities • Child care facility location planning • Nowcasting for economic modelling	
Urban Planning	• Predictions on best areas of zoning for multi-tenant homes • Optimize waste collection routes • Self-service chatbot services for residential inquiries	

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Example Use Cases

Real examples we've worked on

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City of Edmonton: Winter 2023

Permit Application Screening

Overview

Using machine learning and computer vision to automate the pre-screening of building permit applications can enable quick responses to permits with incomplete information, allowing examiners to spend more time working with builders on complex development issues.

Impact

$2M Approximate cost savings for developers submitting applications.

4wk Time saved in administrative review each year.

95% Success rate identifying stamps and signatures.

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Government of Alberta: Fall 2024

Safety Codes Research Assistant

Overview

Municipal Affairs Duty Officers handle a large volume of inquiries about safety code requirements. Responding to these questions involves extensive research and time to provide accurate responses. This solution has streamlined workflows by reducing the time and effort needed to research inquiries and draft responses.

Impact

12s Average response time, reducing research time from hours to minutes.

Increased accuracy to inquiry responses.

Demo is available to view.

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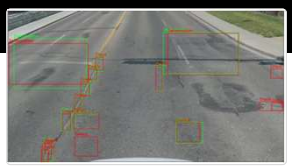
City of Calgary: Fall 2024

Pavement Defect Detection



Overview

Assessments of pavement conditions involves expensive data collection and labor costs for the city. By using data already collected from dashboard cameras, traffic cameras and drone imagery, machine learning can be used to automatically detect and classify road distress and estimate condition severity.

Impact

$300K Reduction in annual manual inspection time and costs.

$4.8M Projected benefits if solution was expanded to sidewalks.

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City of Calgary: Summer 2023

Predictive Fleet Maintenance

Overview

Each year, unplanned maintenance costs the city $7M, a large portion of the $22M in work orders completed annually. The proof of concept for this project showed that machine learning could be used to predict fleet failures and optimize preventive maintenance, cutting costs and potentially saving millions in operational expenses.

Impact

Optimized asset servicing and preventive maintenance.

Reduction in operational and unplanned maintenance costs.

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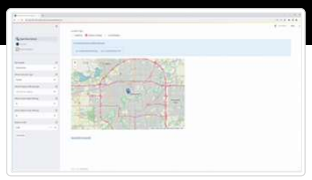
Government of Alberta: Winter 2025

Education Capital Planning



Overview

In 2025, the Province has approved $8.6 billion to plan and build new schools, and the Education Capital Planning team needs to determine the optimal size and location. A machine learning model and dashboard allows users to place a hypothetical new school and then predict enrollment pressure on the new school and surrounding schools.

Impact

$8.6B New capital planning funding.

200k New student spaces over 7 years.

$19M Predicted annual savings.

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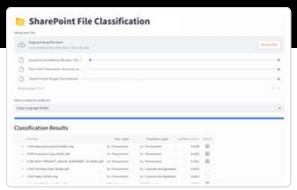
Government of Alberta: Fall 2023

Automated Document Classification



Overview

The Government of Alberta stores an estimated 500-600 million documents, many of which are unclassified. A machine learning solution can ensure documents are classified, making them easier to find, mitigating productivity loss, and reducing the cost of storing documents that should have been disposed of.

Impact

90% Or higher accuracy in initial proof of concept modelling.

3.6M Documents created by staff per year.

16yrs For one person to manually label 1 million documents.

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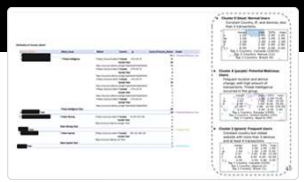
Government of Alberta: Fall 2024

Cybersecurity Threat Clustering



Overview

Two analysts manually comb through security event logs per day to identify at-risk applications and malicious users. Automatically grouping them based on similar features and describing the dominant characteristics of each group using an LLM could reduce manual effort on locating systemic threats and yield more nuanced insights into applications and users of interest.

Impact

500 Logs processed and clustered daily.

27k Hostile transactions analyzed.

2 FTE security analysts refocused on preventing threats.

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City of Calgary: Summer 2023

Predictive Fleet Maintenance

Overview

Each year, unplanned maintenance costs the city $7M, a large portion of the $22M in work orders completed annually. The proof of concept for this project showed that machine learning could be used to predict fleet failures and optimize preventive maintenance, cutting costs and potentially saving millions in operational expenses.

Impact

Optimized asset servicing and preventive maintenance.

Reduction in operational and unplanned maintenance costs.

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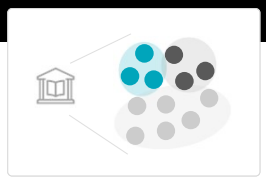
City of Edmonton: Summer 2023

Predictive Facilities Maintenance



Overview

Each year the City process 59,000 work orders to maintain the 9.3 Million square feet of the 200 City Owned flagship buildings with a budget of $60M. Using machine learning to better understand factors that affect facilities maintenance allows the city to save on maintenance costs for new or existing buildings.

Impact

59K Number of facility maintenance work orders processed annually.

$60M Annual city budget used to maintain City facilities.

193 Flagship buildings explored in depth.

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Government of Alberta: Winter 2023

Wildfire Occurrence Prediction

Overview

The Wildfire Management Branch predicts when and where fire pre-suppression resources are most likely needed. A machine learning model that predicts the likelihood of a fire starting will lead to increased situational awareness, improved efficiency, and more robust strategic planning.

Impact

$3.3m Resource planning savings enabled per typical fire year.

100% Model and dashboard deployed.

Demo is available to view.

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What About Municipalities Around the World?

Elevating Communities Worldwide

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The Impact of AI on Municipalities

Blackpool Council's Project Amber

AI-powered space satellite imagery and analysis supporting road maintenance, filling in over 5,000 potholes while saving GBP$1,000,000 compared to traditional methods.[1]

Smart Waste Management in Cascais

Optimizing routes and predicting the best time for garbage pickup is expected to reduce journeys along routes by 180,000 kms and carbon dioxide emissions by 350 tons per year, producing savings $600K annually.[2]

Vaughan Fights Snow with AI

Using weather forecasts and road conditions, AI used to recommend roads for salting instead of salting everywhere. Vaughan saved $400K in one season.[3]

Optimizing Retrofits using AI

Identifying buildings which are in most urgent need of retrofitting and providing automated suggestions on how to upgrade them.[4]

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Source: BBC, Deloitte, Municipal World, The Economist 58

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Art of Possible

Navigating the AI - Where to start?

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Planning for Success

What Makes a Strong Use Case?

Business Case
Identify a clear business use case aligned to strategic objectives that creates ROI.

Data
Quantity, quality, complexity, and reproducibility of data sets are key.

Technical Feasibility
Understanding and defining the technical hypothesis.

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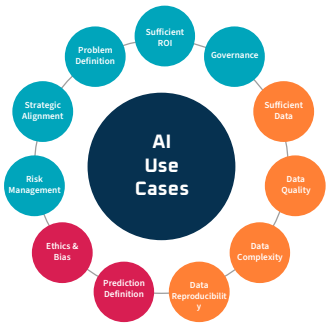

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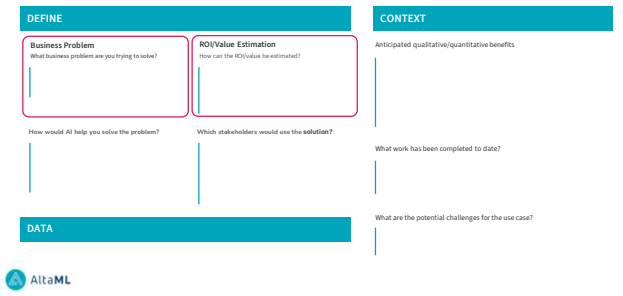
The ML Canvas



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How Can AI Be Used in your municipalities?

Breakout Groups

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How Do You Get Started?

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Reporting back

Problem	Solution	Data Sources (Optional)	Measurement (KPIs)	Idea Source
Problem Describe				
Problem Describe				
Problem Describe				
Problem Describe				

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Adopting AI in the Public Sector

Exploring Potential Challenges

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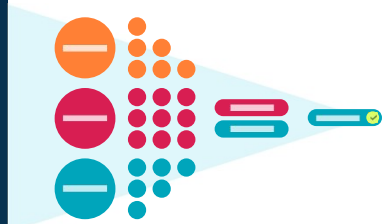
Budget Constraints

Challenge

Limited budget for innovation

Mitigation

Make Small Bets on High Impact Use Cases



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Ethics and Bias

Challenge

Lacking processes and skills for responsible development of AI systems

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Mitigation

Define a RAI Strategy

- Reliability & Safety
- Transparency
- Inclusiveness
- Privacy & Security
- Accountability
- Fairness
- Awareness & Empowerment

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Cultural and Organizational Change

Challenge

Resistant to change, skeptical of losing jobs, insufficient training and support

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Mitigation

Employ Adoption Best Practices

- **Evaluate** Understand internal capabilities and fill gaps.
- **Identify** Source relevant use cases across your organization.
- **Measure & Monitor** Proactively track and report on your return on investment (ROI).
- **Strategize** Develop a strategy and roadmap for successful adoption.
- **Governance** Establish AI and data governance policies and practices.
- **Transparency** Commit to transparency during rollout and ongoing usage.

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Data Quality, Availability, and Privacy

Challenge

Incomplete, inconsistent, and siloed public data. Concerns with using non-public information.

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Mitigation

Governance and Frameworks

- Establish clear ownership and governance structures for organizational data, including policies for data privacy.
- Centralize the storage of organizational data in a data warehouse or data lake.
- Identify processes to measure, monitor, and maintain data quality.

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Prioritization Framework

The prioritization framework serves as the initial stage-gate for ideas you may want to proceed with. The specific criteria can be reframed to your local priorities.

Prioritization Dimension	1 - Low	2 - Medium	3 - Medium-High	4 - High
Impact to Citizens	This use case is not public facing.	This use is public facing but citizens likely will not notice the impact of a successful use case.	This use case is public facing and citizens may notice the impact of a successful use case.	This use case is public facing and citizens will directly notice the impact of a successful use case.
Financial Impact	This use case will not create substantial cost savings.	This use case will create some cost savings.	This use case will create significant cost savings across a single department.	This use case will create significant cost savings across many departments.
Risk Mitigation	This use case has the potential to increase the risk profile for your municipality.	This use case will not significantly change the risk profile for your municipality.	This use case will create minor improvements in the risk profile for your municipality.	This use case will create significant improvements in the risk profile for your municipality.
Effort Estimation	There are significant complexity and timeline risks.	There are either complexity risks or timeline risks associated with this use case.	This use case is the right amount of complexity but there are some timeline risks (ie: data availability, stakeholder engagement).	This use case is the right amount of complexity to be undertaken.
Data Access	There is significant risk that the appropriate datasets may not be available to for this use case.	Risk exists that we may not receive access to the appropriate datasets for this use case.	We have a reasonable confidence that the appropriate datasets will be available for this use case.	We have already received or are confident we will have access to the appropriate datasets for this use case.

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Optimizing success rates

Feasibility Assessment Criteria

Problem Definition
- Use case identification
- Business case definition
- ML problem definition
- Well-defined success metrics and KPIs

Strategy
- Strategic alignment with GovLab objectives
- Creation of business value
- Adoption

Governance
- Stakeholder identification
- Risk identification and mitigation strategies
- Well established governance structure
- Responsible AI
- Approvals

Data
- Data acquisition plan
- Data usage for model development
- Data sufficiency
- Data quality
- Data complexity

Technical
- Solution Architecture
- ML Approaches
- Complexity
- Performance metrics

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Thank You

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altaml.com

Chantal Ritcey
Public Sector Industry Lead
chantal.ritcey@altaml.com

Edmonton
10130 103 Street #2200
Edmonton, AB
T5J 3N9

Calgary
112 4 Avenue SW #800
Calgary, AB
T2P 0H3

Toronto
212 King Street W #600
Toronto, ON
M5H 1K5

Waterloo
137 Glasgow Street Suite #210
– Office #203
Kitchener, ON
N2G 4X8

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