

Region of Waterloo:

Identifying Opportunities to Leverage AI



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Contents

Executive Summary	4
Background	8
Inputs & Analysis	9
Outputs	14
Recommendations	18
Roadmap & Requirements Gathering	21

Executive summary

The Region of Waterloo aims to become a World Class municipality. Through the use of technologies and capabilities such as AI, Automation and Advanced Analytics, the Region intends to enhance and transform the services offered by the Region and how they are delivered by staff. Bringing 'World Class' to life is no simple feat. It requires a combination of linear and lateral thinking from the Region's leadership and staff. Linear thinking will help us stay on track in delivering projects which provide tangible value to our communities - the execution of opportunities. Lateral thinking will help us redefine what value means at the Region for the stakeholder network involved - sustaining idea generation to continuously improve the way the Region runs today for both citizens and staff.

The Region will become World Class as it:

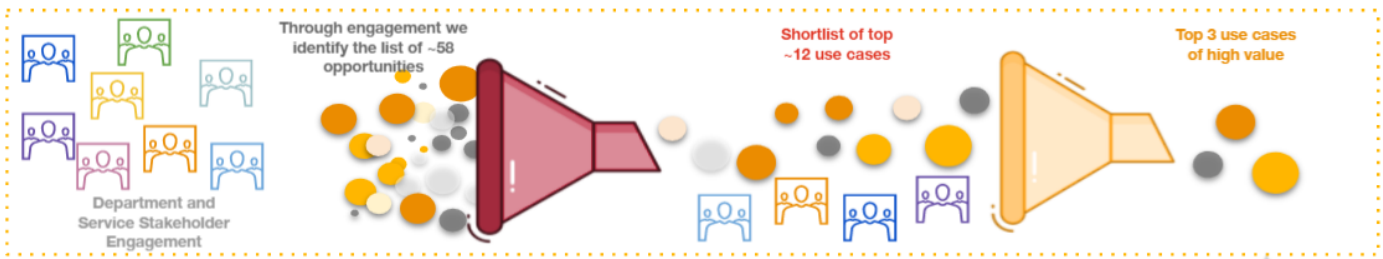
- Rethinks Service Delivery and Design: Understanding citizens' and employee needs and preferences when it comes to interacting with residents and delivering services.
- Enhances Employee Engagement: Stimulating intellectual curiosity and having our people deliver more value-add work, coming back to their original purpose.
- Improves Customer Experience: Mapping the customer journey to understand the wow-moments and friction points that appear through interacting with the Region.
- Sets the Vision on Value-Creation: Changing the way we think of problems and what value entails for our community and Regional resources. Value is not only or always driven by cost-savings, but rather by focusing time investment on value-added activities, rather than manual and cumbersome tasks.

AI, Automation and Advanced Analytics offer up a unique set of tools to help drive the Region to their vision by solving real-world problems that drive business value for the Region. Identifying the right opportunities to start this transformative journey is a critical success factor. The opportunities to kickstart this journey require the right mix of characteristics including dedicated support from leadership and project sponsors to help identify and secure resources for the project, staff that is willing and able to support use case execution, as well as staff that is willing to adopt and incorporate changes or new ways of working in their department, and finally the right data in the right condition to support use case execution. All of these components are critical in executing on use cases that provide timely return on investment, provide the opportunity to mature and transform critical digital services, and create a scalable foundation across services.

The focus of this project was to identify the right types of opportunities to initiate this journey. Through this project we were able to stimulate intellectual curiosity and energy at the Region to collaboratively identify more than 50 potential opportunities to apply AI, Automation and / or Advanced Analytics. The assessment conducted for each opportunity did not only focus on cost-savings intended, but also the value created through impact, momentum and scalability of the opportunity at the Region. This resulted in a list of 8 key initiatives to kickstart the Region's journey. Through the execution of these first set of use cases, the Region will immediately start on its service improvement journey, build momentum and a culture of change to help realise its vision. Thanks to the Region's strong leadership support of being implementation-oriented and highly focused on driving service-improvements, the Region can implement these use cases starting in September of 2021, and quickly demonstrate benefits, gain new skills and apply modern service delivery approaches and techniques in a number of departments. Along the way, the Region can also build a program and governance structure to support the continuous identification of additional opportunities to apply these capabilities and support delivery of these use cases in a disciplined manner. By building on early successes and momentum, the Region can increase the speed to value on the execution of future use cases, enabling the ultimate vision of creating a World Class municipality through the use of modern technologies and capabilities such as AI, Automation, and Advanced Analytics to enhance service delivery for both residents and staff.

The Process

With the vision of becoming a World Class municipality, the Region of Waterloo and PwC began a journey to discover opportunities to leverage technologies, techniques and capabilities such as Artificial Intelligence (AI), Automation, and/or Advanced Analytics to revamp and enhance services offered to residents, while curating a better, more engaging way of working at the Region, for staff. These opportunities provide the foundations for a disciplined, well established, and structured program that the Region will be able to continue building in the long term. To identify the cornerstone “use cases” (concrete applications of the technologies), we utilized a three-staged approach comprising an ideation stage to identify an initial list of ~58 use cases, a shortlisting stage where we evaluated the initial brainstorm and qualified ~12 use cases, and a final refinement stage identifying the top set of recommended opportunities. Over the course of each stage, use cases were either added, modified or removed from consideration, to land on the final use cases retained for execution.



The Opportunities

Human Resources & Citizen Services	Omnichannel Conversational AI	Externally facing call centre chatbot for citizen inquiries	Getting Started
Corporate Services	Schedule Optimization	Prioritizing work orders and schedule optimization for building and equipment maintenance (facilities)	
Community Services	Automation of Manual Tasks	Streamlining staff schedule development for Sunnyside by ingesting paper-schedules and vacation requests into TAMS	
Corporate Services	Omnichannel Conversational AI	Internally facing e-chat / chatbot to support basic IT, HR and Finance related questions	Maximizing Value
Community Services		Automating information gathering based on housing applications to better highlight missing information	
Planning, Development, & Legislative Services	Automation of Manual Tasks	Automated processing of tickets and fines for Provincial Offences Administration	
Public Health & Emergency Services		Data extraction from external systems into iPHIS using optical character recognition and automation	
Planning, Development, & Legislative Services		Automating POA self-schedule capability for citizens for early resolutions	

Throughout the process, there was an emphasis placed not only on what can we immediately accomplish, but also how the initial use cases can be developed into truly transformative initiatives for the Region. After completing the ideation, shortlisting, and final evaluation, the use cases above were identified as either “Getting Started” or “Maximizing Value”. While the “Getting Started” use cases are more transactional in nature (aimed at improving/enhancing the process used to navigate operational inputs and outputs) versus transformational (aimed at redesigning how processes and operations function to improve on the overall objective), the goal of kicking off with the first 3 was to create the momentum in use case

execution and secure the return on investment as it relates to automation of manual tasks. The subsequent set of use cases following the first 3 is meant to leverage the learnings and capabilities created within the first 3 in order to scale to other departments and services.

Scalability Leads to Sustained Transformation

In an effort to outline how each use case will evolve over time and scale between all services and departments within the Region, PwC outlined a vision for becoming a World Class Leader through a 3-phased approach. The first phase of the is to complete the journey of **building an Minimum Viable Product** and launching it into production once evaluation criteria is met. The second phase of the evolution focuses on expanding the implementation of the initial use case from **one department to other departments** at the Region. The required technology underlying each identified use case is mainly the same to implement across departments, but the application of the use case differs; therefore adjusting the technology to satisfy similar yet different scenarios in other departments is critical for the success of this phase. The final phase then shifts the focus to continuous improvement and embedding service-innovation and redesign into the DNA of the Region. By this stage all of the initial solutions have been fully fledged and scaled across the Region to fully capture the essence of your vision.



These phases are highlighted in the tables below to showcase the evolution.

Use Case #1: Externally facing call centre chatbot for citizen inquiries		
Phase 1 Basic FAQ QnA Chatbot (e.g. COVID-19, Waste, Transit)	Phase 2 ROW Conversational Chatbot	Phase 3 Integrated Call Centre Virtual Assistant

Use Case #2: Prioritizing work orders and schedule optimization for building and equipment maintenance		
Phase 1 Equipment scheduling optimization tool including work order submission portal and prioritization	Phase 2 Implementation across departments needing equipment maintenance	Phase 3 Predictive work order and equipment/maintenance scheduling for proactive procurement and planning

Use Case #3: Schedule optimization for Sunnyside by ingesting paper-schedules and vacation requests into TAMS		
Phase 1 Resource schedule optimization and notification for Sunnyside LTC Home	Phase 2 Resource schedule creation and optimization for Sunnyside LTC Home	Phase 3 Predictive & automatic resource schedule creation for Sunnyside LTC Home

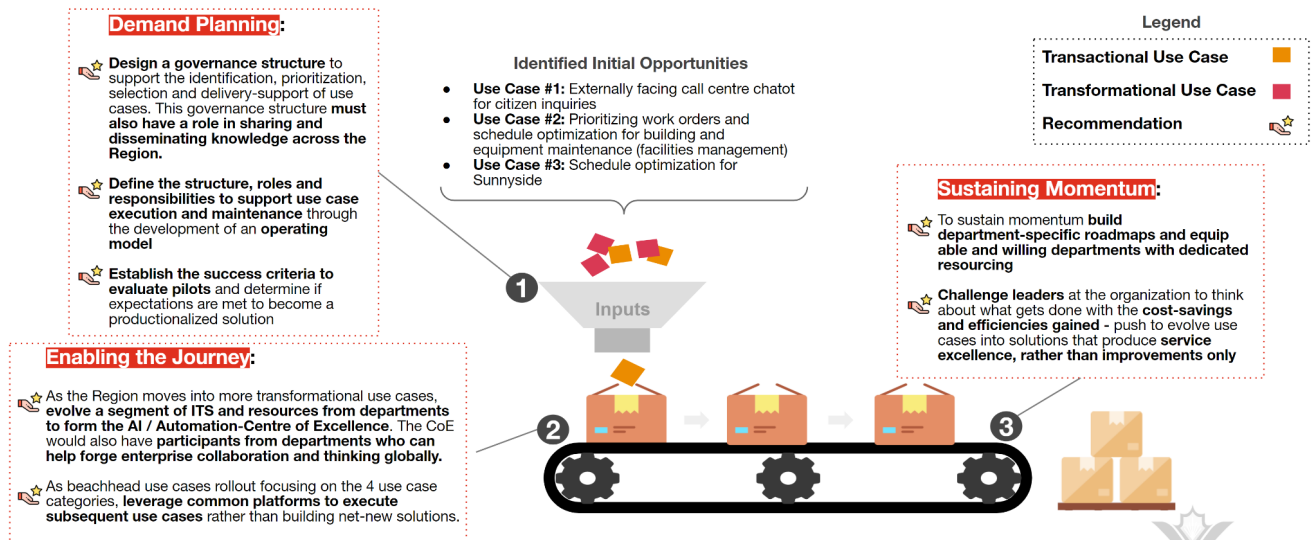
Benefits Intended for the Region - both Staff and Residents

As the initial use cases are developed and scaled throughout the Region, it's important to consider the benefits each provides both to Regional employees and citizens:

	As an Employee of the Region	As a Resident of the Region
Use Case #1: Call Centre Chatbot	A chatbot will quickly and efficiently respond to citizens' questions , freeing up my time answering low-complexity questions, and spend more time helping citizens with more complex requests.	I quickly get answers to my questions without waiting in a queue. If I have a more nuanced request I'm speaking to a real person faster.
Use Case #2: Work Order Prioritization and Schedule Optimization	I will be able to save time between services by taking the most efficient route, and I can have confidence that the equipment being serviced is the most pressing at the time.	I can rest assured that the Region is prioritizing my maintenance needs in a more proactive manner , creating less service requests from me.
Use Case #3: Streamlining Staff Schedules for Sunnyside	I can digitally navigate any changes in my schedule using SMS, calls, or emails. I can focus on other tasks and priorities rather than re-entering information collected on paper.	

How to Get There

To ensure the Region's successful transformation to becoming a World Class municipality, PwC has also identified some key recommendations to ensure the foundations of scalability are in place, revolving around **Demand Planning, Enabling the Journey, and Sustaining Momentum**:



The Future

In conclusion, with this engagement with PwC the Region has identified the opportunities and developed a roadmap to becoming a World Class municipality. This engagement is an important step in beginning the transformative journey to World Class. The continuity of this initiative will depend on having a well established, structured program to not only identify additional use cases but support execution of them. This was only the beginning of a larger transformation at the Region of Waterloo, and by working collaboratively across departments and services, building a culture of innovation, and building upon the energy that comes from a successful implementation, the Region has an opportunity to use AI to become World Class in service delivery.

1 Background

About the Region of Waterloo

The Regional Municipality of Waterloo is a diverse and prosperous area in southern Ontario, located approximately 100 kilometres west of the City of Toronto. The Greater Golden Horseshoe, which includes Waterloo Region, encompasses a population of 9 million people. However, Waterloo Region remains separate and distinct from the main urban mass of the Toronto centred GGH. It comprises 7 Area Municipalities: the Cities of Cambridge, Kitchener, and Waterloo, and the Townships of North Dumfries, Wellesley, Wilmot and Woolwich.

The Region is also one of the fastest-growing in Ontario. Waterloo Region had a population of 623,930 in 2020. The Region was the 10th most populous Census Metropolitan Area (CMA) in Canada, with 583,500 residents in 2016. The Province's Growth Plan projects that Waterloo Region's population will reach 923,000 by 2051.

Audit and Accountability Fund – Intake 2

In 2021, The Province of Ontario announced that large urban municipalities could apply to the second intake of the Audit and Accountability fund to undertake third party reviews with the goal of finding service delivery efficiencies.

To be eligible, a review project would need to:

1. Review municipal service delivery expenditures to find efficiencies.
2. Result in a final report by the independent third-party reviewer that provides specific and actionable recommendations for cost savings and efficiencies. The municipality will be required to submit a final report that includes a statement of the total amount of expenditures reviewed and the total amount identified as potential savings. The municipality will be required to submit a final report that includes a statement of the total amount of expenditures reviewed and the total amount identified as potential savings.
3. Be completed by October 15, 2021 - Municipal applicants will be required to publicly post the independent third-party report that outlines the analysis, findings and actionable recommendations by October 15, 2021.

Accordingly, the Region submitted an application to The Province of Ontario and their application for funding was approved.

Opportunities to Leverage Artificial Intelligence (AI) – Engagement

Through the funding from the Audit and Accountability Fund – Intake 2, the Region secured a third party consultant, PricewaterhouseCoopers (PwC), to assist in conducting an engagement to identify opportunities to leverage AI.

The Region of Waterloo, through this engagement, is seeking to identify and assess opportunities to leverage novel technologies and capabilities such as Artificial Intelligence, process automation and advanced analytics in order to streamline activities, create time savings, enhance cost-avoidance and enable staff to do more value-add tasks.

Regional staff worked with PwC to support the delivery of the following objectives through this engagement:

1. Identify opportunities to leverage AI, automation and advanced analytics
2. Evaluate the opportunities using a standardized prioritization framework
3. Establish a list of opportunities to pilot, based on current state data, analytics and AI-capabilities and build a roadmap to get the Region project-ready.

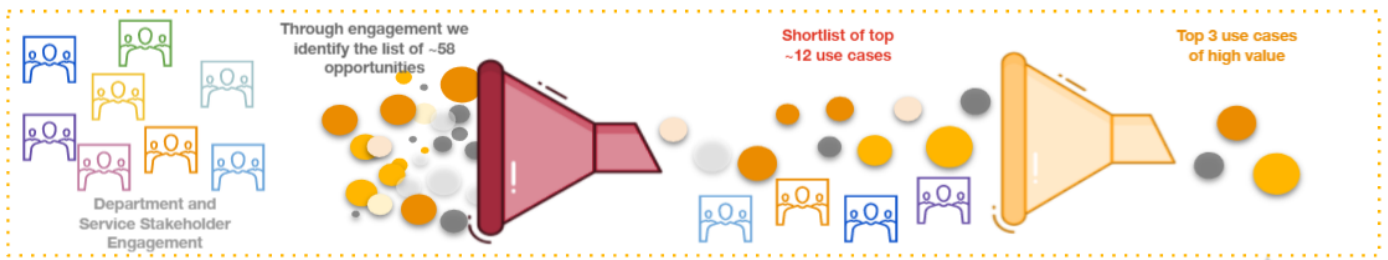
The report that follows outlines the delivery of these objectives.

2 Inputs & Analysis

Summary

In the aim of identifying a set of high value AI, Automation, and/or Advanced Analytics opportunities to pursue for immediate implementation within the Region’s various departments and services, we utilized a three-staged approach comprising an ideation stage, shortlisting stage, and a final refinement stage.

Over the course of each stage, “use cases” (concrete applications of the technologies) were either added, modified or removed from consideration, to land on the final use cases retained for execution.

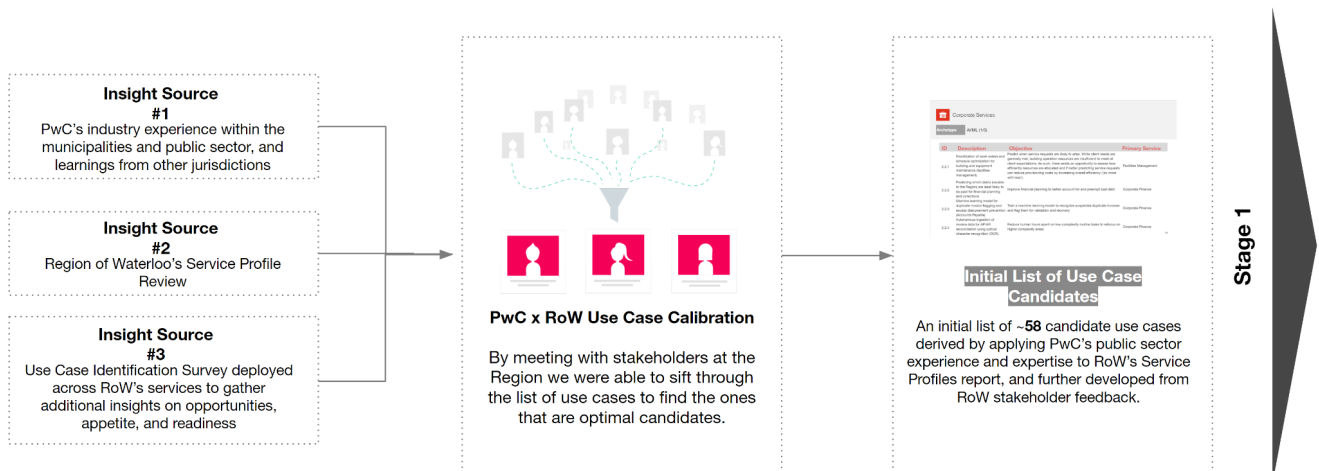


Stage 0 - Brainstorming without boundaries

Stage 0 centres around ideating an initial set of use cases aimed at bolstering efficiencies through streamlining routine activities and solving more complex problems using data and analytics. The Region aims to transform the organization through uses of technology to become a World Class municipality, enhancing the services offered to citizens and Regional staff. Throughout this stage, PwC conducted a thorough review of the Region’s services and surveyed various stakeholders across the Region’s seven Departments in a current state discovery process which was used to locate potentially high-impact / high-appetite areas within the same.

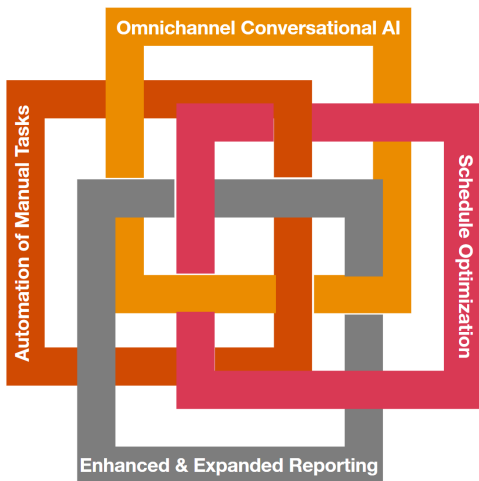
This allowed PwC to narrow the scope of discovery to high-potential areas and then draw on a vast array of case studies, past municipal engagements, and an international network of experts to ideate an initial list of use cases which was supplemented by a pipeline of use cases already in consideration by the Region.

Through this, a list of 58 use cases was identified. Each was classified into three fundamental archetypes on which further ideation and refinement was premised: Automation, AI / ML, and Advanced Analytics.



Stage 1 - Shortlisting

Stage 1 triggered the first of two rounds of use case “filtering” during which use cases were assessed and either retained or removed from further consideration (though discarded use cases may be further considered beyond this project’s scope). This process was premised on a set of evaluation criteria and stakeholder interviews spanning the Region’s seven Departments. This process culminated in a list of 13 use cases of high interest which were labelled as one of four use case themes: Schedule optimization, Omnichannel conversational AI, Automation of manual tasks, and Enhanced & expanded reporting. These were defined as follows:



Schedule optimization:

Scheduling is performed across most of the Region’s services and programs to organize both human and physical capital. In nearly all instances, scheduling is manually done by administrative staff and has been expressed to be challenging as it’s often seen as a ‘moving target’ that’s difficult to get right. There exists an opportunity to streamline and optimize scheduling by looking at historical schedule data and associated outcomes and then apply advanced analytics techniques to autonomously produce optimized schedules.

Omnichannel conversational AI:

The Region is responsible for fielding a wide array of inquiries originating from both internal (staff & contractors) and external (citizens) sources. These are generally serviced by Regional staff and often generate standard responses. With the Region already establishing and updating

key messages for communication for frequently asked questions, a “chatbot” (conversational AI) function can help alleviate pressures related to taking these types of calls, lessening the administrative burden, reducing turnaround times to address questions, and improving the overall service through standardization of responses.

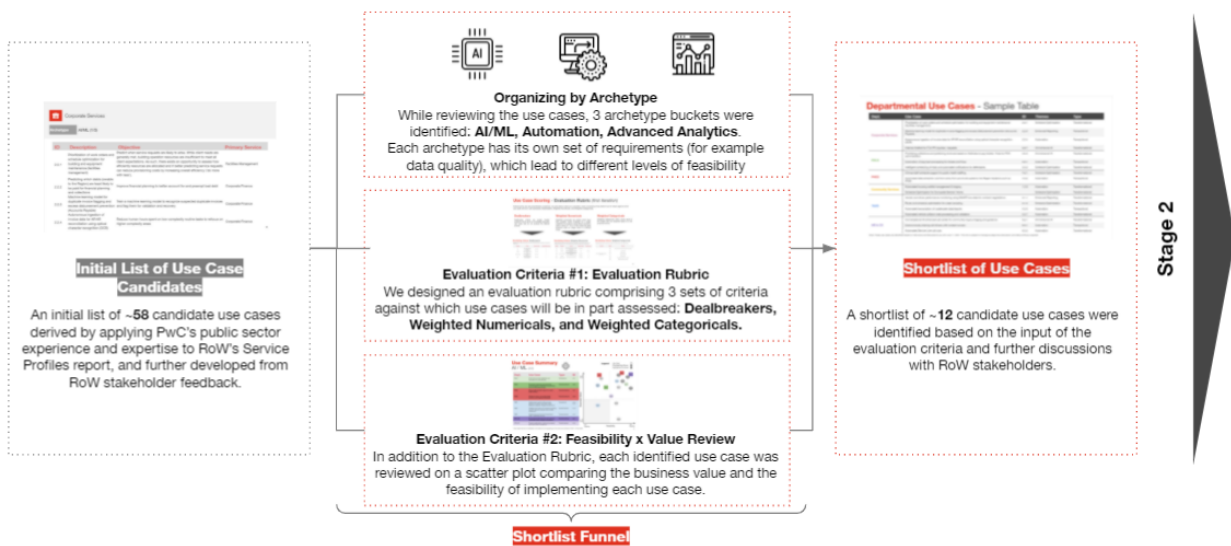
Automation of manual tasks:

Manual tasks are a necessary part of any organization, but with well-defined and standardized workflows automation of these tasks can quickly prove their value through saved time and energy. Across departments we’ve identified multiple opportunities to leverage automation and intelligent RPA to alleviate workload off Regional staff and allow them to spend more time on value-add work. For example, automated fraud detection, transcription of data/reports, and data extraction.

Enhanced & expanded reporting:

Significant resources are expended on various forms of reporting across the Region, with a large share of those resources using manual effort to generate reports. Beyond alleviating reporting burdens through automation, opportunities have been identified to expand the scope of prevailing reports and - in some instances - engaging in novel reporting altogether by circumventing constraints through clever applications of machine learning and advanced analytics techniques to help manage and enhance data quality.

Use case Themes comprise views of the Region’s areas of foremost and immediate interest. While each use case is primarily linked to one of the above Themes, they may appeal to other Themes in some instances and as they evolve.



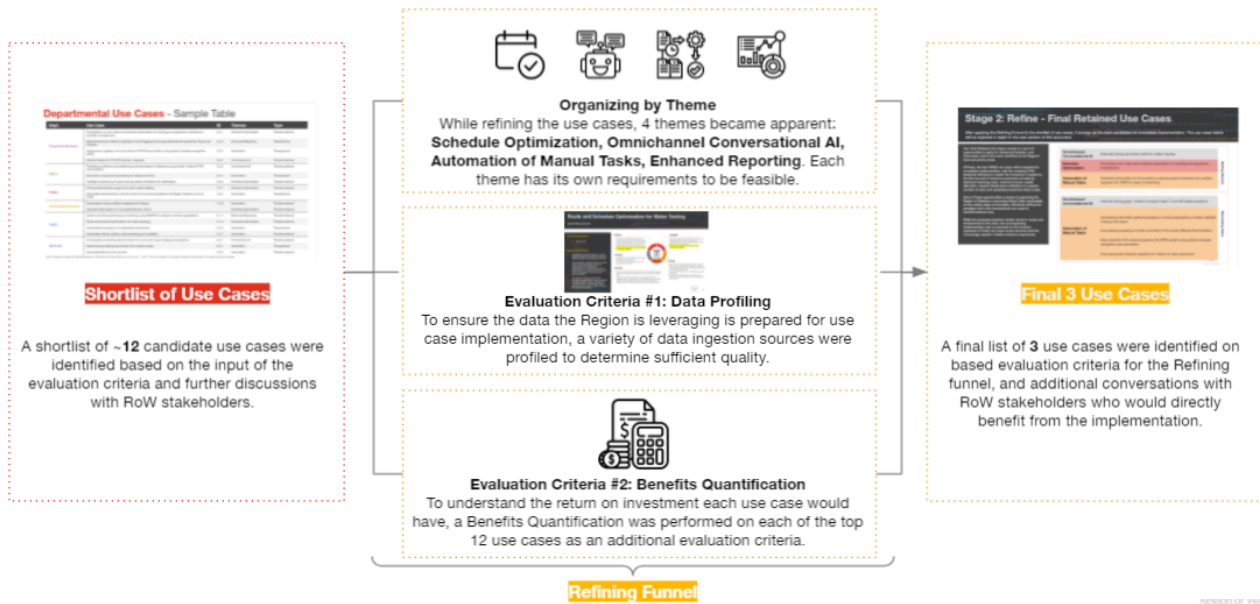
Stage 2 - Refine

The final stage consisted of refining each use case's scope as well as the broader list of 13 use cases of interest. Execution feasibility served as the primary vehicle through which this process was carried out, with use case scopes being modified to better align with current state capabilities. With respect to AI / ML and Advanced Analytics archetype use cases, feasibility was predominantly premised on a data profiling exercise which ultimately informed the suitability of the Region's data assets against use case requirements by identifying opportunities and gaps. Automation archetype use cases required a different approach with a greater focus on workflows and application integration to inform the use cases appropriateness.

In addition to evaluating execution feasibility, particular attention was given to quantifying value metrics. Most notably, potential time-savings in the execution of daily operations were estimated to inform efficiency gains. While harder to

quantify, significant attention was also given to enhancements to service delivery such as improved customer experience resulting from shorter turnaround times and novel communication channels for citizens.

Ultimately, eight high-value use cases were identified and added to the Region’s portfolio of projects. Of the eight retained use cases, three were earmarked for immediate implementation with the remaining five being reserved to build on the momentum anticipated by the first three.



The final eight retained use cases are introduced and broken down in the Output section.

Use Case Evolution - a phased approach to World Class

While the road to becoming World Class extends beyond what can be achieved within a 1-2 year timeline, the Region is making significant strides in setting a robust foundation on which future projects - each iteratively gaining in scale and sophistication - will be enabled. Given that achieving the ultimate objective will require sustained effort and development, the Region is adopting a three-phase approach that will be kicked-off by a first iteration set of use cases in order to snowball momentum towards World Class operations and services.

Phase 1 - MVP to Productionalization:

The first phase of the evolution to becoming World Class is to complete the journey of **building an Minimum Viable Product** and launching it into production.

The initial MVP should satisfy the **evaluation requirements** of the use case and prove out the benefits of rolling out the solution to the entire department.

Phase 2 Transition Requirement:

Fully functional use case deployed and operational within one department.

Phase 2 - Scaling Across other Departments:

The second phase of the evolution focuses on expanding the implementation of the initial use case from **one department to other departments** at the Region. The required technology underlying each identified use case is mainly the same to implement across departments, but the application of the use case differs. Adjusting the technology to satisfy similar yet different scenarios in other departments is the success criteria for Phase 2.

Phase 3 Transition Requirement:

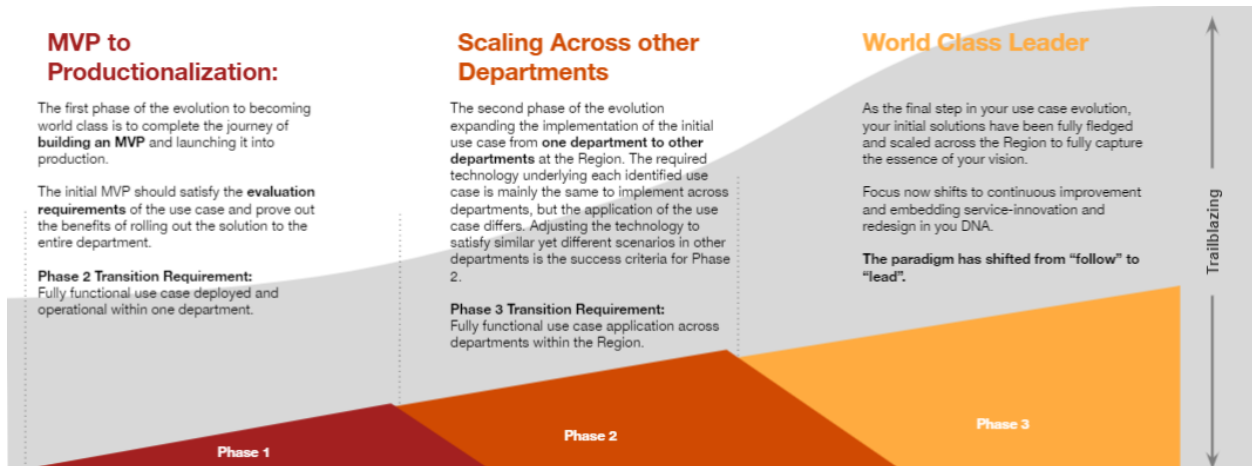
Fully functional use case application across departments within the Region.

Phase 3 - World Class Leader:

As the final step in your use case evolution, your initial solutions have been fully fledged and scaled across the Region to

fully capture the essence of your vision.

Focus now shifts to continuous improvement and embedding service-innovation and redesign in your DNA.



3 Output

Summary

This engagement’s ultimate output (Final Retained Use Cases) consists of a set of 8 opportunities to apply AI, Advanced Analytics, and Automation which have been identified as the Region’s foremost priority areas.

Of these, the top three use cases will be targeted for immediate implementation, with the remaining five iteratively following to sustain the momentum created by the first set and to maximize economies of scale (i.e. distribute licensing costs, maximize human capital allocation, expand infrastructure utilisation to a greater number of users and spread investment fixed costs).

Each of these opportunities is aimed at supporting the Region of Waterloo in becoming a World Class municipality on the cutting edge of innovation, effectively shifting the paradigm from more transactional use cases to transformational ones.

While the proposed solutions remain narrow in scope and transactional at the onset, the accompanying implementation plan is premised on the eventual expansion of these use cases across services and into increasingly capable / flexible solutions respectively.

Human Resources & Citizen Services	Omnichannel Conversational AI	Externally facing call centre chatbot for citizen inquiries	Getting Started
Corporate Services	Schedule Optimization	Prioritizing work orders and schedule optimization for building and equipment maintenance (facilities)	
Community Services	Automation of Manual Tasks	Streamlining staff schedule development for Sunnyside by ingesting paper-schedules and vacation requests into TAMS	
Corporate Services	Omnichannel Conversational AI	Internally facing e-chat / chatbot to support basic IT, HR and Finance related questions	Maximizing Value
Community Services		Automating information gathering based on housing applications to better highlight missing information	
Planning, Development, & Legislative Services	Automation of Manual Tasks	Automated processing of tickets and fines for Provincial Offenses Administration	
Public Health & Emergency Services		Data extraction from external systems into iPHIS using optical character recognition and automation	
Planning, Development, & Legislative Services		Automating POA self-schedule capability for citizens for early resolutions	

Getting Started:

Externally facing call centre chatbot for citizen inquiries

Description

A large proportion of calls to the SFCC currently relate to COVID-19, waste management / collections, and / or transit use. A conversational AI chatbot trained to answer citizens' administrative questions can ease the burden by addressing common questions, freeing up resources to tackle other high priority requests. The foundations of an initial QnA (Question and Answer) bot can first focus on COVID-19, Transit and Waste related questions and can easily scale to other basic administrative QnA capabilities.

Benefits Intended

As staff of the Region of Waterloo, a chatbot will quickly and efficiently respond to citizens questions, freeing up my time answering low-complexity questions, and spend more time helping citizens with more complex requests

As a citizen of the Region of Waterloo, I quickly get answers to my questions without waiting in a queue and if I have a more nuanced request, I'm speaking to a real person faster

Use Case Evolution		
Phase 1 Basic FAQ Q&A Chatbot (e.g. COVID-19, Waste, Transit)	Phase 2 ROW Conversational Chatbot	Phase 3 Integrated Call Centre Virtual Assistant
<p>Objective:</p> <p>Phase 1 of the chatbot would focus on simple, administrative questions where information sharing is the typical solution. These would include answers to non-clinical COVID-19 related questions, questions related to waste collection and recycling guidance, and transit related questions to support community mobility. Examples of questions this chatbot could address would include:</p> <ul style="list-style-type: none"> • "How do I get from point A to B?" • "Am I eligible for my second dose?" • "Is aluminium recyclable?" 	<p>Objective:</p> <p>With the foundations for a chatbot created, the next evolution is to build out knowledge bases for common citizen questions across other departments at the Region, integration with the CRM, and e-chat enablement.</p> <p>Prime areas to expand include TES, POA and PHES. This will allow citizens to reach out asking questions such as "how do I pay my speeding ticket?"</p>	<p>Objective:</p> <p>With a full QnA chatbot implemented for all departments across the Region, the next evolution is to turn the chatbot into a Call Centre Virtual Assistant. Features at this stage include agent chat routing, sentiment analysis, and agent performance management.</p> <p>Additionally, by this iteration the solution will be able to handle more complicated citizen requests, such as populating work orders or housing applications.</p>

Prioritizing work orders and schedule optimization for building and equipment maintenance

Description

Work order submission, prioritization, and subsequent scheduling of equipment maintenance is currently done manually. This use case focuses on prioritizing work orders to create the most efficient schedules based on a variety of factors such as distance for maintenance, time since last maintenance, and vehicles in the area. The evolution of this use case centres on predicting maintenance needs to proactively provision service inputs to reduce downtime.

Benefits Intended

As a resident of Regional housing, I can rest assured that the Region is prioritizing my maintenance needs in a more proactive manner, creating fewer service requests from me.

As an employee responsible for maintenance, I will be able to save time between services by taking the most efficient route, and I can have confidence that the equipment being serviced is the most pressing at the time

Use Case Evolution		
Phase 1 Equipment scheduling optimization tool including work order submission portal and prioritization	Phase 2 Implementation across departments needing equipment maintenance	Phase 3 Predictive work order and equipment/maintenance scheduling for proactive procurement and planning
<p>Objective:</p> <p>Create a Machine Learning model to ingest work order data to prioritize and schedule equipment maintenance based on variables available.</p> <p>Phase 1 aims to replace the current manual process with an automatic process.</p>	<p>Objective:</p> <p>Phase 2 expands the scope of the tool to support equipment maintenance prioritization and scheduling in other departments that receive / create work orders such as fleet management.</p>	<p>Objective:</p> <p>Phase 3 leverages the historical data used to determine when equipment maintenance is required based on work order patterns and creates a predictive work order and maintenance scheduling system for all departments relying on the ML system</p>

Streamlining staff schedule development for Sunnyside by ingesting paper-schedules and vacation requests into TAMS

Description

At current state, scheduling staff at Sunnyside Seniors' Home is a manual process whereby paper schedules are filled by staff to then be re-entered into TAMS by clerks. After entering the information in TAMS the schedule is created for staff. This use case aims to automate this manual task, and then expand on the process to optimize schedules based on availability and leverage digital channels to alert staff to availability.

Benefits Intended

As an employee working at Sunnyside, I can digitally navigate any changes in my schedule using SMS, calls, or emails

As an employee responsible for resourcing, I can focus on other tasks and priorities rather than re-entering information collected on paper and having to call multiple staff members to find an available resource.

Use Case Evolution		
Phase 1 Resource schedule optimization and notification for Sunnyside LTC Home	Phase 2 Resource schedule creation and optimization for Sunnyside LTC Home	Phase 3 Predictive & automatic resource schedule creation for Sunnyside LTC Home
<p>Objective:</p> <p>Phase 1 aims to automate the ingestion of scheduling and vacation preferences into TAMS by converting it from a manual-first data entry to a digital entry through optical character recognition</p>	<p>Objective:</p> <p>Phase 2 expands on the ingestion functionality to leverage the ingestion pipeline to create optimized schedules based on demand planning changes and notify resources of any changes that may have occurred through digital channels, such as SMS, email, or VOIP</p>	<p>Objective:</p> <p>Phase 3 leverages the historical data used to create schedules to create a predictive scheduling system, allowing for greater flexibility in advance and reducing the challenges of surprise resource planning.</p>

Maximizing Value:

To build on the value ushered in by the Getting Started use cases, additional use cases were identified to Maximize Value as the Region graduates into Phase 2 (Scaling Across other Departments) of its roadmap to becoming World Class. While non-exhaustive, these initial use cases will serve as a baseline for expanding Conversational AI, and Automation across the Region's service areas. Some examples are listed below:

Use Cases		
Theme	Title	Description
Omnichannel Conversational AI	Internally facing e-chat / chatbot to support basic IT, HR and Finance related questions	A conversational AI model (chatbot) that is trained to answer employees' basic inquiries to IT, HR and Finance, and guide them through appropriate workflows. For example, the chatbot could share the correct form to submit a request for a new laptop or access to folders.
Automation of Manual Tasks	Automating information gathering based on housing applications to better highlight missing information	Automate housing waitlist triaging, applicant intake, and eligibility assessment by overlaying an RPA bot on digital housing application platforms. Leverage intelligent RPA to detect, flag, and treat anomalous applications automatically.
	Automated processing of tickets and fines for Provincial Offenses Administration	Autonomously apply ticket / fine formatting through functions that are automatically triggered by a defined set of actions. Leverage RPA to process payments by autonomously reading and uploading payment data for processing.
	Data extraction from external systems into iPHIS using optical character recognition and automation	Autonomously extract data from one system for imputation into another with minimal human intervention by creating pipelines through which RPA bots can upload a wide array of data.
	Automating self-schedule capability for citizens for early resolutions (POA)	Digitization and automation of administrative workflows in trial schedule management and bookings. Process digitization and automation allows for trial scheduling to be autonomously executed against time constraints while RPA bots notify defendants / appellants / etc about their trials and concomitant actions according to rules-based functions.

4 Recommendations

As the retained use cases move towards implementation, the success of these projects will hinge in part on fundamental requirements ranging from technology provisions to more conceptual frameworks such as roles & responsibilities and demand management. To that end, we have adopted a set of Guiding Principles along with two distinct sets of recommendations provided by PwC to support these projects and enable future opportunities within the scope of the Region's broader AI Strategy.

Guiding Principles

A thriving AI Strategy program has been identified as the cornerstone of the Region's broader objective of being a World Class municipality. As such, establishing a robust vision to nurture and crystalize the AI Strategy program will be integral to overcoming challenges on the road to becoming World Class.

The proposed vision is broken into a set of Guiding Principles that are being adopted across the Region's departments. These Guiding Principles will serve as the AI Strategy Program's North Star and are defined as follows:

Willingness to Experiment: A willingness to experiment means thorough testing and having the drive to try different implementations to find the best fit for the Region.

World Class Innovation and Service Modernization: World class innovation requires a paradigm centred on taking calculated risks and consistently challenging the status quo. The Region must champion effective use of existing and new technologies, processes, and mindsets to this end.

Focusing on Scalability: The easiest thing to do is not always the best in the long run. To assist the process of going from pilot to production, spending the time and effort in building scalable systems the first time will reduce the need for duplicative or inefficient work.

Collaborative by Nature: Working as a team can lead to efficiencies by unblocking staff when they get stuck on a problem. Supporting each other within departments and through cross-department collaboration will lead to desired outcomes

Measuring Outcomes, not Activities: With many competing priorities, it's easy to fall into the trap of "just getting things done". Having a clear focus on measuring the output of activities will lead to efficiencies in work and understanding of downstream impact.

Programmatic Recommendations

Programmatic recommendations comprise the first of two sets of recommendations aimed at supporting project implementation, and are characterized by three macro-level objectives: demand planning, enabling the journey, sustaining momentum. Each of these macro-level objectives are then broken down into the following recommendations:

Demand Planning:

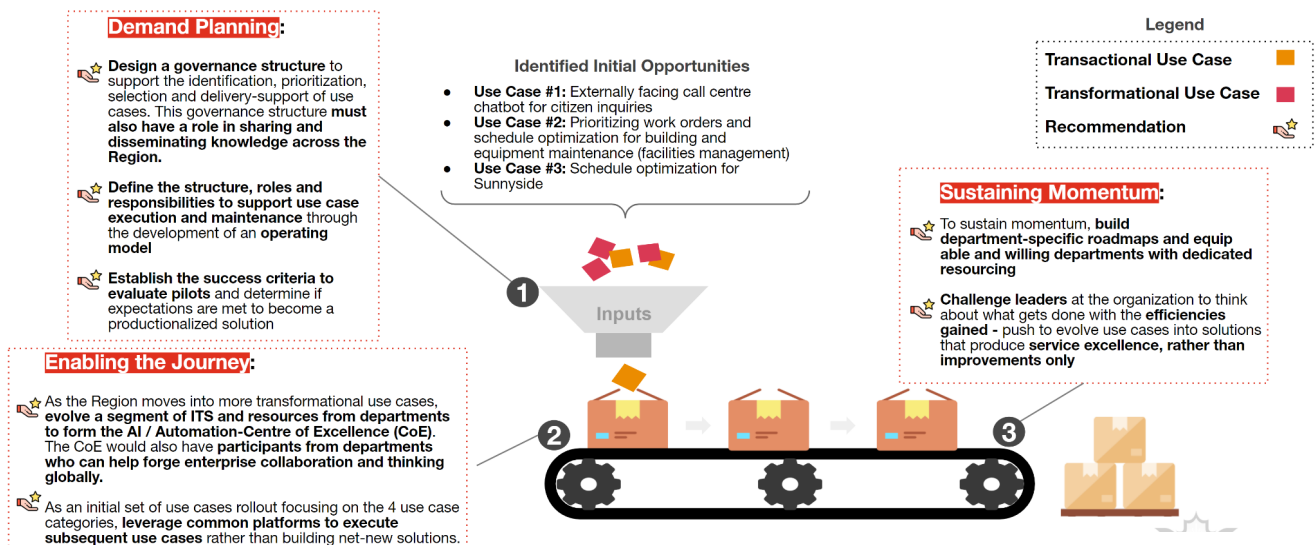
- Design a governance structure to support the identification, prioritization, selection and delivery-support of use cases. This governance structure must also have a role in sharing and disseminating knowledge across the Region.
- Define the structure, roles and responsibilities to support use case execution and maintenance through the development of an operating model.
- Establish the success criteria to evaluate pilots and determine if expectations are met to become a productionalized solution.

Enabling the Journey:

- As the Region moves into more transformational use cases, evolve a segment of ITS and resources from departments to form the AI / Automation-Centre of Excellence. The Centre of Excellence would also have participants from departments who can help forge enterprise collaboration and thinking globally.
- As the initial set of use cases rollout focusing on the 4 use case categories, leverage common platforms to execute subsequent use cases rather than building net-new solutions.

Sustaining Momentum:

- To sustain momentum, build department-specific roadmaps and equip able and willing departments with dedicated resourcing.
- Challenge leaders at the organization to think about what gets done with the cost-savings and efficiencies gained - push to evolve use cases into solutions that produce service excellence, rather than improvements only.



Foundational Infostructure Recommendation

Foundational infostructure (infrastructure supporting data and information needs such as data collection, management, analytics, and reporting) recommendations, while also aimed at supporting the Region's AI Strategy, emphasize elements that will be required for use case execution and sustainment. These are centred around three enablement pillars: **Data & AI Governance, Data Management, Upskilling.**

Data & AI Governance:

Roles and Responsibilities

Staff need to clearly understand the roles and responsibilities across use case workflows, otherwise confusion can lead to failure.

Policies and Procedures

Well defined processes, in addition to roles and responsibilities, provide clarity and accountability

Model Operations

As use cases evolve, maintaining data sheets and model sheets will be critical for long term success

Ethics

As Conversational AI uses cases become more advanced an ethical code of conduct will guide the Region's actions around transparency and services.

Data Management:

Support Processes with Tools

In order to effectively manage use cases and have confidence in their output, tools and workflows need to be put in place to manage what data is being used, how it is being used, and active monitoring to ensure it is the right data to use.

For example, the following tools have been implemented in other municipalities to assist with Data Management:

- Data Management Framework
- Data Quality Toolkit
- Responsible Data Sharing Toolkit

Upskilling:

Learning Pathways

Design educational programs such as a data academy to enhance data literacy across every level of the organization. This should highlight the value of being data driven and taking on design thinking exercises such as group problem-solving and hands-on hackathons.

Open Forums

Develop an internal forum & channel to communicate initiatives that are being developed, rollout plans, documenting why, what and how data is being prioritized through the implementation of initiatives

The final foundational infostructure recommendation consists of implementing a **Centralized Data Hub** which will be required by all use cases to enable, facilitate, and support appropriate storage and access to data across the Region. The Data Hub will serve as a unified storage, computation, intake, and monitoring infrastructure enabling the proposed set of use cases and beyond.

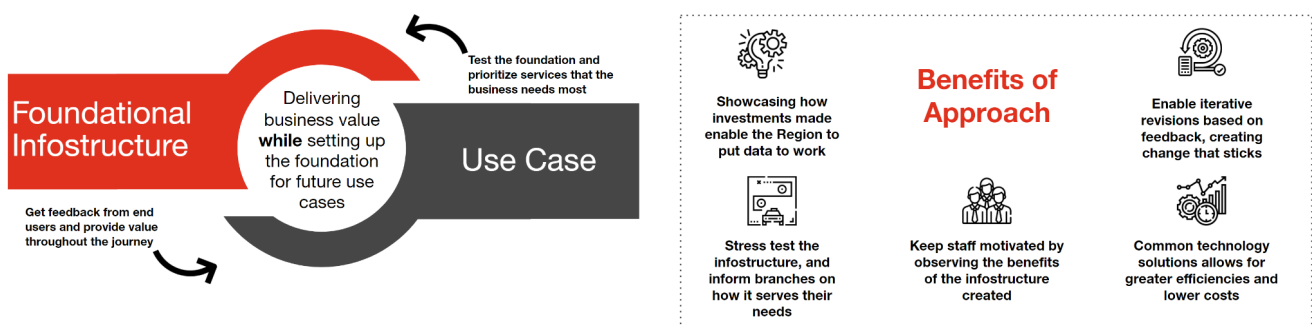
Creating a reciprocal relationship between the Foundational Infostructure and Use Cases

Enhancing D&A at the Region through use cases helps drive the necessary infostructure by providing a clear rationale and value generated through Foundational Enablement activities.

This approach ensures that momentum needed to deliver foundational capabilities does not occur without a direct relation to business value.

The two work streams (Infostructure and use cases) work in tandem to move the bar on AI maturity at the Region.

Leveraging a common and centralized data platform as a foundation to build use cases will allow the Region to enjoy economies of scale thereby reducing technological redundancies and associated costs.



5 Roadmap

Over the next 12-months the Region of Waterloo aims to execute on the first 3 use cases. Executing on these use cases while building out foundational elements such as a data governance strategy, data privacy and security program, and AI program will help sustain the momentum gained from these first 3 use cases. These first 3 use cases were strategically selected through a rigorous evaluation process. A part of this evaluation process included the ability for each use case to evolve within the department and service it resides in but also scale across multiple services and departments. This is the mindset and cultural transformation that RoW leadership must enable.

The 12-month roadmap breakdown into the following phases for each of the 3 use cases:

Use Case	Phase	2021		2022				2023				
		Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
Externally facing call centre chatbot for citizen inquiries	1 Basic FAQ QnA (e.g. COVID-19, Waste, Transit)	●	●									
	2 RoW Conversational Chatbot					●						
	3 Integrated Call Centre Virtual Assistant						●					
Prioritizing work orders and schedule optimization for building and equipment maintenance (facilities management)	1 Equipment scheduling optimization tool including work order submission portal and prioritization	●			●							
	2 Implementation across departments needing equipment maintenance					●			●			
	3 Predictive work order and equipment/maintenance scheduling for proactive procurement and planning									●		
Schedule optimization for Sunnyside (e.g. automating paper ingestion of schedules and vacation requests, call outs via SMS, enhanced reporting)	1 Resource schedule ingestion optimization into TAMS for Sunnyside LTC Home	●		●								
	2 Resource schedule creation and optimization for Sunnyside LTC Home				●							●
	3 Predictive & automatic resource schedule creation for Sunnyside LTC Home									●		

6 Requirements Gathering

As of September 2021, the Region has officially kicked off a requirements gathering process to determine the functional and nonfunctional requirements for the first iteration of each of the prioritized (3) use cases. As the requirements are gathered and operational integration considerations are documented, the Region intends to move into execution of the use cases.

Disclaimer

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Our Services were performed and this Report was developed in accordance with our statement of work ("SOW") with the RoW dated April 28, 2021 and are subject to the terms and conditions included therein.

Our role is advisory only. The RoW is responsible for all management functions and decisions relating to this engagement, including establishing and maintaining internal controls, evaluating and accepting the adequacy of the scope of the Services in addressing RoW's needs and making decisions regarding whether to proceed with recommendations. The RoW is also responsible for the results achieved from using the Services or deliverables.

Our work did not constitute an audit conducted in accordance with generally accepted auditing standards, an examination of internal controls nor attestation nor review services in accordance with the standards established by the Chartered Professional Accountants of Canada. Accordingly, we do not express an opinion nor any other form of assurance on the financial or other information, or operating internal controls of the RoW.

Further this Report does not constitute an opinion as to legal matters or any other similar matters.

Our work was limited to the specific procedures and analysis described herein and was based only on the information made available through July 15, 2021. Accordingly, changes in circumstances after this date could affect the findings outlined in this Report. We are providing no opinion, attestation or other form of assurance with respect to our work and we did not verify or audit any information provided to us.

This information has been prepared solely for the use and benefit of, and pursuant to a client relationship exclusively with, the RoW ("Client"). In the event that this Report is used for any purpose other than in accordance with its intended purpose, any such party relying on the Report does so entirely at their own risk and shall have no right of recourse against PwC, and its partners, directors, employees, professional advisors or agents. PwC disclaims any contractual or other responsibility to others based on its use and, accordingly, this information may not be relied upon by any third party. None of PwC, its partners, directors, employees, professional advisors or agents accept any liability or assume any duty of care to any third party (whether it is an assignee or successor of another third party or otherwise) in respect of this Report.

Some of the documents and figures we reviewed were produced by third parties. We did not corroborate or verify these documents and figures with these parties. It is outside the scope of our review to evaluate the methodology used to conduct independent studies; therefore, we have accepted the information as presented, including conclusions.

Our Report must be considered in its entirety by the reader. Selecting and relying on specific portions of the analyses, or factors considered by us in isolation may be misleading.