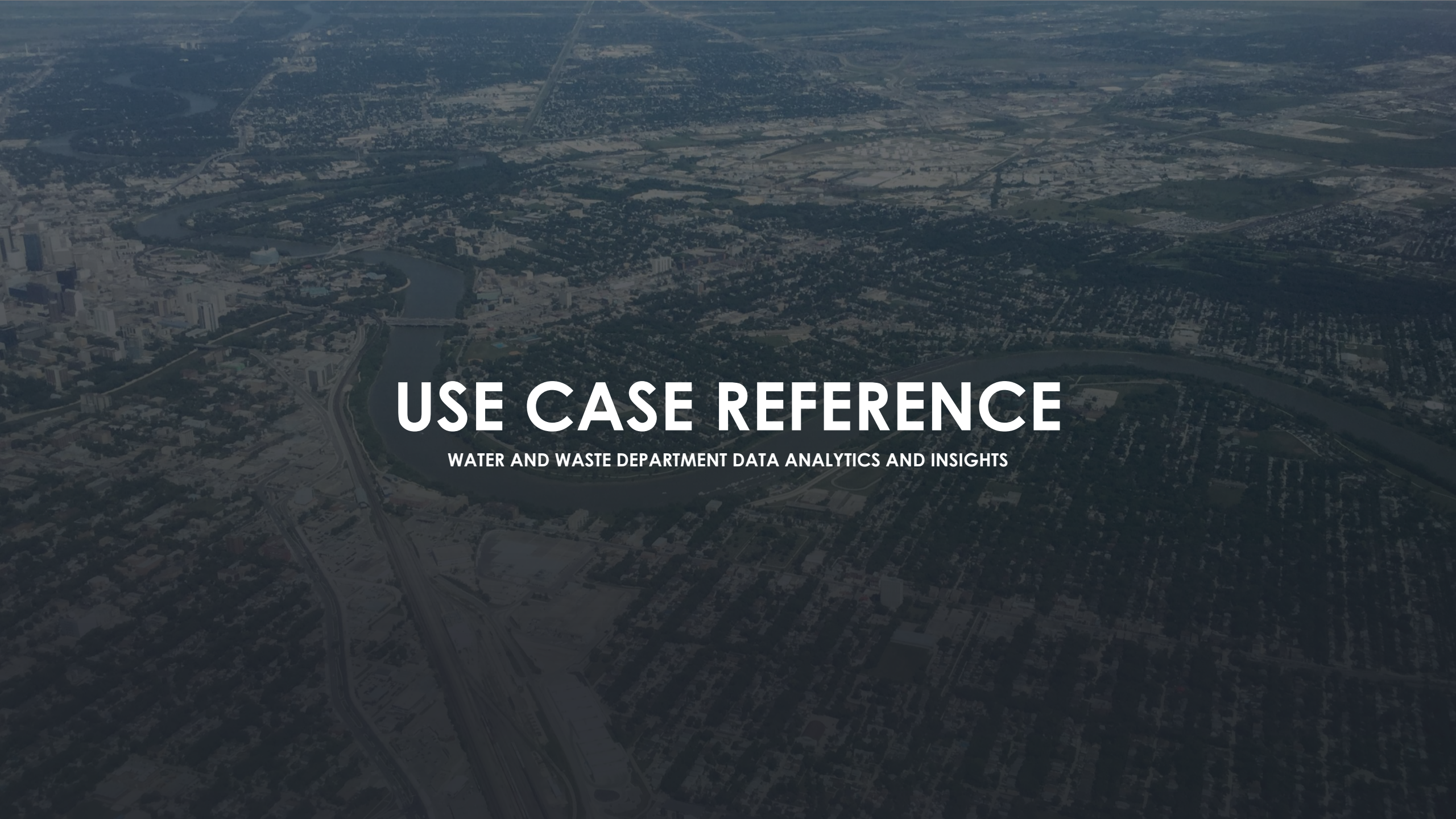
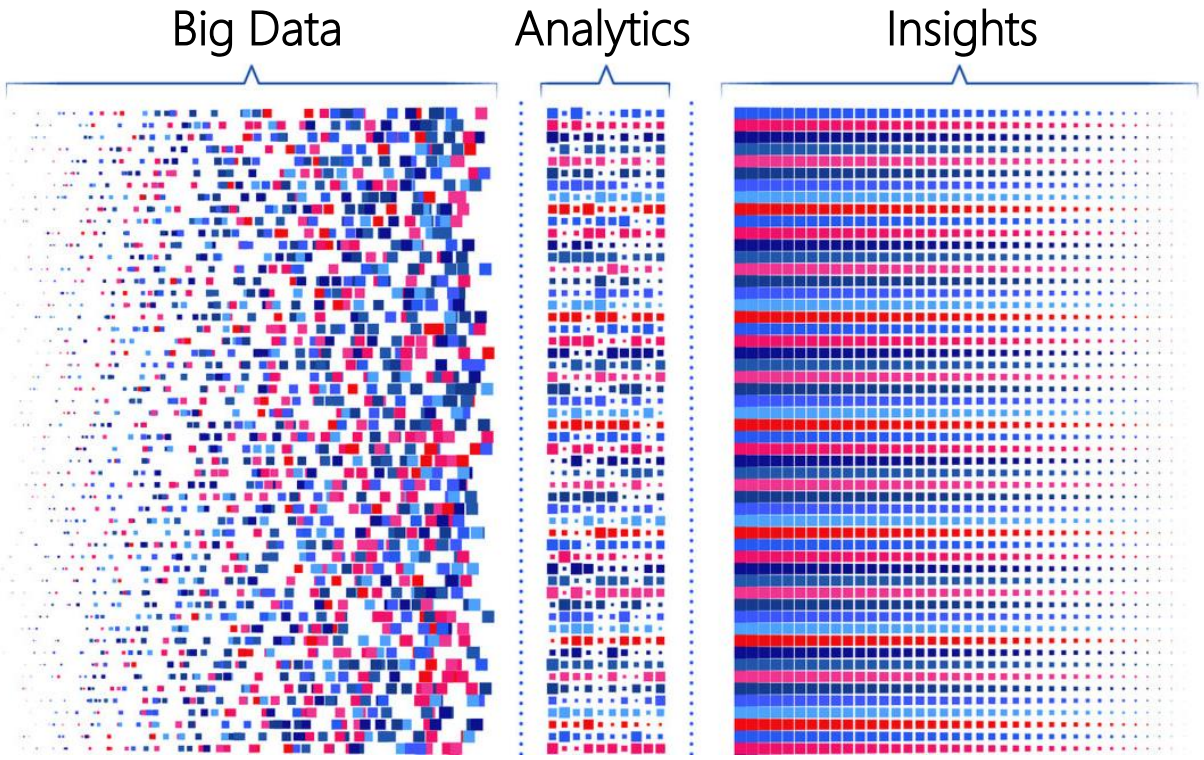


USE CASE REFERENCE

WATER AND WASTE DEPARTMENT DATA ANALYTICS AND INSIGHTS

Data: The Key to the Utility of the Future

The Water and Waste Department (WWD) can leverage Business Intelligence and Analytics (BIA) to gather insights regarding services offered and make better fact-based decisions to realize synergies, minimize costs, and deliver greater value for customers.



Opportunities and Challenges

In 2018, the Department and its divisions were engaged to provide immediate ideas on what critical opportunities and challenges need to be addressed to optimize performance, improve citizen confidence, sustain operations and service delivery, and more.

These ideas were captured as Crunchy Questions which form the basis for developing robust Use Cases that will be addressed through the offering of BIA products and services.

Crunchy Questions Prioritization Map

A prioritization map is essential for distilling key business questions into what has value, what's complex, and thus answering what should be targeted as initial BIA efforts.

1 ★ How can we measure success where success results in less direct data?

2 ★ Are we competitive compared to other utilities?

3 How do we optimize landfill management by guiding services, controlling revenue loss, and adjusting the pricing model?

4 How can we consistently develop our cost of service rates process (thereby making the process less subjective and less ad hoc)?

5 ★ How can we drive innovation and leverage technology trends like the "Internet of Things" (IoT) in our strategy and planning processes?

6 What is the impact of turning off a water-main valve?

7 How do we optimize operations of pumping stations and distribution system assets to minimize the impact of transients?

8 ★ Can BIA change the service model (i.e. Demand Management/Elastic Supply)?

9 How do we provide a consistent customer experience?

10 What proportion of Utility Billing Center calls have been diverted to the MyUtilityBill portal?

11 Can we predict customer payment behavior, i.e., which customers will fall in arrears?

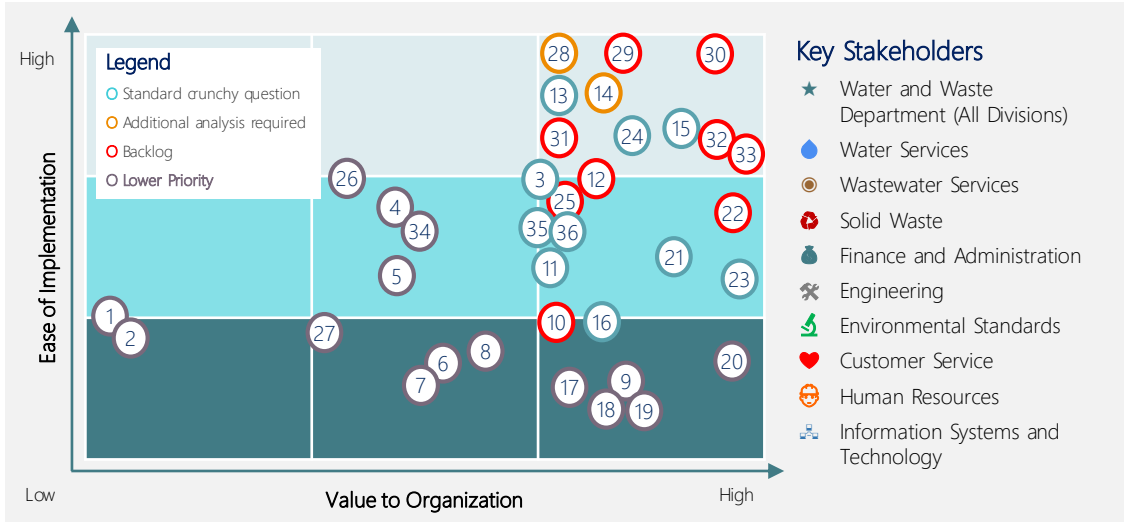
12 How do we prioritize water services crew resources to maximize benefit (i.e., how do we prioritize between meter exchanges and turn-offs for non-payment and water main repair)?

13 How do we optimize meter population?

14 How do we enhance monitoring of compliance?

15 How do we reduce incidents and injuries to improve health and safety at the workplace?

16 How can we predict cart damage and replacement (asset planning)?



17 How can BIA insights help with capability planning?

18 ★ How to use data to drive best practices for council decisions?

19 ★ Are we a service or a business (related to changing level of service, e.g., reduction of work hours)?

20 How can we use asset information (including maintenance) in conjunction with external influences (e.g., climate) to make optimal decisions?

21 How do we go from >50% to 0% unplanned maintenance?

22 How do we optimize asset management practices to maximize efficiency and reduce costs?

23 How can we identify unaccounted water including its theft (based on factors such as water consumption, meter age, and inspection date)?

24 What are the collective financial implications of a given work order and how can we leverage this information to forecast future costs/effort?

25 How do we prioritize maintenance efforts?

26 How can we predict and avoid dry weather overflows?

27 How do we track and prioritize media and councilor requests?

28 How can we measure success and feed back actual costs for future estimates?

29 What is the most cost-effective way to record assets (carts) to ensure accuracy?

30 How can we improve spending tracking to ensure alignment to budget?

31 How do we ensure data is sent to end users efficiently in a usable and meaningful format?

32 How can we improve water meter reporting accuracy for consumption?

33 How do we reconcile differences between budgeting, HR planning, collective agreements, and financial resource planning?

34 How can we predict water main renewal work required beyond 1 to 2 years?

35 How do we ensure we are billing for all services provided?

36 How do we better predict water revenue in the short term?

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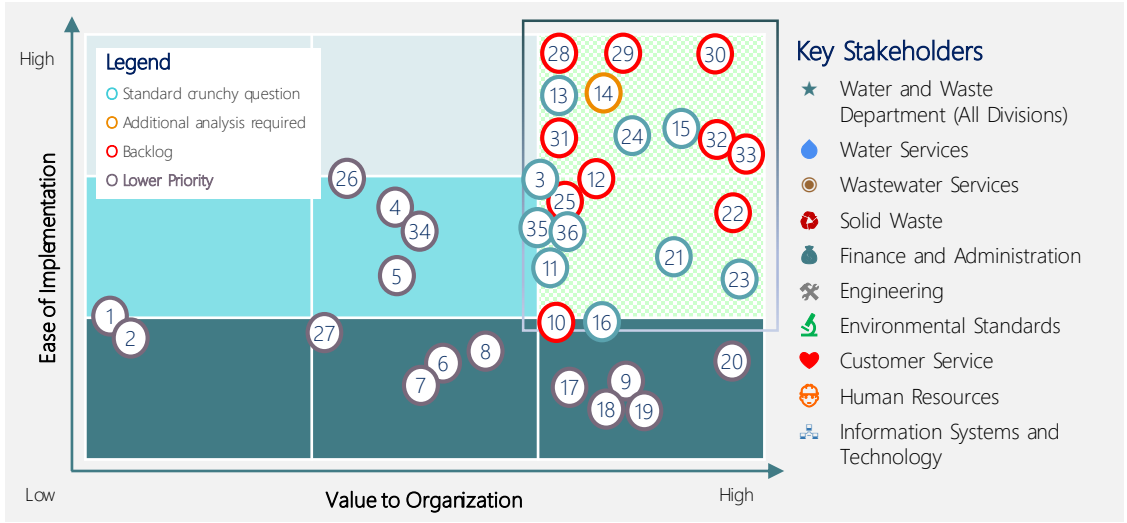

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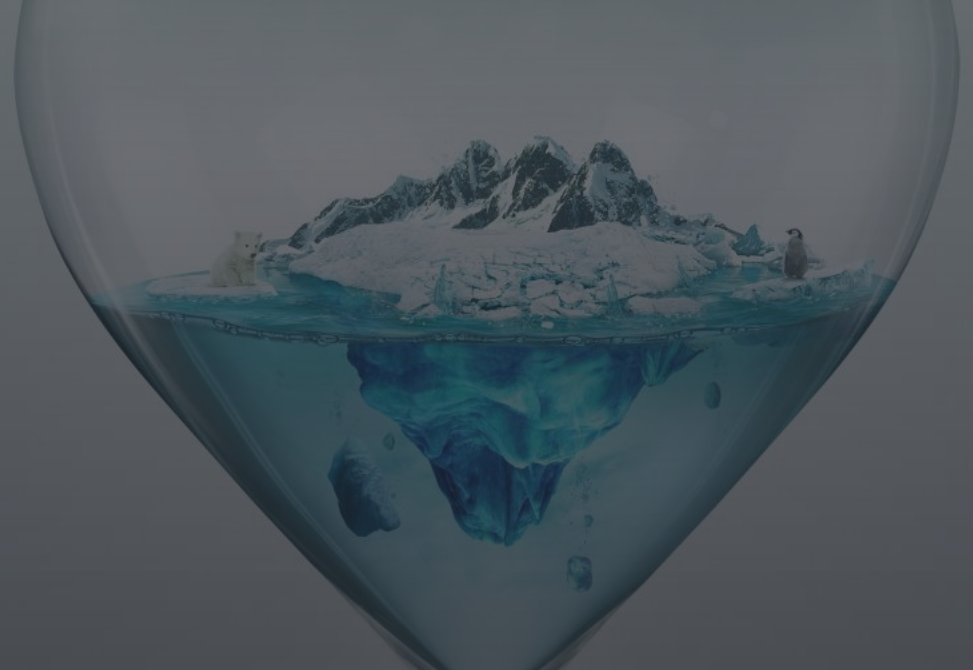
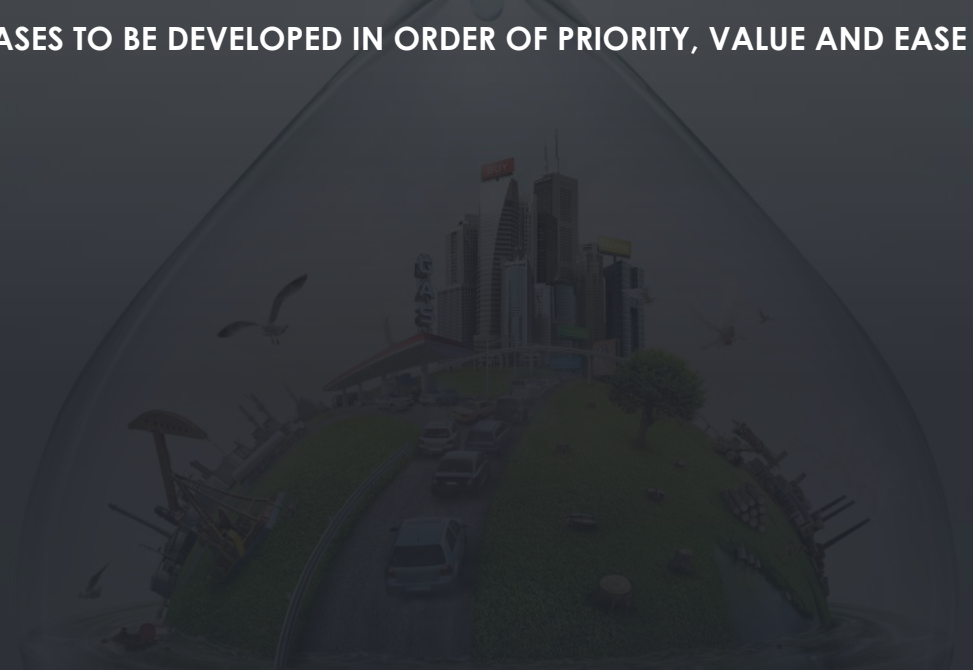


USE CASE PRIORITIZATION SUMMARY

OVERVIEW OF USE CASES TO BE DEVELOPED IN ORDER OF PRIORITY, VALUE AND EASE OF IMPLEMENTATION



Use Case Prioritization Summary

Where a Crunchy Question represents a business problem that needs to be addressed, a Use Case outlines the requirements, application and objectives of a solution to a problem.

Priority	Crunchy Question		Use Case	Area of Impact	Objective	Requirements	Key Data Sources	Data Format				Data Structure	Volume	Perceived Data Quality
								Database	Extract	Digital	Paper			
1	15	How do we reduce incidents and injuries to improve health and safety at the workplace? **Dimensions & Measures** Incidence Event, Incidence Date, Severity, Severity Score, Frequency, Cost Centre, Lost Hours, Claim Cost, Training History, Certifications, Location, Action, Job Description, etc.	Safety Analytics	Human Resources	Reduce the number and frequency of injuries and other incidents to create a safer workplace. Reduce financial, legal, and reputational liabilities.	Supervisors should be able to view safety data to take necessary corrective actions. Data should be able to give us factors and predictors of safety incidents. Visualizations should allow users to drill-down a granular level to explore and improve analysis.	PeopleSoft	✓				Structured	■■■■■	★★★★
							WCB Claims Database		✓			Structured	■■■■■	★★★★★
							SmarterU	✓				Structured	■■	★★★
							Job Planning			✓	✓	Semi-structured	■■■■■	-
							Safe Work Procedures			✓		Unstructured	■	-
							Work Observations			✓	✓	Semi-structured	■■■■■	-
							Incident Investigations			✓	✓	Semi-structured	■	★
							Safety Talks			✓	✓	Unstructured	■■■	-
							Equipment Maintenance			✓		Structured	■	-
							Regulatory			✓	✓	Structured	■■■	-
							Corporate Policies			✓		Unstructured	■	-
							Hazard Assessment			✓		Semi-structured	■	-
2	13	How do we optimize meter population? **Dimensions & Measures** Water consumption meter reads (estimated and actual), Service Points, Addresses, Meter Type, Meter Location, Meter Age, Billed Usage, etc.	Water Meter Life Cycle Analytics	Finance and Administration	Determine the optimum time to exchange a meter (i.e., weighing replacement cost against unmetered revenue)?	Ability to identify the optimum time to replace each meter and demonstrate the return on this investment. Ability to group meters by various characteristics.	Oracle Utilities Customer Care and Billing (OUCCB)	✓	✓	✓		Structured	■■■■■	★★★★
							Meter Test Data			✓		Structured	■	★★★★
							Meter Maintenance Report	✓	✓	✓		Structured	■■■■■	★★★★

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								Database	Extract	Digital	Paper			
3	23	How can we identify unaccounted water including its theft (based on factors such as water consumption, meter age, and inspection date)? Dimensions & Measures Water Consumption Meter Reads (estimated and actual), Service Points, Addresses, Meter Type, Meter Location, Meter Age, etc.	Non-Revenue Water (NRW) Identification Analytics	Finance and Administration	Reduce non-Revenue Water (NRW) by identifying specific meter issues for review (e.g., significant change in consumption implying theft or change of occupancy).	Ability to distinguish between a meter slowly degrading in accuracy versus a sudden change in consumption (could be theft – meter tampering, open by-pass, change of occupancy / process) Ability to group these meters by various characteristics and drill-down for deeper analysis.	Oracle Utilities Customer Care and Billing (OUCCB)	✓	✓	✓		Structured	■■■■■	★★★★
							Meter Maintenance Report	✓	✓	✓		Structured	■■■■■	★★★★
							CM ERT List (16mm AMR from OUCCB)		✓	✓		Structured	■■■	★★★★★
							By-law Enforcement (Theft Records)		✓	✓		Structured	■■	★★★
							Annual Water Audit (AWWA)			✓		Unstructured	■	-
							Pumpage Reports			✓		Unstructured	■	★★★★
							Broken Seal Data			✓		Structured	-	-
							Bypass Seal Data (from OUCCB)	✓	✓	✓		Structured	-	-
4	21	How do we go from >50% to 0% unplanned maintenance? Dimensions & Measures Asset Type, Asset Age, Asset Costs, Asset Location, Flow, Pressure, Temperature, Vibrations, Work Orders, Labor Costs, Specifications, etc.	Wastewater Predictive Maintenance I (Major Pumps)	Wastewater Services	Optimize resource allocation. Ensure equipment uptime and performance. Mitigate occurrence and impacts to service delivery and quality due to unplanned maintenance. Ensure regulatory compliance.	Aspire towards 0% unplanned maintenance. Ability to anticipate likelihood of process/system failure and prescribe preventative measures.	Distributed Control System (DCS)	✓	✓	✓		Structured	■■■■■	★★★
							Supervisory Control And Data Acquisition (SCADA)	✓	✓	✓		Structured	-	-
							Oracle Work Asset Management (OWAM)	✓	✓	✓		Structured	■■■■■	★★★
							Manuals, Specifications and other Documents			✓	✓	Semi-structured	■■■■■	★

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Where a Crunchy Question represents a business problem that needs to be addressed, a Use Case outlines the requirements, application and objectives of a solution to a problem.

Priority	Crunchy Question	Use Case	Area of Impact	Objective	Requirements	Key Data Sources	Data Format				Data Structure	Volume	Perceived Data Quality
							Database	Extract	Digital	Paper			
5	3 How do we optimize landfill management by guiding services, controlling revenue loss, and adjusting the pricing model? Dimensions & Measures Customer Contacts, Staff, Wages and Salaries, Scale Weights, Accounts Payables, Accounts Receivables, Payment Transactions, Check-ins, Manual Overrides, Material Types, Material Volumes, Diversion, Landfill Capacity, Arrears, etc.	Landfill Service and Revenue Analytics	Solid Waste	Ensure that scale transactions are accurate. Ensure that landfill service levels match required service. Ensure controls are in place to minimize revenue loss by identifying transactional anomalies.	Reduce transactional anomalies. Optimize revenue and expenses.	WasteWORKS	✓	✓			Structured	■■■■■	★★★★★
						PeopleSoft	✓	✓	✓		Structured	■■	★★★★★
6	14 How do we enhance monitoring of compliance? Dimensions & Measures -	Environmental Compliance Analytics	Water Services Wastewater Services Environmental Standards										
7	24 What are the collective financial implications of a given work order and how can we leverage this information to forecast future costs/effort? Dimensions & Measures Work Orders, Work Activities, Effort, Equipment, External Costs, Supplies, Salaries, GPS coordinates, Permits, etc.	Work Order Cost Analytics	Water Services	Optimize maintenance activities with respect to cost, resource availability and more effectively prioritize maintenance activities.	Ability to measure actual cost and apply to forecasting models. Ability to account for total cost of a work order.	PeopleSoft	✓	✓	✓		Structured	■■■■■	★★★★★
						REPA	✓	✓			Structured	■■■■	★★★★
						Water Cuts	✓	✓			Structured	■■■■	★★★★
						Fleetbridge	✓	✓			Structured	■■	-
						Winnipeg Fleet Management			✓		Semi-Structured	■	-
						Oracle Work Asset Management (OWAM)	✓	✓	✓		Structured	■■■	★★

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Priority	Crunchy Question		Use Case	Area of Impact	Objective	Requirements	Key Data Sources	Data Format				Data Structure	Volume	Perceived Data Quality
								Database	Extract	Digital	Paper			
8	21	How do we go from >50% to 0% unplanned maintenance? Dimensions & Measures Asset Type, Asset Age, Asset Costs, Asset Location, Flow, Pressure, Temperature, Vibrations, Work Orders, Labor Costs, Specifications, etc.	Wastewater Predictive Maintenance II (High-Value Assets)	◉ Wastewater Services	Ensure that scale transactions are accurate. Ensure that landfill service levels match required service. Ensure controls are in place to minimize revenue loss by identifying transactional anomalies.	Reduce transactional anomalies. Optimize revenue and expenses.	Distributed Control System (DCS)	✓	✓	✓		Structured	■■■■■	★★★
							Supervisory Control And Data Acquisition (SCADA)	✓	✓	✓		Structured	-	-
							Oracle Work Asset Management (OWAM)	✓	✓	✓		Structured	■■■■■	★★★
							Manuals, Specifications and other Documents			✓	✓	Semi-structured	■■■■■	★
9	21	How do we go from >50% to 0% unplanned maintenance? Dimensions & Measures Asset Type, Asset Age, Asset Costs, Asset Location, Flow, Pressure, Temperature, Vibrations, Work Orders, Labor Costs, Specifications, etc.	Wastewater Predictive Maintenance III (Small Pumps)	◉ Wastewater Services	Ensure that scale transactions are accurate. Ensure that landfill service levels match required service. Ensure controls are in place to minimize revenue loss by identifying transactional anomalies.	Reduce transactional anomalies. Optimize revenue and expenses.	Distributed Control System (DCS)	✓	✓	✓		Structured	■■■■■	★★★
							Supervisory Control And Data Acquisition (SCADA)	✓	✓	✓		Structured	-	-
							Oracle Work Asset Management (OWAM)	✓	✓	✓		Structured	■■■■■	★★★
							Manuals, Specifications and other Documents			✓	✓	Semi-structured	■■■■■	★

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10	36	How do we better predict water revenue in the short term? Dimensions & Measures Customer, Meter Reads Billing Data, etc.	Unbilled Water Revenue Forecasting	Finance and Administration	Since the utility must balance its budget, it is important to know whether revenue will be above/below budget in a timely manner.	Forecast confidently unbilled revenue for current quarter and forthcoming year with ability to drill-down to individual water meters.	Oracle Utilities Customer Care and Billing (OUCCB)	✓	✓	✓		Structured	■■■■■	★★★★
11	11	Can we predict customer payment behavior, i.e., which customers will fall in arrears? Dimensions & Measures Bill and Payment History, Notices, Water Turn-Off History, Turn-off Requests, Pay Plans, Adjustments, Property Taxes, Service Requests, etc.	Customer Payment Behavior Predictive Analytics I	Finance and Administration	Reduce frequency and volume of unpaid accounts, and prescribe proactive measures to ensure reliable revenue collection.	Ability to predict the likelihood of non-payment based on a customer's past behavior and utilize this data to prioritize our collection activity. Ability to apply a model that monetizes the risk of delaying collection activity.	Oracle Utilities Customer Care and Billing (OUCCB)	✓	✓	✓		Structured	■■■■■	★★★★
							Oracle Work Asset Management (OWAM)	✓	✓	✓		Structured	■■■■	★★★
12	11	Can we predict customer payment behavior, i.e., which customers will fall in arrears? Dimensions & Measures Bill and Payment History, Notices, Water Turn-Off History, Turn-off Requests, Pay Plans, Adjustments, Property Taxes, Service Requests, etc.	Customer Payment Behavior Predictive Analytics II	Finance and Administration	Maximize revenue collection and margins.	Ability to estimate ROI for prioritizing water shut-offs to ensure reliable collection of revenues from water usage.	Oracle Utilities Customer Care and Billing (OUCCB)	✓	✓	✓		Structured	■■■■■	★★★★
							Oracle Work Asset Management (OWAM)	✓	✓	✓		Structured	■■■■	★★★

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Priority	Crunchy Question		Use Case	Area of Impact	Objective	Requirements	Key Data Sources	Data Format				Data Structure	Volume	Perceived Data Quality
								Database	Extract	Digital	Paper			
13	35	How do we ensure we are billing for all services provided? **Dimensions & Measures** Service Points, Addresses, Carts, Dwelling Assessments, GPS, Property Types, Service Connections for Water and Sewer, Asset Type, Service Requests, etc.	Billing and Services Reconciliation	Finance and Administration	Develop standards and systems that more streamlines revenue assurance.	Ability to quantify potential for unbilled revenue for suspected revenue gaps. Ability to trigger investigation of possible unbilled service and to track results of investigation (or send to another system).	Oracle Utilities Customer Care and Billing (OUCCB)	✓	✓	✓		Structured	■■■■■	★★★★
							Collections Management Services (CMS)	✓	✓			Structured	■■■■	★★★
							MANTA/Taxation	✓	✓			Structured	-	★★★★
							GIS	✓	✓			Structured	-	★★★
							Oracle Work Asset Management (OWAM)	✓	✓	✓		Structured	-	★★★★
14	16	How can we predict cart damage and replacement (asset planning)? **Dimensions & Measures** Status Code, GPS, Vehicle Number, Cart Details, Photos, Videos, Inventory, Service Information, Customer, Service Location, Service Requests, Damage Reports, etc.	Cart Life Cycle Analytics	Solid Waste	Ensure that sufficient funds and replacement assets are available to replace carts that are damaged or reach end of life Identify causes of damage in order to reduce financial impact	Determine indicators of cart damage (e.g., neighborhood, pick route, customer, seasonal events, number of transactions (i.e., how many times it was picked)) Study indicators as an input to allocate/budget sufficient funds to replace cart assets Determine number of carts repaired or replaced due to avoidable causes (i.e. contractor damage).	Fleetmind	✓	✓			Structured	■■■■■	★★★★
							Collections Management Services (CMS)	✓	✓			Structured	■■■■	★★★
							311 / KANA	✓	✓			Structured	■■■	★★★★
							Photos of Damaged Carts			✓		Unstructured	■■■	★★★

USE CASE VALUE PROPOSITION

WHY ARE THESE USE CASES IMPORTANT? HAVE OTHER UTILITIES DONE THE SAME AND ACHIEVED THE DESIRED RESULT?

Use Case Value Proposition

A value proposition tells us 'Why' an organization should undertake an initiative or use case, what success would look like to the user and ultimately, the benefit to the organization.

Priority	Crunchy Question		Use Case	Area of Impact	Desired Success Outcome(s)	Value Drivers	Business Champion	Key Users	Real World Application	
									Client	Success Outcome(s)
1	15	How do we reduce incidents and injuries to improve health and safety at the workplace?	Safety Analytics	Human Resources	Ability to analyze safety data in a more meaningful manner. Raise awareness, design, develop and implement more effective corrective and preventative actions to safety incidences. Improve quality and timeliness of safety-related decisions.	❖ ➤ $	Floyd Buhler	Safety Officer Division Manager Branch Heads Supervisors	General Industry Trends in the Canadian Workplace[1]	*Cost avoidance of penalties/sanctions; reduction in direct cost of WCB premiums; reduce daim costs; improve productivity; and avoid litigation attributed to negligence daims in avoidable safety incidents.*
2	13	How do we optimize meter population?	Water Meter Life Cycle Analytics	Finance and Administration	Ability to identify the optimum time to replace each meter and demonstrate the return on investment. Ability to analyze meter asset information by various characteristics, categories and groupings.	$ ❖ ➤	Jason Enns	Superintendent Meters Division Manager Assistant Controllers Branch Heads Planners Supervisors	Clayton County Water Authority (CCWA) in Morrow, Georgia[2]	*3% of residential meters were under-registering on average $6 per meter. Nonresidential meters were under-registering on average at $67 per meter. Total revenue loss amounted to more than $585,000 over a four-year period. 22 meters were prioritized for replacement and uncovered $200,000 in lost revenue over the next five-years.*
3	23	How can we identify unaccounted water including its theft (based on factors such as water consumption, meter age, and inspection date)?	Non-Revenue Water (NRW) Identification Analytics	Finance and Administration	Ability to distinguish between a meter slowly degrading in reading accuracy versus a sudden change in consumption that could be caused by theft, tampering, open by-pass, change of occupancy, etc. Ability to analyze meter asset information by various characteristics, categories and groupings.	$ ♥ ➤ ❖	Jason Enns	Superintendent Meters Division Manager Assistant Controllers Branch Heads Planners Supervisors	Multiple-US utilities observed for trends in non-revenue water[2,3]	*Data analytics help utilities account for and combat 20-30% of annual NRW and accelerates the adoption of Advanced Metering Infrastructure (AMI). Annual global NRW is estimated to be over $14 billion USD.*
4	21	How do we go from >50% to 0% unplanned maintenance?	Wastewater Predictive Maintenance I (Major Pumps)	Wastewater Services	Ability to identify top causes of failures, their probability of occurrence and criticality to operations and service delivery in order to minimize impacts to citizens. Ability to predict when maintenance is needed.	❖ ➤ $ ♥	Richard Ramrattan	Engineers Division Manager Branch Heads Planners Supervisors	Multiple-US utilities that implemented Specific Energy Inc.'s Intelligent Pump Station Optimization and Analytics Solution[4]	*Pump optimization and management with data analytics unlocked anywhere from a 18-21% reduction in annual energy costs by minimizing specific energy and ensuring pumps operated within preferred operating ranges (POR).*

Value Drivers: $ Financial ❖ Internal ♥ Citizens ➤ Innovation

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Priority	Crunchy Question		Use Case	Area of Impact	Desired Success Outcome(s)	Value Drivers	Business Champion	Key Users	Real World Application	
									Client	Success Outcome(s)
5	3	How do we optimize landfill management by guiding services, controlling revenue loss, and adjusting the pricing model?	Landfill Operations Optimization Analytics	Solid Waste	Ability to anticipate and identify anomalous transactions. Ability to prescribe corrective and preventative actions to reduce anomalous transactions and therefore, optimize revenue collection, reduce expenses and prevent revenue leakages. Ability to more accurately and reliably build pricing models that reflect operating costs.	$ ❖ ➤	Justin Lee	Planners Division Manager Branch Heads Supervisors Frontline Staff		
6	14	How do we enhance monitoring of compliance?	Environmental Compliance Analytics	Water Services Wastewater Services Environmental Standards			Courtney Diduck	Branch Head Division Manager Auditors		
7	24	What are the collective financial implications of a given work order and how can we leverage this information to forecast future costs/effort?	Work Order Cost Analytics	Water Services	Ability to easily compare forecasted cost and actual cost by work order and GL. Ability to drill-down to what is still pending for each work order and their cost, labor and material implications. Ability to accurately cost work tasks based on past work and input costs (i.e., labor, materials, equipment, etc.). Use cost data to accurately budget for maintenance activities. Optimize maintenance activities with respect to cost, allowing better decisions to optimize discretionary maintenance activities.	$ ❖ ➤	Michael Szmon	Engineers Division Manager Branch Heads Planners Supervisors	Gwinnett County Department of Water Resources (GCDWR), Lawrenceville, Georgia[5]	*It has benefited from a 70% increase in maintenance work order execution rate, increased it's preventative maintenance work orders by 40%; and reduce it reactive maintenance work order from 67% to 34%.*

Value Drivers: $ Financial ❖ Internal ❤ Citizens ➤ Innovation

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Priority	Crunchy Question		Use Case	Area of Impact	Desired Success Outcome(s)	Value Drivers	Business Champion	Key Users	Real World Application	
									Client	Success Outcome(s)
8	21	How do we go from >50% to 0% unplanned maintenance?	Wastewater Predictive Maintenance II (High-Value Assets)	Wastewater Services	Ability to identify top causes of failures, their probability of occurrence and criticality to operations and service delivery in order to minimize impacts to citizens. Ability to predict when maintenance is needed, rather than performing planned maintenance on a set schedule or unplanned maintenance.	❖ ➤ $ ♥	Richard Ramrattan	Engineers Division Manager Branch Heads Planners Supervisors	Gwinnett County Department of Water Resources (GCDWR), Lawrenceville, Georgia[5]	*GCDWR was able to increase it's equipment availability from 70% to 92% within a 3 year period after leveraging the power of data analytics.*
9	21	How do we go from >50% to 0% unplanned maintenance?	Wastewater Predictive Maintenance III (Small Pumps)	Wastewater Services	Ability to identify top causes of failures, their probability of occurrence and criticality to operations and service delivery in order to minimize impacts to citizens. Ability to predict when maintenance is needed, rather than performing planned maintenance on a set schedule or unplanned maintenance.	❖ ➤ $ ♥	Richard Ramrattan	Engineers Division Manager Branch Heads Planners Supervisors	Gwinnett County Department of Water Resources (GCDWR), Lawrenceville, Georgia[5]	*GCDWR was able to increase it's equipment availability from 70% to 92% within a 3 year period after leveraging the power of data analytics.*
10	36	How do we better predict water revenue in the short term?	Water Demand and Unbilled Water Forecasting	Finance and Administration	More confidently make mid-year revenue forecasts. Ability to calculate the amount of unbilled revenue at the end of the fiscal year with a high degree of confidence.	$ ➤	Wanda Burns	Assistant Controller Division Manager Planners		
11	11	Can we predict customer payment behavior, i.e., which customers will fall in arrears?	Customer Payment Behavior Predictive Analytics I	Finance and Administration	Ability to predict the likelihood of non-payment based on a customer's past behavior and utilize this data to prioritize revenue collection activity. Ability to apply a model and monetize the risk of a non-payment event and consequences of delaying revenue collection.	$ ❖ ♥ ➤	Wanda Burns	Assistant Controller Division Manager Customer Service		

Value Drivers: $ Financial ❖ Internal ♥ Citizens ➤ Innovation

Use Case Value Proposition

A value proposition tells us 'Why' an organization should undertake an initiative or use case, what success would look like to the user and ultimately, the benefit to the organization.

Priority	Crunchy Question		Use Case	Area of Impact	Desired Success Outcome(s)	Value Drivers	Business Champion	Key Users	Real World Application	
									Client	Success Outcome(s)
12	11	Can we predict customer payment behavior, i.e., which customers will fall in arrears?	Customer Payment Behavior Predictive Analytics II	Finance and Administration	Ability to estimate ROI for prioritizing water shut-offs to ensure reliable revenue collection from water usage.	$ ♥ ◆ ➤	Wanda Burns Jason Enns	Assistant Controller Superintendent Meters Division Manager Customer Service Water Shut-off Crew		
13	35	How do we ensure we are billing for all services provided?	Billing and Services Reconciliation	Finance and Administration	Improve confidence and accuracy of billing for all services provided in a timely manner. Reduce the number of staff dedicated to revenue assurance. Address disjointed information coming from multiple sources of truth (CCB vs CMS vs MANTA vs GIS, etc.).	$ ◆ ♥ ➤	Wanda Burns	Assistant Controller Division Manager Customer Service		
14	16	How can we predict cart damage and replacement (asset planning)?	Cart Life Cycle Analytics	Solid Waste	Ability to determine indicators of cart damage (e.g., neighborhood, pick route, customer, seasonal events, number of transactions (i.e., how many times it was picked)) Ability to study indicators as an input to allocate/budget sufficient funds to replace cart assets. Ability to determine number of carts repaired or replaced due to avoidable causes (i.e. contractor damage).	◆ $ ♥ ➤	Justin Lee	Planners Division Manager Branch Heads Supervisors Frontline Staff		

Value Drivers: $ Financial ◆ Internal ♥ Citizens ➤ Innovation

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ANALYTICS USE CASES SUPPORTED BY REAL WORLD EVIDENCE

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