Information Builders

City of Windsor's Information Management and Data Analytics Assessment

Nov. 26, 2019

Presented to the **City of Windsor**

/ WebFOCUS / iWay Software / Omni

Table of Contents

Executive Summary

The City of Windsor (the City) embarked on a project with the support of the Provincial Audit and Accountability Fund to identify improvements in how it handles, manages, organizes, and utilizes data. The Corporation's objective was to assess its capabilities to analyze data and improve services by:

- Leveraging an effective Information Management strategy to modernize Information Technology's use of data and drive operational efficiencies throughout the entire organization. The strategy will aid in establishing master data and governance standards / processes, and policies / practices to support enterprise data management
- Aligning business process and technology to drive a holistic strategy for modernization and digital transformation
- Providing accurate and up-to-date data that is available to all residents of the municipality, to create an evidence-based, decision-making culture
- Leveraging the knowledge of "Best Practices" to increase productivity and front-line staff efficiencies
- Benchmarking the performance of Corporation services to other municipalities to identify and act on areas of improvement and highlight successes of service delivery
- Reducing expenses by optimizing utilization of resources and assets
- Building consensus of staff decision-making through rigorous and efficient analysis.

Information Builders Inc. in collaboration with LBCG was engaged to review the Corporation's existing corporate data and documents, consult with administration management in all departments, assess the current data assets and technology and compare this with other jurisdictions and external data to identify opportunities and make recommendations. In addition to the business analysis, the current data assets and information systems were reviewed in terms of application technology, data management and users.

The City of Windsor has been among the leaders in the country in its commitment to benchmarking performance as one tool to manage effectively and efficiently. The City invests considerable time and effort to gather the data for the annual Municipal Benchmarking Network Report which was one source used for comparison.

Context

Over the last decade, the City has undergone an extended period of fiscal accountability reducing its debt and effectively managing through a period of economic downturn by holding the line on taxes for residents while also seeking to maximize the value, efficiency and effectiveness of the services provided within a constrained municipal budget.

The City is facing a high percentage of staff that will reach the retirement age in the next 5-10 years (40% to 50% are expected to turnover in the next 10 years). This is both a challenge and an opportunity. Corporate memory is at risk of being lost where it is held by individuals and not embedded in information assets. However, the large number of vacancies provides an opportunity to recruit staff with the competencies needed in a data-driven environment and to manage the re-

deployment of the remaining staff to more value-added activities as business processes are re-designed and digitized.

While everyone recognizes that the comparisons in the MBNCanada Performance Measurement Report are not perfect and completely comparable, they are recognized as important benchmarks for areas of potential improvement which are worthy of further examination. They are also reflective of the City's own specific parameters, priorities, and service level decisions. In the most recent 2017 report, Windsor's comparative performance was better than the median of the other municipalities in some areas while also indicating the potential for improvement in others. There are potential areas where the City might be able to generate savings or avoid costs if the City met the median level of performance. However, achieving these efficiencies would require work in a number of areas discussed in this report.

It is important to note that while striving to achieve improved performance may be an ideal objective, rankings in many categories are reflective of past service level decisions, fiscal resource allocation, city-specific environmental/geographic considerations, socio economic issues, and many other factors. Successful improvement depends on a number of factors documented in the research on performance improvement. Those factors commonly include investment in people, process improvement and technology support and are discussed further in this report.

Findings

The study identified a range of opportunities for improvement across the Corporation. A common reported challenge is the amount of time that staff spend on transactional activities, manual data tracking and manual reporting using spreadsheets. This limits the operational efficiency of many departments and their ability to leverage the benefits of existing investments in information systems. A significant number of processes were identified during the project which could benefit from efficiency improvements, many of which are caused or exacerbated by barriers to the delivery, management, and timeliness of information including:

- E-mail as a document delivery/management system – each recipient receives numerous reports from multiple sources and must consolidate information and in some cases manage report storage/retrieval based on E-mail indexing.
- Multiple requests to resolve information needs – special requests for data to support investigations can require numerous requests/meetings to refine/finalize the data needs. This is further complicated if multiple source systems are needed.
- Experts in some cases must apply business rules to refine/explain data requests. These rules may not always be consistent or documented.
- One expert per system – can lead to bottlenecks and/or delays.
- Data management in silos – the information infrastructure is often fragmented into silos around data sources, and/or business units. A view of the entire catalog of information is not available. In some cases, managers don't know all that is available to them.
- However, it was reported that 'all' the data is available if you "ask the right person".
- Knowledge and expertise loss – when either technical subject experts are no longer available (i.e. retirement) or management changes occur.
- Consolidated information views – if analysis requires more than one source of data, end users are required to 'figure out' how to merge disparate datasets using desktop tools such as Excel.

- Inconsistent information management policies – information access rules; secure delivery policies; storage/retention policies; are all managed within each information group and not at a corporate level.
- New Systems Design – as new systems are rolled out (either cloud or on-premises), requirements to capture, leverage, distribute, and manage information assets being created by the new system are not incorporated in each program creating new silos of information and integration with other data sources left to future efforts.

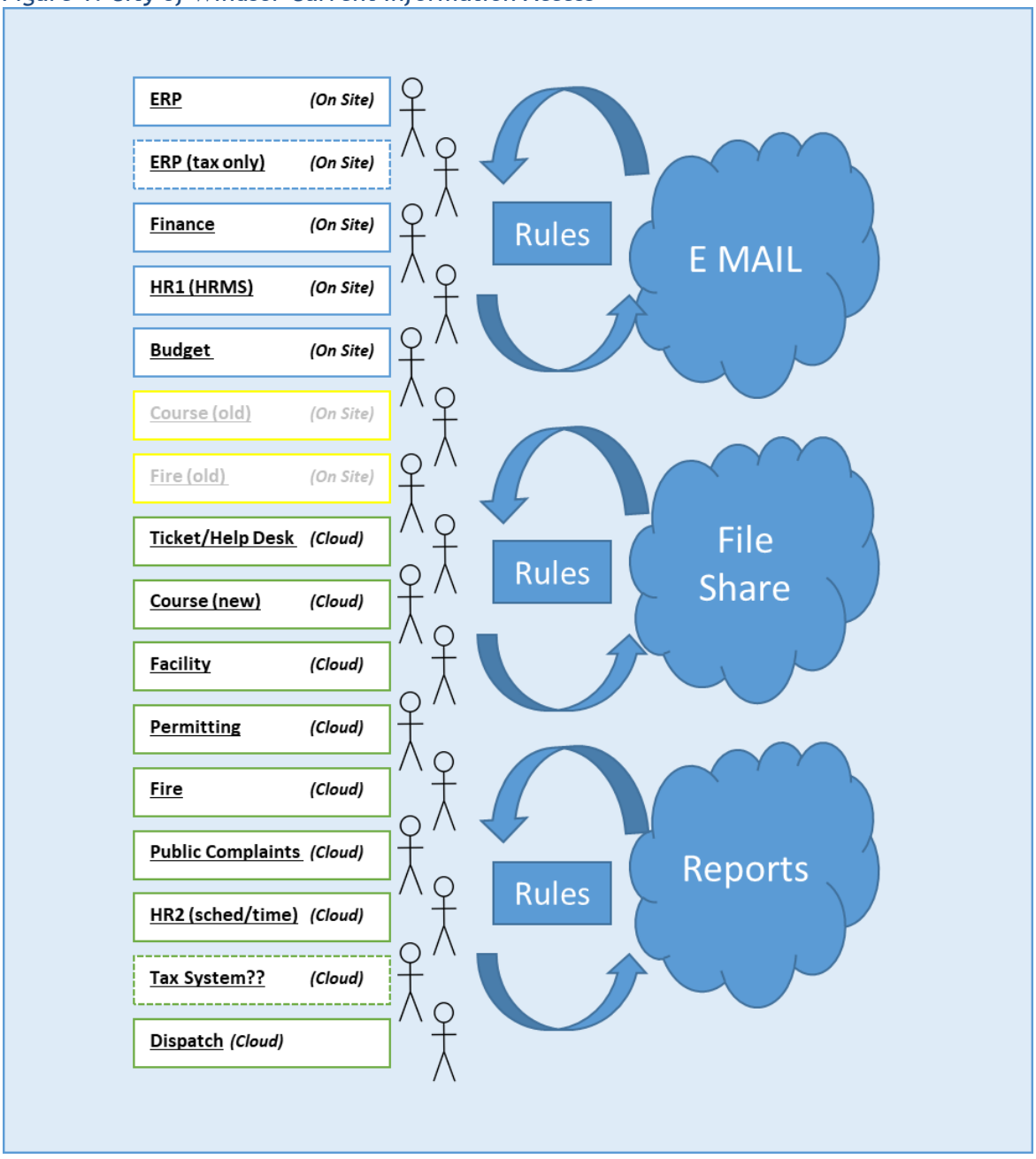
It is our experience that organizations without an Information Management and data governance roadmap that governs technology investments are more likely to struggle with shadow IT and siloed systems. Due to the many diverse and legacy applications and data sources needed to run the Municipal landscape we often encounter Municipalities that have a plethora of sources systems but no single source of truth or golden record.

The City has diligently broken down administrative silos in the departments leading to more communication, a high level of cross departmental co-operation, and better collaboration.

However, as witnessed in our review, access to departmental data can be siloed by the architecture of the information systems, necessitating special requests (and additional work) to access data outside their respective department, correlated data with multiple departments or a complete organizational view of data.

Figure 1 below shows how high-level enterprise data access is currently handled. In general, reporting on each data source is handled by a 'local' team that generates data extracts and/or reports on a regular schedule (daily/weekly/monthly/quarterly/annual) for use in operations (i.e. outstanding events/work orders) and management (budget vs actuals). Distribution of data is through standard communications channels including e-mail, shared folders, and/or physical documents. In the case of financial reporting, expertise is distributed into business units, with each area having a financial planning administrator assigned. Other systems provide a centralized reporting scenario with a single individual and/or group providing all reporting (i.e. 311).

Figure 1: City of Windsor Current Information Access



Course and Fire are shown differently than the others because they are old and have been or are being replaced. They are included on the diagram because historical information is still required for reporting and analytics

The Opportunity

The findings from the study indicate the potential for significant benefits to the City and its residents with a combination of data analytics and technology strategies focused on the business

goals of the Corporation. The City needs an integrated information management strategy to help to deliver on the City's goals.

In 2015, the City began the shift from managing constraint to planning for the future with the development of a Strategic Vision[1] and most recently in early 2019 the newly elected City Council undertook a Strategic Planning exercise to identify its key strategic planning priorities. This could be expanded upon to provide comprehensive and integrated guidance to both Council and staff as multiple day-to-day decisions are made on where to best invest limited human and financial resources.

The effective use of data needs to be a key element of any organization's business strategy. The Information Management strategy[2] that was developed by the City administration in 2015 contains many elements that still apply today and should be refreshed based on the findings and recommendations in this report.

In fact, given the breadth of services provided by municipalities, the challenge of managing service on a myriad of data sets is very common. Some municipalities/municipal services are beginning to explore and implement opportunities to integrate data to enhance the overall data analytics capability; examples include:

- York Regional Police: Integrated data cross-functionally to improve operational efficiency and decision-making.
- Ottawa Paramedics Services: Leveraging real-time data for predictive analysis and to support in-the-moment decision-making.
- Town of Milton: leveraging traffic monitoring capabilities and real-time insights to optimize traffic signal performance. (Note: City of Windsor is also piloting a similar technology)
- New York City Health and Human Service: Consolidating all social service data in a single place to reduce duplication of effort.

Anticipated Efficiencies

The City has already begun to see the benefits of investment in data analytics. Examples of this include the recent purchase and implementation of a recruitment and selection application as well as the investment in implementing workflow management in purchasing. This study identified a number of operational opportunities that are likely to result in tangible impact on the City's operational efficiency; these opportunities include:

- With the anticipated volume of staff turnover in the next 5 to 10 years, an end-to-end recruitment process supported by workflow management and automation can expedite the recruitment timeline and enable HR staff to focus on higher-value business activities
- Expedited onboarding process and reduced turnaround time when searching for key organizational information
- Reduced manual effort to generate reporting and to support executive decision-making. Expedited process in coordinating information exchange

[1] 20-Year Strategic Vision, City of Windsor, 2015

[2] Information Management Strategy, City of Windsor, July 2015.

- Capturing and integrating external market data can support cost-effective procurement decisions. Integrating external data sources can also enable the City to be more targeted at preventive asset maintenance to reduce unexpected costs
- Reduction in staff effort on transactional, paper-based, and manual activities can result in greater operational efficiencies on the day-to-day level
- Aligning mandated procedures with the up-to-date risk tolerance level can result in enterprise-wide improve on operational efficiencies when unnecessary controls are eliminated.

Based on the opportunities for more efficiencies identified in this project, if implemented, the City can effectively reduce duplication of efforts, as well as, minimizing the existing proliferation of manual processes. A clear path to achieving these results is if data analytics and reporting are both centralized and automated. In addition to operational efficiencies, the other benefits include allowing staff to focus on higher value activities such as providing more in-depth analytics and less time on data gathering; leading to expected business improvements, better service, and potential cost avoidance and/or savings. It is noted that such benefits may only be achieved after a period of initial investments for the additional resources as proposed in the recommendations in the report.

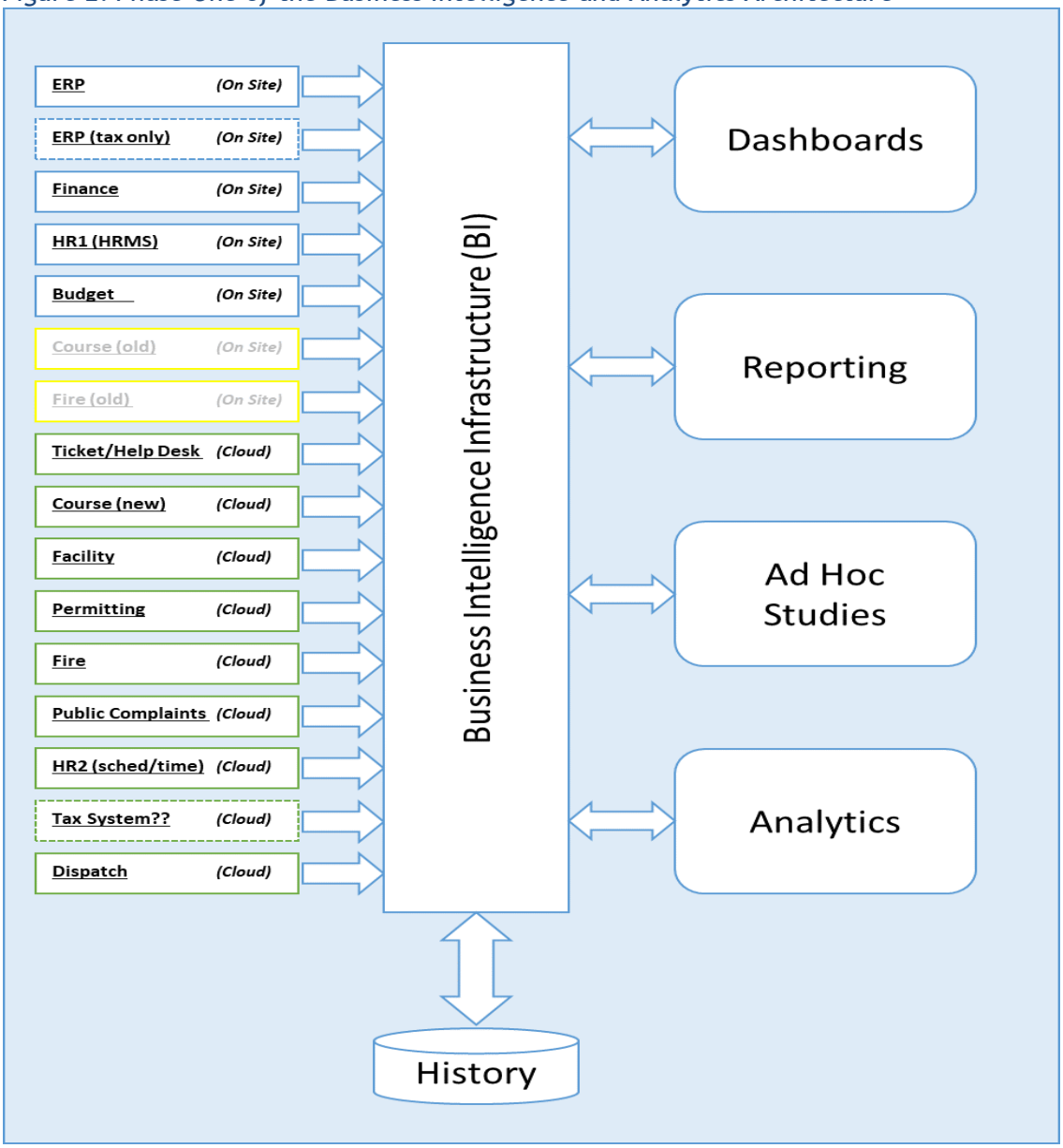
Recommendations

The past approach has led to a number of barriers to information delivery, management, and timeliness that could be addressed by the proposed information management strategy. There are two main elements to the proposed information management strategy:

- Creation of a business intelligence and analytics architecture,
- Supported by a Business Intelligence Centre of Excellence (BI CoE).

The proposed business intelligence and analytics architecture would transition the City from the current siloed applications with respect to data, to an architecture that facilities improved access to data and an ability to leverage it for benefits to all stakeholders. Figure 2 below illustrates the first phase of transition to integrated use of existing data and technology assets. Two more phases of development are described in the full report.

Figure 2: Phase One of the Business Intelligence and Analytics Architecture



Information needs to evolve quickly as new approaches to leveraging data assets emerge and are adopted. Best practice organizations leverage the expertise of a Business Intelligence Centre of Excellence (BI CoE) to help business units, technical projects, and management better leverage valuable data assets across an organization to help bridge the data silos that inevitably develop over time. The BI CoE supports:

- Procurement and maintenance of reporting tools, data management, and analytics technologies;
- Provision of city-wide reporting, dashboards and insights;
- Investigations, proposals, and information requests;

- Provision of expertise to business groups to leverage corporate assets;
- Maintenance of centralized view/catalog of authoritative data sources;
- Capture of business/technical rules for accessing/leveraging data sources;
- Implementation of the information strategy as developed by executive and management teams; and
- Technology projects to ensure that data life cycle needs are included in new systems deployment.

Implementation

An implementation roadmap would follow the following steps to transition from the current state to a modern information management structure. The roadmap has three phases:

1. Phase One – Business Intelligence Infrastructure
2. Phase Two – Data Management and Integration
3. Phase Three – Data Warehouse and Data Mastering

The implementation would need to include both business and information management. Effective implementation requires attention to four areas that have been identified as key success factors in strategy implementation:

- Clients: attention to the desired benefits to the City's residents, business and community partners;
- Finances: allocation of finances to support the approved directions;
- Process: re-design of business processes to achieve the desired outcomes; and
- People: investment in the continuous learning and role transition at all levels of the organization to support the strategic directions.

The implementation research reveals a simple logic: that you cannot expect different results if you work in the same old way (processes), allocate your finances the same way (finance), and neglect to develop your staff and organization capabilities. Most important is that the desired benefits to the City's residents, business and community partners must be kept at the forefront to ensure that they are achieved as implementation proceeds.

Recommendations

In summary, the following actions would be required to achieve the goals set out at the beginning of the project:

1. Develop an integrated information management strategy to meet the City's Strategic goals;
2. Implement a business intelligence and analytics architecture in phases as described in this report;
3. Create a Business Intelligence Centre of Excellence (BI CoE) to support the successful implementation of the business intelligence and analytics architecture and the more effective use of data at all levels of the organization;
4. Invest in the business process re-design and change management that is essential to the success of the overall plan.

Introduction

The City of Windsor (the City) embarked on a project to identify targeted improvement in how it handles, manages, organizes, and utilizes data.

The purpose of the project and the methodologies are described briefly below followed by a description and analysis of the current state. This is followed by a description of the opportunities for improvement that were discovered in each department and their potential to meet the goals of the project. The final sections provide an integrated analysis and draft recommendations and a proposed roadmap to implement the recommendations. Additional data is provided in the Appendices.

Project Purpose

The Corporation conducted a review under the Audit and Accountability Fund Program Guidelines to serve as a catalyst for targeted improvement in how it handles, manages, organizes, and utilizes data. The Corporation's objective was to assess its capabilities to analyze and improve services by:

- Leveraging an effective Information Management strategy to modernize Information Technology's use of data and drive operational efficiencies throughout the entire organization. The strategy will aid in establishing master data and governance standards / processes, and policies / practices to support enterprise data management
- Aligning business process and technology to drive a holistic strategy for modernization and digital transformation
- Providing accurate and up-to-date data that is available to all residents of the municipality, to create an evidence-based, decision-making culture
- Leveraging the knowledge of "Best Practices" to increase productivity and front-line staff efficiencies
- Benchmarking the performance of Corporation services to other municipalities to identify and act on areas of improvement and highlight successes of service delivery
- Reducing expenses by optimizing utilization of resources and assets
- Building consensus of staff decision-making through rigorous and efficient analysis. [3]

Methodology

The project team reviewed the Corporation's existing corporate data and documents, analyzed data collected through administration interviews and compared this with external benchmarking data to identify opportunities to be discussed with the Corporate Leadership Team. The Municipal Benchmarking Network Report for 2017 was used for comparison.

[3] From the Statement of Work

Technology

In reviewing the current use of technology, business intelligence (BI) and analytics at the City, a top down approach was used by the consultants. A review of business groups' information usage and needs focused the technical investigation on key information systems and data assets. The business review identified opportunities to enhance data usage through analytics, and improved information access, timeliness, and efficiency and where pockets of staff (analysts) were further along on an analytics path. These opportunities are documented in "Technical Opportunities" section below.

The effort, and time, required to assess all information sources and management, necessitated a review of key information systems. This review provided a high-level understanding of the types of technology, systems, processes, data assets, and current utilization by the City. The core information systems reviewed are listed below.

Core Information Systems

- ERP (Property/Cash/etc.)
- HR2 (Scheduling/Time Tracking)
- Public Complaints
- Facility
- Finance (GL/AP/AR)
- Budget
- HR1 (HRMS)
- Course (new)
- Permitting (new)
- Course (old)
- Ticketing/Help Desk
- Fire (old/new systems)

Each of these systems were reviewed in terms of:

- Application Technology
    - Architecture diagrams (if available)
    - Hosting situation (on Premises or Cloud)
    - Technology being utilized (application, database, etc.)
    - Roadmap for the systems involved (new, being upgraded, being replaced, etc.)
- Data Management
    - Data sources or user inputs
    - Data extracts; integration points; access; reporting
    - Data Dictionary information - system of record for what topics/classes of data
    - How much detailed information is being captured/used today
    - Volume/Velocity - how much data, and how much on a 'daily' basis
    - Data Integrity - any quality issues

- Users
    - Primary owner of the system
    - User types and how many of each
    - Typical usage patterns (both operationally and reporting)

Operating Context

Fiscal Restraints

Given the challenging economic circumstances faced by the City post the 2008 recession, The City of Windsor approved eight consecutive years of no tax increases and has only recently begun easing these fiscal restraints as economic circumstances have improved. During this period, the City undertook a variety of value for money-based efficiency initiatives that can be built upon.

20 Year Vision

In 2015, City Council developed a 20-Year Strategic Vision that provides a long-term picture of the future direction for the City. It outlines three main goals for the City for the next 20 years. The goals are specific and communicate clearly the City's commitment to the following strategy outcomes:

- More jobs in Windsor: The City will support a new economy, creating and maintaining jobs for its residents
- Addressing Windsor's Reputation: The City will be a dynamic place of civic pride and a hub for innovation, culture and creativity and attractive for people of all ages
- Improving Quality of Life in Windsor: The City will provide a high quality of life for all, supported by sustainable growth and a vibrant, caring community

The Mayor and Council remain committed to changing the future of Windsor and stand behind this strategic vision. On this basis, a strategic planning exercise was undertaken by City Council in early 2019 to reaffirm the key areas of focus for the current term of council.

Ministry Managed Information

As a municipality, the City is legislatively obligated to deliver a number of provincial programs which are operated with provincially hosted software programs where information entry, reporting, analytics and management are centrally managed by the respective provincial ministries. For example:

- RAI-MDS for long-term care;
- SAMS for Ontario Works;
- ICON[4], a case tracking system that contains records for Ontario Court of Justice criminal and Provincial Offences Act.

Any customized information needs and requests are filed centrally with the respective Ministries which can mean delays in obtaining the crucial information. This limits the ability of City staff to obtain the real-time information to support proactive program management and creates barriers to integrating valuable insights with other data assets utilized by the City.

[4] A secondary system called CAMS manages a more detailed dataset related to the ICON database for the City of Windsor and other municipalities. Thus some reporting for case tracking is available in CAMS.

Municipal Benchmarking Network

Windsor participates in the Municipal Benchmarking Network (MBNCanada). The most recent 2017 MBNCanada Performance Measurement Report presents the results of 11 single-tier and 5 upper-tier municipalities, representing 6 provinces. This is the 12th public performance report and includes 177 measures across 36 municipal service areas. While everyone recognizes that the comparisons are not perfect and precise, they are recognized as important benchmarks and indicators of areas of potential improvement. It was reported that considerable resources are invested in contributing to the benchmarking exercise annually.

In the most recent 2017 report, Windsor's comparative performance was better than the median of the other municipalities in some areas and identified the potential for improvement in others. The report provides some high-level calculations of the potential savings, cost avoidance and/or service improvement metrics that could be achieved using, in part, the benchmarking data as a general guide to focus the efforts.

As noted above, achievement of improved performance depends on a number of factors. Those factors commonly include investment in people, process improvement and technology support. The potential to address these factors is discussed in the various sections of this report.

In summary, the City is projected to invest heavily in its internal operations and information management systems as recently approved in the City's Asset Management Plan. In addition, the City continues to look for opportunities to improve its performance in multiple areas as captured in the MBNCanada benchmarking report and to consider opportunities to leverage Ministry-managed information data in order to enhance the services being delivered to residents. Further investments into its internal operations and information data management will enable the City to make evidence-informed decisions in real-time that will improve the City's performance.

Jurisdictional Best Practices

Adopting data integration and harnessing data intelligence is a leading practice that municipalities in Ontario are recently adopting. As expected, the data-rich service areas are the early adopters of data intelligence given the volume of historic data that can accurately inform decision-making. Given this nascence, there are only a handful of practices in Ontario that can be considered as "best practice"; these are outlined below. A US example is also included to showcase the potential of leveraging data intelligence in the municipal area.

Case Study #1: York Regional Police RTOC

Context

York Regional Police (YRP) employs 1,529 officers and 605 civilians, serving approximately 1.13 million residents in one of Canada's fastest-growing and most-diverse communities.

Challenge

While YRP had access to vast amounts of data, it lacked the technology, resources and processes required to make use of it. Information used for important operational or strategic decisions required the manual querying of multiple systems and in many cases was only possible by highly skilled technical staff, creating bottlenecks internally.

Data Integration Actions

The internal Business Intelligence & Analytics team worked with vendors to create a custom law enforcement solution so that data could be used across various parties and functions. York Regional Police created 11 dashboards and four separate map-based data visualization applications that provide real-time information for resource management across five policing districts, cost analysis per call, member wellness, frontline officer performance (along 10 complex KPIs), and crime trends by sector or district.

YRP developed a Data Warehouse that was fed by approximately 7 different internal systems/databases, as well as external data sources to provide a single version of the truth and feed YRP's dashboards and maps with live and historical data. They achieved this through eight core phases:

1. Conducted external market research to better understand how organizations, specifically law enforcement services, were leveraging their data.
2. Conducted internal research and stakeholder meetings with all levels of the organization.
3. Created a Business Case identifying key opportunities and goals the solution would support.
4. Created a Request for Proposal (RFP) to select the best vendors, and also identify the goals of the solution and the tasks the vendors would be responsible for.

5. Worked with vendors and internal IT department to build/configure/implement the solution.
6. Trained all relevant members of the organization (2300 members total).
7. Continuous improvement to identify enhancements, opportunities, and new use cases.
8. Annual budgeting exercises to support new enhancements and opportunities, which may be identified through internal analysis or external vendor/industry breakthroughs.

Measurable Impact

So far, the most significant impact has been in operational efficiency. The Real Time Operations Centre Live Resource Management system has helped YRP save over 2 hours every time it responds to a missing person call where there is a need to initiate a Search and Rescue mission, which is a significant amount of time critical to successful missions. The system also flags resource deficiencies in real time, improving operational efficiencies and the safety of officers. This change also allows officers and supervisors to evaluate officer activities by geographic locations defined as Priority Patrol Zones, which was never possible before this implementation.

Though anecdotal, significant positive cultural impact has been reported through enhanced performance among individuals and within teams. One dashboard allows members to compare their statistics against team averages without disclosing who they are and helps to track wellness of officers to proactively manage health, safety and wellbeing.

Case Study #2: Ottawa Paramedics Services

Context

The Ottawa Paramedic Service manages 126 response vehicles and more than 600 paramedics, dispatchers and technicians. They respond to upwards of 140,000 calls each year.

Challenge

The Ottawa Paramedics Service had been using a historical data management system for around six years to attempt to predict priorities for large-scale events and holidays. Approximately 18 months ago, it gained access to real-time data and decided to implement analysis of that data into a dashboard used by emergency paramedic supervisors and staff at four of Ottawa's largest hospitals. The goal was to help direct the transportation of patients to the most appropriate hospital to ease the burden of offload delays, which cuts down on two significant times: minutes spent waiting for an ambulance to arrive and the time it takes to offload a patient at the hospital.

Data Integration Actions

In this case, the Ottawa Paramedic Service expanded its use of a program that was already running. Instead of merely collecting data and running reports of past events retroactively to look for patterns that may give clues into future events, the incoming data was arranged to provide real-time information to both paramedics and hospitals for in-the-moment decision making.

Inputs to the tool included collecting data around vital elements such as duration of processing emergency dispatch calls, ambulance response times to specific scenes, GPS systems in ambulances, and data from electronic medical records. The ambulance dashboard tracks and reviews distribution and other statistics related to the last 20 patients to avoid unnecessary delays and ensure the most appropriate hospital is selected in each case.

By undertaking a significant digital transformation that touched multiple stakeholders, hospital staff can now see things such as the number of incoming ambulances, projected offload delays, and how many paramedics have completed transfer of care and are on their way back out to the community, all in real time.

Measurable Impact

Following implementation of this real-time tool, the Ottawa Paramedics Service reports that the efficiencies in resource management have contributed to 350,000 minutes saved and put back to the community for improved coverage--which translates to approximately 6,800 more hours of ambulance time per year available in the community to respond to emergency calls. This increased availability improves patient outcomes by reducing time to first response and to hospital intake.

Qualitatively, the first-responders community reports that the solution has also improved communication channels between hospitals for coordinated care and workload balance for care workers. Making data and analytics more accessible to the wider employee base has resulted in a significant cultural shift for Ottawa's paramedics, police, and firefighters.

Case Study #3: Town of Milton Miovision TrafficLink Pilot[5]

Context

The Town of Milton has seen significant growth in the last 20 years, with expected additional growth in the coming decade. Between 2001 and 2011 Milton was the fastest growing municipality in Canada, with a 71.4% increase in population from 2001 to 2006 and another 56.5% increase from 2006 to 2011. In 2016, Milton's census population was 110,128 with an estimated growth to 228,000 by 2031.

With this growth, in-town traffic has become an issue. One of the busiest streets in Milton was the subject of daily citizen complaints due to poor traffic flow. The corridor in question was the cause of increasing driver frustration due to sporadic travel times between two intersections. The problem was identified as resulting from irregular changes in signal cycle lengths that led to traffic progression issues.

Challenge

The town's Engineering Services Department needed a solution, but the traffic studies necessary to determine the best approach typically cost hundreds of thousands of dollars and take months or

[5] City of Windsor is current undertaking a similar pilot project at the time of this study.

years to implement. Aware of the high costs to conduct traffic studies, and the data inaccuracies associated with physically observing traffic at the intersection, the town turned to a vendor (Miovision) to gather high quality traffic data using video.

Data Integration Actions

Intersection cameras that provide vehicle and pedestrian video detection capabilities were used for the initial assessment. Analysis through the Miovision TrafficLink portal uncovered a variable offset in signal timing due to a pedestrian call button as the cause of poor progression between two intersections, causing a completely unpredictable driver experience where in some cases citizens experienced minimal delays at the intersection, while others experienced significant delays.

To correct this, the technology provided vehicle and lane detection, along with other real-time insights. The data portal provided the Traffic Engineering department with the ability to assess the effects of different mitigation strategies to achieve optimal performance using built-in signal performance measures, allowing staff to monitor and manage traffic signals remotely and make quick adjustments, based on performance measures generated continuously by the system. This includes using a split trends chart to review movement at intersections and show when green signal time fails to meet vehicle volume demand. The town also uses a point-to-point travel times graph to review historical travel times between intersections, allowing staff to determine the effectiveness of the signal timing adjustments. The system now runs at 13 intersections within the town.

Measurable Impact

Technologically, the Traffic Engineering team in Milton implemented changes based on the data provided by TrafficLink, resulting in an immediate 8.5% reduction in split failures[6] (and a 10% reduction at 4 weeks). Fewer cars were queued at each intersection, and the mean speed along the corridor was increased.

For drivers, this simple change normalized overall travel times and helped keep traffic moving in a more predictable fashion, improving driving experiences for citizens. The Town of Milton reported that since it was installed in spring 2018, morning peak travel times from 6:30 a.m. to 9:30 a.m. have decreased by 41 seconds in that busy downtown stretch, while evening peak travel times between 3:30 p.m. and 8:30 p.m. decreased by 120 seconds, representing an improvement of 17 and 33 percent, respectively.

Town administrators have seen a reduction in traffic-related complaints, which has been attributed by town officials as being due to reduced driver frustration. Though the town has yet to quantify exact outcomes, it did highlight that improved traffic flow also means drivers spend less time idling during the red phase of a signal cycle, resulting in fuel savings for citizens as well as reduced CO_2 emissions.

Financially, by avoiding expensive and traditional engineering tests, city hall also saved hundreds of thousands of dollars.

[6] where green signal time fails to meet the vehicle volume demand.

Case Study #4: New York City's HHS-Connect Initiative

Context

New York City's Health and Human Service agencies serve more than 2 million clients each year. The organization supports clients in applying for more than 35 city, state, and federal benefit programs hosted on multiple platforms across several offices.

Challenge

Five years ago, New York City launched an initiative, HHS-Connect, to collect its social service data in one place. The idea was to allow clients to walk into different social service agencies without having to re-enter their information and complete duplicate paperwork; an overarching theme of the HHS-Connect project was to enable information sharing among disparate NYC agencies. A challenge seen in many different HHS-Connect projects was ensuring that previous and potential point-to-point data transfers were implemented such that additional agencies could participate with minimal rework or duplication of efforts through repeated collection of the same information.

Data Integration Actions

ACCESS NYC was redesigned by the Service Design Studio and Product Team at the Mayor's Office for Economic Opportunity starting in the summer of 2016 through an iterative prototyping process that engaged residents, social workers, case managers, and government agency staff. The new design and core user experience were created in-house, and information about each benefit was standardized, and made available both through ACCESS NYC and the Benefits and Programs API, a dataset that includes benefit, program, and resource information on health and human services available to New York City residents.

Measurable Impact

Before the HHS-Connect program, case workers were required to log in to several agency systems to view the clients' cases across the diverse benefit programs. Now they are able to check potential eligibility for over 30 benefits in 10 easy steps through an integrated view of information across programs and a central point to access data.

Continued expansion of this technology is expected to make government benefits easier to obtain for those who qualify and more difficult for those whose actions produce waste, fraud and abuse. Data mining and predictive analytics will help overburdened social service agencies detect fraud and better provide and target services. Shifting resources away from intensive reviews allows for additional budget to be spent on actual service and benefit delivery.

Case Study #5: Charlotte-Mecklenburg Police Department

Context

The Charlotte-Mecklenburg Police Department (CMPD) serves the more than 700,000 citizens of Charlotte and the unincorporated areas of Mecklenburg County, North Carolina. The department employs 1716 police officers, as well as a civilian staff of 530.

Challenge

The Charlotte-Mecklenburg Police Department wanted to more effectively use data analytics to reduce crime, make more efficient use of police resources, and reduce costs. The department had been collecting data for many years, but stored it in a variety of sources. Employees had to sift through data using a number of tools in order to analyze crime statistics, identify trends, and determine the best allocation of police resources.

Data Integration Actions

One of the technologies the department deployed is Information Builders' Law Enforcement Analytics (LEA) solution. LEA provides an innovative predictive policing and business intelligence system for law enforcement. With its innovative predictive policing capabilities, LEA would better facilitate crime mapping and analysis for patrol officers. Since these professionals spend a great deal of their time on the street, they would reap the benefits of having up-to-date and comprehensive information as they patrol their assigned areas. Using the information culled from operational systems, patrol officers would be able to instantly spot trends in their areas, gain a better understanding of activity that has occurred during previous shifts, and develop a more global, macro view of significant developments that occur in outstanding cases. Before deployment of Information Builders' LEA solution, staff had to manually search out crime statistics data from numerous sources in an attempt to optimally assign patrol officers.

Measurable Impact

Police officers have more real-time information they can act upon, and supervisors can more effectively assign officers to areas with a higher likelihood of criminal activity. Crime has been reduced, and police resources are used more effectively. The police department will see a projected, cumulative three-year net benefit of $7,772,486, with a return on investment of 529% and a payback period of five months.

Additional Case Studies

Butler Health System

To improve patient care, reduce costs, and increase operational efficiency, this Pennsylvania-based health network put data analysis capabilities directly into the hands of business and clinical users, and created BI environments to support infection surveillance, orthopedics, and quality control. Butler will hire fewer developers, avoid additional software costs, and generate more revenue due to increased patient volumes, achieving a projected, cumulative five- year net benefit of $2,989,071, with an ROI of 459 percent and a payback period of seven months.

Coty

The world's largest beauty company will see a net benefit of more than $8 million and an ROI of 415 percent through its use of Information Builders' iWay integration solutions. Coty's Aggressive growth-through-acquisition plan requires the ability to rapidly integrate the IT environments of acquired companies into its own. iWay brings together multiple, disparate systems from production plants and offices around the globe; easily incorporates new acquisitions; and brings Coty closer to being a real-time organization.

Quinte Health Care

This Canadian healthcare firm relies on Information Builders' integration and BI solutions to measure processes and scrutinize patient information to uncover ways to cut $10 million from its operating budget. More than 300 decision-makers, from executives to nurses, can easily identify areas where money could be saved – for example, where costs may be higher than average or where length of stay is longer than average across the province.

Opportunities

This section describes the findings of the study including the challenges facing the Corporation as well as work already underway. The next section analyzes the potential opportunities followed by recommendations and an implementation roadmap later in the report.

Recruitment

Overall, the City is facing a high percentage of staff that will reach the retirement age in the next 5-10 years (40% to 50% are expected to turnover in the next 10 years). This is both a challenge and an opportunity. Many of the interviewees reported delays in filling vacant positions and this will become more critical as the number of retirements increases. In some cases, due to conditions in collective agreements, delays in the recruitment process create labour relations challenges in multiple ways (e.g., in Public Works).

Data from the most recent MBN Report shows the City ranks below the median in the Total Cost for Human Resources Administration per T4 Supported, which may suggest potential under-investment to adequately address this strategic challenge of managing significant turnover due to retirement.

This issue was recognized by the Corporation which recently purchased and implemented an application to process online applications for external hires. Its ability to connect with external job advertising websites and to make the candidate shortlisting process more efficient is already generating tangible impacts. It is reported that high volume applications processing can be reduced by approximately 2 weeks whereas low volume application process can be reduced by approximately 2 days. In a recent hiring process, one department reported that it took one staff person a half-day to short-list applicants with the new system, which would have taken three days of work in the past.

There are currently five HR Business Partners supporting the recruitment process. It is reported that a high majority of their time (approximately 95%) is spent supporting other departments in fulfilling their recruitment needs. Further process improvements (e.g., workflow management tool to support the end-to-end recruitment process) may have the ability to significantly reduce the transactional aspects of these 5 FTEs which would allow them to focus their efforts on supporting the strategic human resource needs for all departments.

Opportunity

Workflow management and automation with process redesign to reduce staff effort on transactional activities.

Anticipated Efficiencies

With the anticipated volume of staff turnover in the next 5 to 10 years, an end-to-end recruitment process supported by workflow management and automation can expedite the recruitment timeline and enable HR staff to focus on higher-value business activities.

Knowledge Management

All internal stakeholders who were interviewed reported the skill and dedication of staff as a key organizational strength. While some also identified the need for staff development when they move from a line position to management, the knowledge and competencies of staff were recognized to be a key ingredient to the City's success to date.

However, with the expected level of staff turnover due to retirement in the near future, there is significant risk of losing the "corporate memory" as the institutional knowledge held only in the minds and experience of individual staff is lost if it is not formally captured and made readily accessible in information systems. The core of this issue is that knowledge retention is reported in the scope of individual departments. This suggests individual departments may not be fully aware of key learning from other areas (i.e., potential duplicative organizational learning) let alone the loss of expertise and insights when turnover takes place.

The Information Technology department has promoted the need for capturing institutional knowledge through business process mapping, procedures, and contingency plans and some departments are more developed in this area than others. A single Corporate knowledge management system with standardization of data management would be the best practice in this.

Opportunity

Knowledge management information system to further the collective culture of learning and to support succession planning.

Anticipated Efficiencies

Expedited onboarding process and reduce turnaround time when searching for key organizational information.

Information Management and Reporting

This section is broken into three areas:

- Timely access to integrated information
- 3rd party information systems
- Business intelligence

Timely Access to Integrated Information

It is noted that there currently is no operational accounting information to support real-time and accurate departmental and resource planning within departments. For example, the Peoplesoft financial system does not provide real time financial data for operational managers in other departments thereby constraining the ability of managers to easily manage their budgets in a more timely manner, particularly near the year end. Each department has a Financial Planning Administrator that provides detailed and significant financial accounting and financial analysis support to operational managers which is an extremely valued centralized support function. However complete, timely and well-defined financial information provided in real time to managers would be an effective tool for them to help manage the day to day budgetary aspects of their jobs.

Integrating information from one information system to another is a common and constant challenge that frequently results in workaround solutions that involve individual Excel spreadsheets, manual processes, or even duplicative data entry which further exacerbates the fragmentation of information. Issues were reported from housing which requires real estate market data from planning as well as in Social Policy and Planning which draws ActiveNet, Transit and StatsCan data. An example with a measurable impact is in Risk Management where 2 FTE staff must access 311 records and a myriad of different information to process over 400 claims on an annual basis. To process these claims, these staff are reliant on information from different departments and mainly request the information via email exchange which has inherent delays and additional staff time across departments. In some cases, the requisite information may also include different versions of a document (e.g., drawings and comments). In one example, a $200K claim was reduced to $50K at the last minute because a paper record of maintenance was discovered that wasn't available for a year during which the claim was being processed. Timely access to integrated information and version-controlled documentation can reduce staff effort and has also proven to reduce the claims cost to the City.

Staff spends a significant amount of time generating reports given there is not ready access to integrated information or automated report generation capability to proactively inform decision-makers. In Risk Management, a Risk Analysts spends two full days a week generating and providing reports to different departments on expiring insurance. Similarly, when there is a media inquiry or when producing a Council report, staff often have to source information from different departments, and this can be a complex and timely exercise when current information is residing across multiple spreadsheets and more prone to errors or omissions.

Another example is in Bylaw Enforcement where there is a lack of detail in tracking and monitoring the bylaw enforcement officers' activities in their assigned ward. This is a challenge in managing and optimizing the deployment of bylaw enforcement officers. It is estimated that the management spends 12-13% of time daily working with complaint data to manage the program. Advanced analytics such as year-over-year enforcement trends and seasonality would support proactive program/service management.

From an executive perspective, managing and planning for a longer time horizon (e.g., 12 to 36 months) can be a real challenge when working with ad hoc and disparate data. For instance, the Chief Engineer reported that with better access to 311 data, his team would be able to analyze trends and spot issues or adopt a more proactive approach. Integrated information at a strategic level can enable executives to monitor and understand the City progress towards strategic priorities without the delays and the staff resources required to work with fragmented data.

Opportunity
Efficient and timely access to an integrated view of City's information

Anticipated Efficiencies
Reduced manual effort to generate reporting and to support executive decision-making. Expedited process in coordinating information exchange.

3rd Party Information Systems

The City's functioning is not limited to working with internal information systems and data. There are a number of service areas where the City is reliant on 3rd party information systems for service planning, delivery and reporting. To name a few, Provincial Offences uses ICON provided by the

Ministry and manages offense data through another software. A secondary system called CAMS (supported by Region of Niagara and soon to be a private 3rd party) manages a more detailed dataset related to the ICON database for the City of Windsor and other municipalities with some reporting for case tracking.

Childcare programs use the provincial CCMS; Ontario Works operates on SAMS; Long-term care uses RAI-MDS; and the City works with transfer payment agencies using TPON.

When working with 3rd party information systems, access to information can be more challenging than otherwise. Typically, these information systems provide the ability to produce standardized reporting for use; however, any changes to system features, creating custom reports, or integrating information with other information systems that the City owns can be limited.

Business Intelligence

Many staff envision a future where Business Intelligence capability can bring significant value in managing the City's various portfolios much more strategically, once the foundational challenges of working with City's data are addressed.

An area of focus is leveraging externally available data to inform strategic decision making. For instance, it was reported that a greater understanding of the marketplace would help departments to issue procurement more strategically. The scope of intelligence would include who is bidding on construction projects in the nearby regions as this would give the City an idea of the reasonable market price and plan accordingly. The marketplace information can come in structured or unstructured data from commonly used procurement portals such as Merx, Biddingo or Bids and Tenders. Market data on pricing fluctuations throughout the different seasons (e.g., for construction projects) can inform when procurements can strategically take place. In other areas, GIS data on poverty, social risks, etc. can be effectively used to support social and community program planning and to deliver programs in a much more targeted and impactful manner.

As the use of information becomes more integrated across systems, the ability to carry out Analytics projects, develop models, and optimize targets, becomes possible. The analytics capabilities would allow the City to (for example):

- Predict tender pricing better (historical/predictive)
- Climate impact/Flooding impacts (weather, property impact, health impact)
- Staffing optimization (right staffing for predicted workloads)
- Staffing Life Cycle (HR propensities)
- Citizen Life Cycle – understanding the changing needs of the City's population.

Another area where greater analytics capability would help is in proactively coordinating efforts and managing risks in Asset Planning. Modeling on how assets will perform based on different funding levels or modelling the cost of operating vs. asset replacement would allow the department to plan and prioritize proactively. In addition, there is also potential to integrate internal data on asset conditions with external data such as weather/climate trends to enable predictive analytics and be proactive in asset management activities.

Opportunity
Leverage both internal and external data to provide business intelligence and predictive data analytics

Anticipated Efficiencies
Capturing and integrating external market data can support cost-effective procurement decisions. Integrating external data sources can also enable the City to be more targeted at preventive asset maintenance to reduce unexpected costs.

Service Delivery

It is evident to see that, through improvements mentioned in this section, the City's ability to deliver enhanced services would improve. Many reported barriers to service delivery improvement are internal in nature including a lack of access to information or disparate information mentioned elsewhere in this section. It is expected that addressing these internal challenges would directly translate to greater responsiveness to public complaints or inquiries, reducing the duplication of effort, and creating a cohesive customer experience for the public.

There are additional opportunities to further enhanced service delivery based on the smaller-scale project that the City has already implemented. It is noted that the City's approach to working with the public as a key partner in service delivery is a best practice. As a partner, the public has the ability to self-serve (e.g., 311 Online) which enables the public to submit information to the City at a time and place that is convenient for them, a true client-orientation approach. This facilitates civic participation and reduces the City's resources required to engage the public. The self-serving feature in ActiveNet is another example of this. Additional opportunities to enable the public to self-serve would further these benefits.

Although young in its maturity, the MyWindsor program is an example. The idea of providing online services for residents with an account gives the City the opportunity to build a profile of each resident and understand what's important to that resident. Through analytics and artificial intelligence, the online "self-service" model will improve. Discussions to bring Active into the MyWindsor framework have begun, which is the goal for all of the City's public facing hosted applications.

As the City's data analytics capabilities improve and business intelligence opportunities are explored, there are opportunities to pre-emptively act on matters or to make plans before negative downstream impacts take place avoiding negative service experience for the public. As an example, a single view of an individual of the public can allow a comprehensive service experience (e.g., checking in on the status of a 311 complaint when the individual is contacting the City for another matter). The ability to pre-emptively act on matters before issues materialize (e.g., preventative maintenance, where appropriate), along with the appropriate public communications, can create the appreciation of excellence in public service delivery.

Opportunity
Leverage leading edge technology to further provide opportunities for self-serve functions to the public

Business Processes

This section is broken into two areas:

- Manual processes
- Process review

Manual Processes

A common reported challenge is the amount of time HR staff spend on transactional activities that creates a gap in the operational capacity to fully realize the value of existing investments in information systems and information technology. As an example, there are features in PeopleSoft that are available to the Human Resources departments but are not utilized due to the limited operational capacity. This is supported by the reported level of manual data tracking and manual reporting using spreadsheets. An example is the accident and incident reporting that is done manually and is paper based. There have been discussions to shift this into a SharePoint team. During Ministry of Labour inspections, workplace injury related inquiries require a manual search and typically consume 1 FTE a full day to complete the request.

Additionally, working with disparate HR data from multiple or paper-based sources consumes more HR staff time. A prime example is the health and safety records which do not sit centrally within Human Resources; therefore, it is challenging for the direct supervisors/managers to review any accommodation needed or to determine the most appropriate staff assignment to tasks, on a day-to-day level. In addition, while Collective Agreements (CA's) are online, supplementary Memoranda of Agreement (MOA's) are paper based in binders. Some departments reported that they need to look at the MOA every day to make staffing decisions; accessing paper-based files consumes valuable staff time especially when it usually is the direct supervisor/manager making staffing decisions. In addition, there might be a gap when people with a MOA transfer from one department to another and the information isn't transferred. Additionally, because MOAs are paper based, the process to get MOAs approved and signed reportedly can take weeks.

There are examples of the City utilizing SharePoint to support workflow management and automation to remove the coordinating activities that are transactional in nature (e.g., solutions implemented by the Purchasing department). Another example of addressing this challenge is the implementation of a Workforce Management System that will remove the manual data validation step. The level of convergence on this reported challenge suggests a significant improvement in operations if adopted. Additionally, the ability to access integrated data to support progress monitoring, reporting and decision-making can also greatly reduce the amount of staff time spent on coordinating activities that are transactional in nature. Resolving these operational bottlenecks can allow staff to focus their efforts on higher-value or strategically oriented matters.

Opportunity

Push reporting and notification on integrated reporting to reduce staff effort on transactional activities

Anticipated Efficiencies

Reduction in staff effort on transactional, paper-based, and manual activities can result in greater operational efficiencies on the day-to-day level.

Process Review

A significant number of inefficient processes were identified during the project. Some of these appear to be based on procedures that are not reflective to today's operating environment and may be amenable to streamlining with business process analysis and revised guidelines. These procedures were developed using an enterprise risk management approach. The purpose behind some of the procedures are not fully understood by staff and are seen as barriers to greater public service efficiency and effectiveness. One example that takes considerable staff time is the unique approval process for rental of Festival Plaza. Unlike other rentals of City facilities, a special report and approvals process is required for this facility.

Opportunity

Review risk tolerance level at the enterprise level and align procedures to the resulting risk assessment.

Anticipated Efficiencies

Aligning mandated procedures with the up-to-date risk tolerance level can result in enterprise-wide improvement on operational efficiencies when unnecessary controls are eliminated.

Impact of Digitization

The Purchasing Department is responsible for approximately $400M in purchasing for the City and its agencies and boards as it supports purchasing over $5,000 in value. The Purchasing Department oversees everything from the needs assessment to executing the contract. They also centralized the way the contracts are managed in collaboration with the department. It serves as a good example of the impact digitization of processes and information can bring to the City. Recent efforts in the last five years to digitize and automate many purchasing activities (e.g., contract signing, delegation of authority, etc.) have significantly impacted the contract processing time from 90 days down to 7 days. These improvements also significantly improved the department's ability to extract valuable analytics. The objectives achieved in Purchasing serve as examples of workflow management and digitization that can be implemented elsewhere within the City.

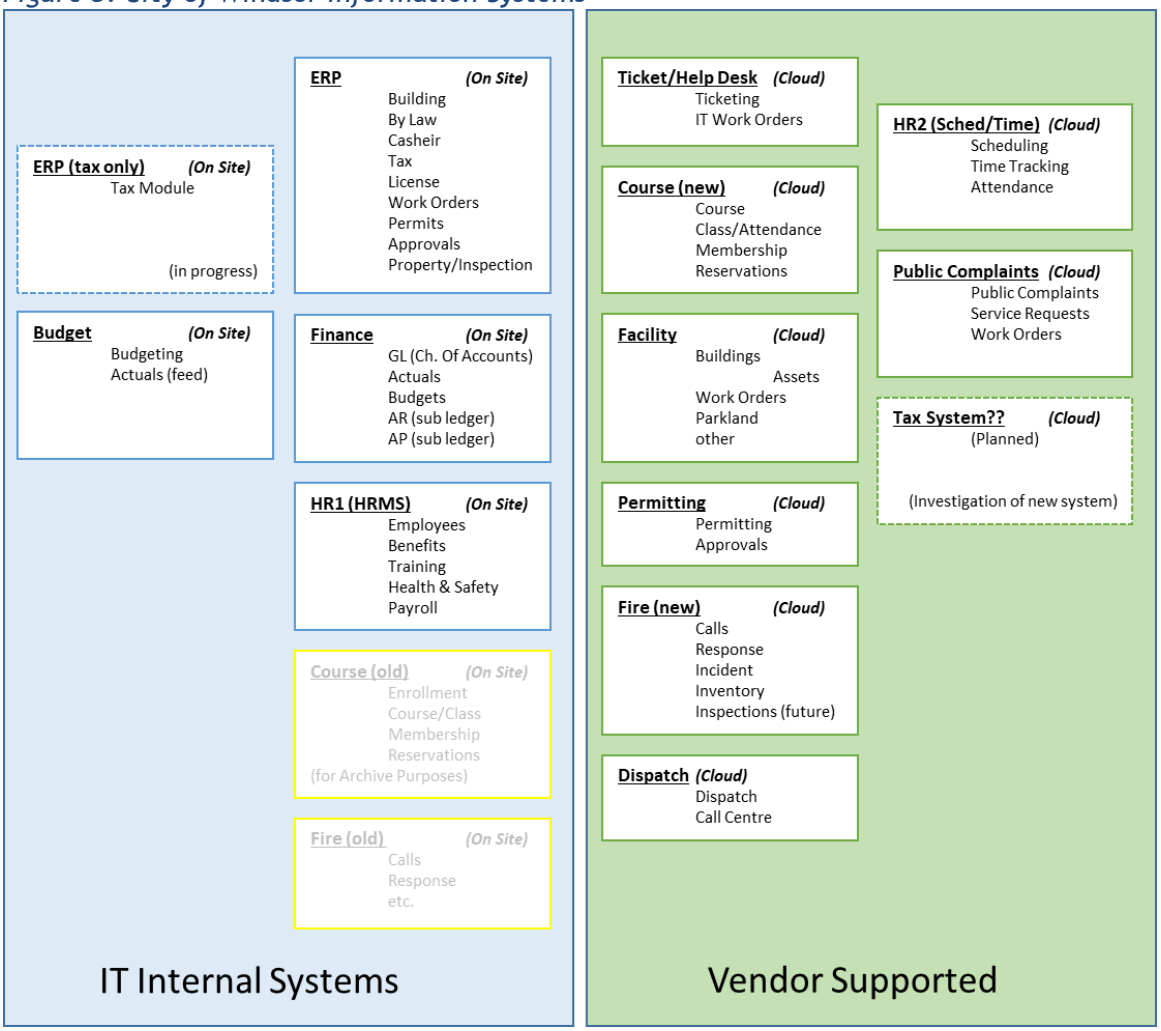
The next area within Purchasing is to address the tendering process. It is reported that the tendering process continues to use Excel spreadsheets as the primary management tool; in addition, there continue to be manual processes to support tendering. As a result of the manual and fragmented process, the ability to report on tendering (e.g., comparison of the result tender against cost) is limited.

Summary of Information Access

A list of authoritative data sources was provided by the City and is included in Appendix A for reference. Figure 3 shows the core systems used by the City and the various subjects that they provide, collect and manage information on. These systems include "Cloud" based applications, which are supported by the requisite vendor, and "On Premises" systems support primarily by the IT department. The overall architecture includes central "Enterprise" applications that provide an integrated suite of services/subject areas, and, more distributed, singular applications. The later

includes some cloud base solutions including 311 and Development Services, which increase the need for integration of disparate systems.

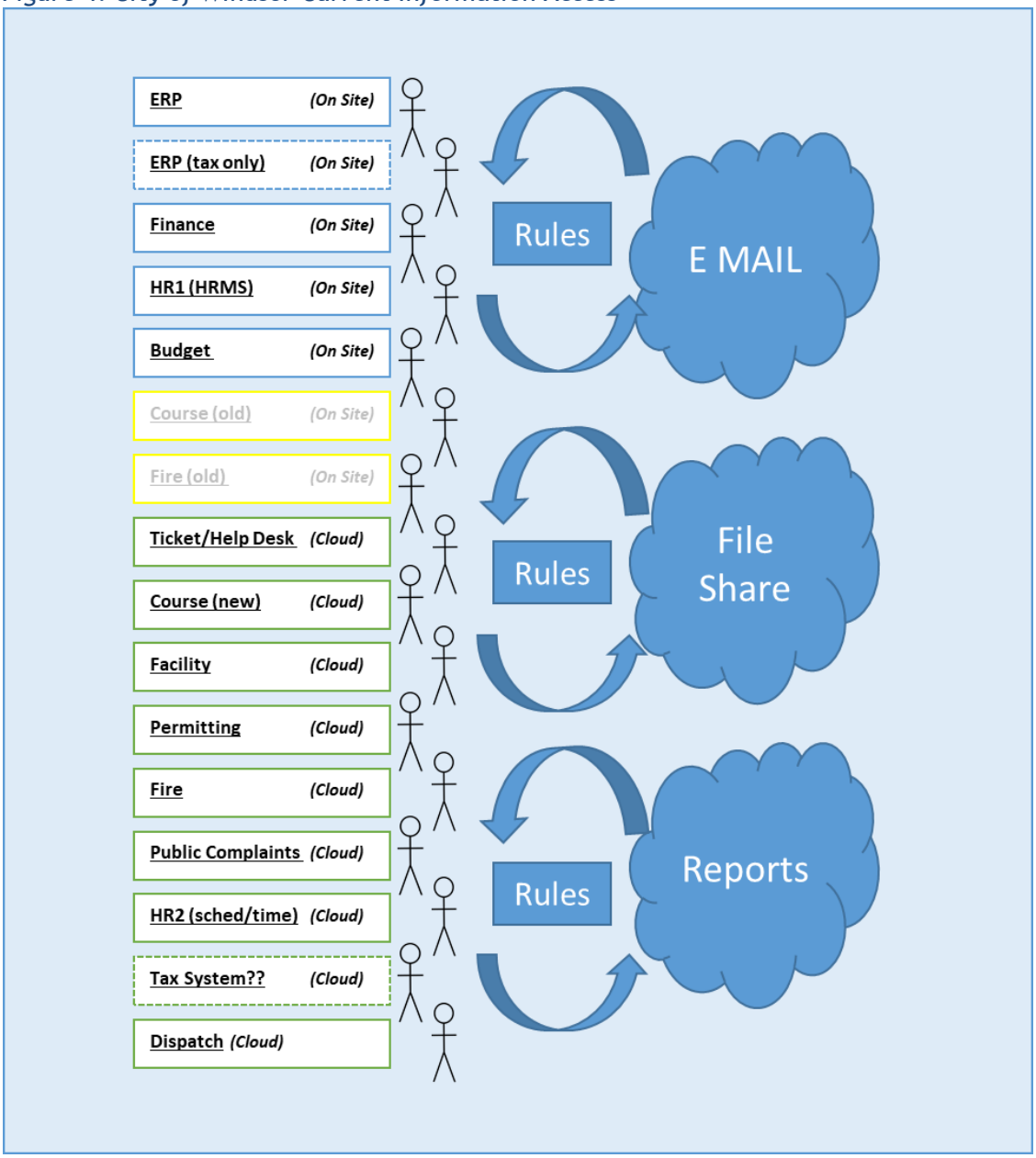
Figure 3: City of Windsor Information Systems



Each system provides data access, reporting and/or information delivery options that are specific to the technology and/or platform. Although access to information assets requires knowledge and understanding of most source system, in most cases information is used across many business units. In many cases this means that data access is via knowledgeable staff (experts).

Figure 4 below shows how high-level enterprise data access is currently handled. In general, reporting on each data source is handled by a 'local' team that generates data extracts and/or reports on a regular schedule (daily/weekly/monthly/quarterly/annual) for use in operations (i.e. outstanding events/work orders) and management (budget vs actuals). Distribution of data is through standard communications channels including e-mail, shared folders, and/or physical documents. In the case of financial reporting, expertise is distributed into business units, with each area having a financial analyst assigned. Other systems provide a centralized reporting scenario with a single individual and/or group providing all reporting.

Figure 4: City of Windsor Current Information Access



Opportunities Summary

The following table summarizes the opportunities identified in key information consultations with each department.

Corporate Areas							
Areas of Opportunity	Transportation Services	Parks, Recreation, Culture and Facilities	Finance & Technology	Environmental Protection & Infrastructure Services	Social Development and Health	Public Engagement and Human Services	Public Safety & Economic Development
Recruitment		✓	✓	✓	✓	✓	✓
Talent Management		✓				✓	✓
Information Management and Reporting	✓	✓	✓	✓	✓	✓	✓
Service Delivery	✓	✓			✓	✓	
Business Processes		✓	✓	✓	✓	✓	✓

Potential Opportunities

Although various improvement areas have been identified in the study, some specific actionable opportunities can also be identified. These targeted solutions are based on un-audited feedback from interviews, and are conceptual solutions at this point. These are provided as examples of how to achieve overall gains in process/technology efficiencies, as discussed elsewhere.

In general, the IT spending of Windsor is below the norm; however, this can be misleading, as many departments contain 'shadow IT' staff that provide local technical support, to both the immediate group, as well as, other departments within the City. This leads to opportunities for resource alignment like:

- More senior staff carrying functions and processes that can be completed by lower cost alternatives (e.g., automation). An example of this would be managers developing reports, extracting data, and pulling data together from multiple sources into a single data set for analysis, when the outcome needed is the analysis itself.
- Staff dedicated to information management within departments to help provide/extract/merge data for managers. This can provide duplicate staffing across multiple departments carrying out the same functions.
- Technical staffing of data management processes. In this case highly technical staff, such as DBAs, Analysts, or sometimes Business Subject Matter Experts, are processing data for

reporting/analysis. In some cases, systems support staff are allocated to extracting data/report development.

Capitalizing on these opportunities can lead to addressing both duplication of efforts, as well as, a proliferation of manual processes that could provide efficiency savings and/or cost avoidance if data analytics and reporting were both centralized and automated. The process improvements would allow staff to focus on higher value activities such as providing more in depth analytics and less time on data gathering; leading to business improvements, better service, and potential efficiency savings and/or cost avoidance.

A summary of the estimated value associated with each project is listed below:

Use Case	*Improvements*	*Savings*	*Description*
Financial Reporting	Automate reporting and processing	40 to 50	weeks of effort reduction for other tasks
	Self Service - save manager efforts	50 to 70	weeks of effort reduction for other tasks
Transit Self Service	Centralized reporting/ Self Service	40 to 52	weeks reduction (One (1) less staff required)
Bylaw Self Service	Automated data extraction & history	4 to 8	weeks of effort reduction for other tasks
	Automated email processing	40 to 52	weeks of effort reduction for other tasks
"311" Dashboard & Reporting	Automated extract and self service	10 to 25	weeks of effort reduction (10 mgrs)
		10 to 26	weeks of effort reduced (0.5 persons)
	Advanced Analytics		Better Citizen service
HR Dashboard	Consolidated view of HR data	60 to 120	weeks of effort reduction
		254 to 403	weeks

Each case is reviewed in terms of current and future operational modes, and a quantification of expected outcomes.

Financial Reporting

Current Process

Financial reporting and analysis for most departments is carried out by FPAs. This includes monthly/regular reporting, as well as, ad hoc requests. The FPAs apply manual changes/adjustments to the extracted data, and provided formatted/Excel reports to the users.

Future Process

In a centralized reporting model for Business Intelligence, the regular reporting cycles can be automated in term of data extraction, and period end adjustments can be applied either at the accounting, or at processing level. The information would be available to end users in a self-service capacity so that they can access, analyze, and report when needed without intermediate assistance.

Intra-period reporting can be accomplished by extracting un-adjusted information on a daily basis, along with budget comparisons, for user self-service reporting.

Expected Outcomes

- Automated processes
  FPA efforts (up to 1 staff equivalent) could be utilized for other analysis as users are empowered by self-service access to information, based on 10% utilization for reporting.
- Management Efficiency
  Managers (up to 15) would be able to access information faster, make better decisions, and do analysis faster. This could save up to 1 to 2 days of effort per month per manager.
- Other Benefits Include:
  - Daily access to financial data – providing operational insights to improve decision support.
  - Self-service analytic studies – the ability to access financial information for studies/analysis in support of projects, grants, etc.

Transit Self-Service

Current Process
New transit systems have provided a rich data environment, and information has been used to support analysis, ridership analytics. The transit group has been providing ridership analysis to client organization such as school boards and universities. They also use analytics internally for planning and managing routes. Currently these analyses are done manually, based on data extracted from the source systems. Two staff in the transit area carry out this work.

The transit requirements, and client requests, are expected to increase significantly over the next few years and the current manual process will be/is overloaded.

Future Process
In a centralized reporting model, data will be extracted and made available for reporting through automated processing. User will be able to access historical and current data about usage and ridership. Client access to usage can also be provided through external portal (NOTE: Because Transit Windsor uses third party software, it may not be possible to automate this process if their software vendor does not provide an easy or cost-effective data extraction option.)

Expected Outcomes

- Automation Processes
  Reporting would be handled by dedicated system/team reducing future analytics support of potentially 2 to 3 staff (savings of one (1) additional staff).

Bylaw Self-Service

Current Process
Data extracts are received by email, daily, and are processed into an Excel workbook for review and dissemination. The results are used to assess performance workload, and staff assignments. Also, the final task of enforcement officers is to contact the originator about the resolution. This is done primarily by phone.

Future Process
In a centralized reporting model, automated data extracts are prepared and loaded for reporting and ad hoc analysis, including historical data. With self-service access, users would be able to access information immediately, and directly. This allows better analytics, including trending, to support operations, special studies, and management reporting.

Integration and alerting, would allow an automated message to be send to originator with details on the steps taken, resolution provided, and contact information if follow up is required.

Expected Outcomes

- Automated data preparation
  Up to 1 hours of time per day can be saved by this process and reliance on individual staff for data generation would be reduced.
- Automated Closure Email
  Close to 15,000 incidences will be investigated in 2019, and the total workload is rising each year. This could eliminate 7.5 minutes of time, per incident. This excludes some cases where contact is required for clarification and other reasons.

"311" Dashboard & Reporting

Current Process
The “311” system collects information and provides access to operations users. The system is also integrated with some work order/enforcement systems for some incidents. Data extracts are provided to the open data initiatives. Ad hoc requests are provided by a support resource when requested.

Future Process
In a centralized reporting model, data extracts can be automatically stored and self-service interface provided to users.

Expected Outcomes

- Automation and Self-service
  reporting support can be handled by central group reducing 0.5 FTE. As the “311” system provides analysis and resources to many groups in the City, using Business Intelligence tools to automate collection, management of history, and analysis of the data will reduce the manual workload of the application group.
- Self-service and Dashboards
  Managers efforts to reduce effort to extract, analyze and review data. This would save potentially 1 day per month for up to 10 managers/users. By having access directly to data for analytics purposes, managers would not have to rely on manual data requests/fulfillment processes.

HR Dashboard

A number of initiatives have been implemented (or are in progress) for improving HR information management at the City. This includes WFM for scheduling improvement and time tracking; JazzHR for recruitment automation; and, Employee Self-Service.

There are a number of sources of HR information, files and data for specific purposes. A centralized view of all HR will help match needs with allocation, understand trends and predict needs, and ensure correct resource allocation. In discussions with some business groups this would improve the efficiency and time taken to complete management/staffing tasks. Some examples are:

- Staffing allocation
  for part-time instructors, having schedule information, and course enrollment in a single view will help automate management of staffing/demand levels.

- Staffing allocation
  having historical work levels and trending can provide insights to future needs and better support projected staffing planning.
- Off Time Analysis
  historical analysis of off-time (sick days etc.) to better understand trends/patterns to evaluate behavior.
- Contract Compliance
  provide a single source to understand contract obligations, and staffing schedules can reduce management time in planning, and in potential grievance analysis/reviews.

Expected Outcomes:

- Staff Assignment improvements
  With self-service access to data coupled with advanced analytics capability better resource assignment can reduce overstaffing in some areas. We can expect that up to 10 staff days per month could be saved in up to 5 groups (or 50 days per month). This would be a combination of both staff assignment better alignment with workload, and management time for analysis/planning.

Pilot Overview

The City of Windsor (the City) embarked on a project with the support of the Provincial Audit and Accountability Fund to identify improvements in how it handles, manages, organizes, and utilizes data. One component of the proposed solution was an Information Management and Data Analytics Assessment

In order to help illustrate the functionality and value of this strategy, demonstrations and pilot project are proposed for The City of Windsor that could span the following scenarios:

- Internal
  - An HR based analytical system would aid internal performance for ALL departments
- External
  - A 311 based analytical system would aid services driving performance improvement and citizen satisfaction
- Business Process Automation
  - BPA would support improved business flow and enhanced services in existing systems by quickly adding needed functionality

These examples would illustrate Business Intelligence and Business Process Automation integration proposed in the Opportunities Summary.

Human Resources

Discussion with management of the department provided insights for the current needs of the HR department predominately regarding job fulfillment.

The proposed BI functionality for this line of business (potentially used by all departments) would entail capability based on their input and additional HR capability IBI has experienced as value added in other business organizations:

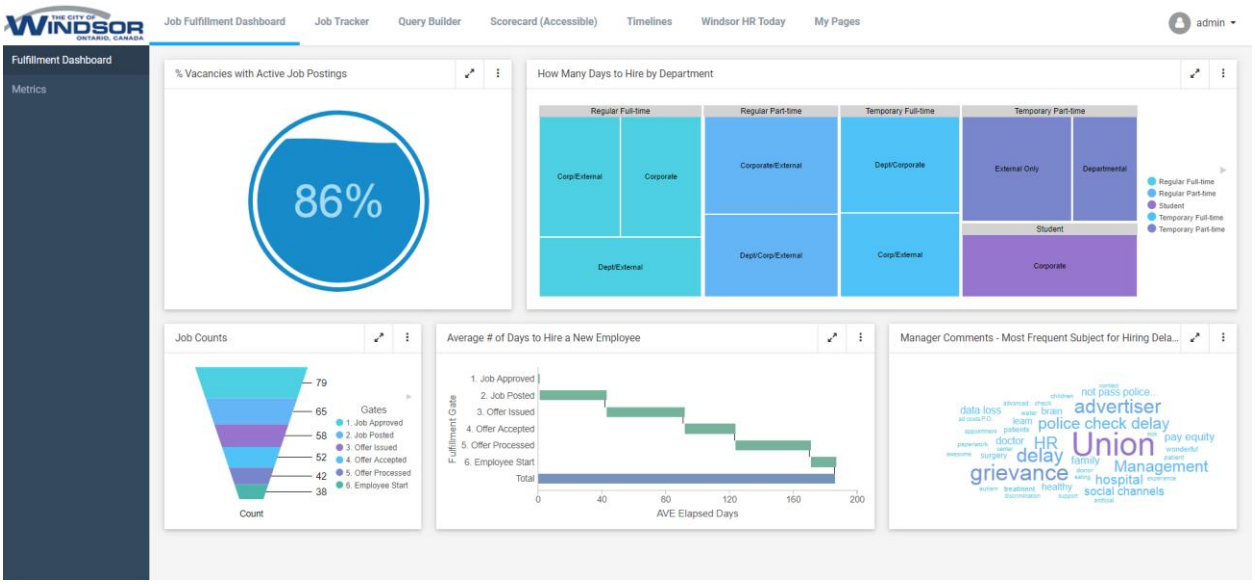
Job fulfillment metrics:

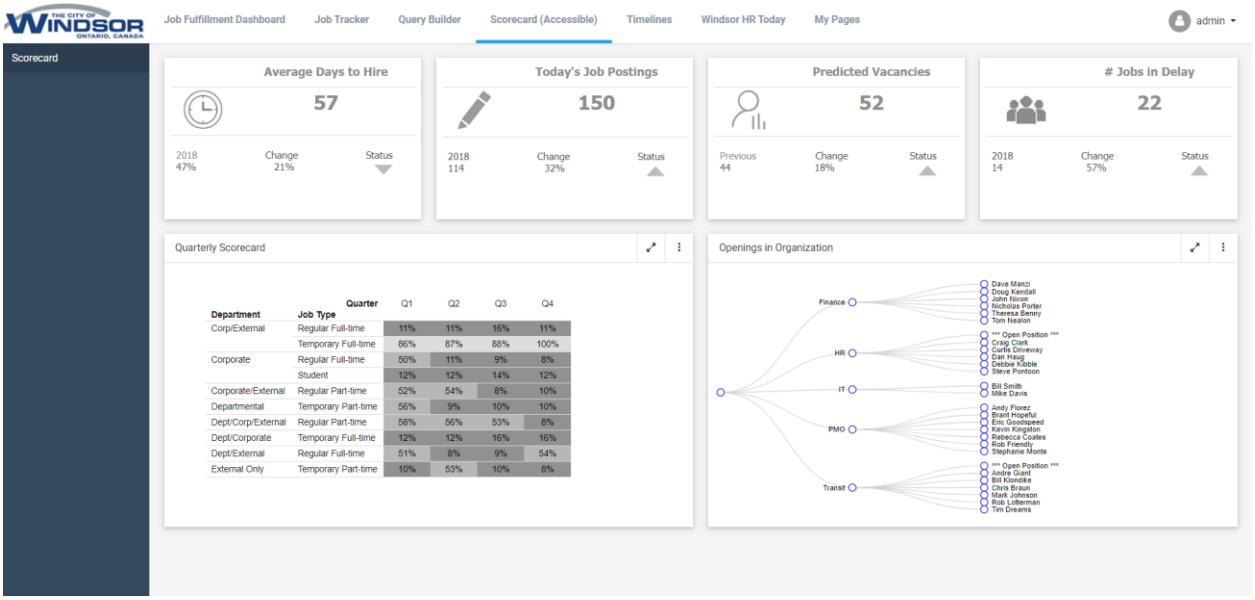
- Date position created, filled, postponed, etc.
- Progress through the fulfillment 'gates'
- Trends by dimension over timeframes
- Current next-step by person/department ("Who's court is the ball in?")

Additional HR capability

- Top/Bottom *n* reports (i.e. Top 10, Bottom 5, etc.)
  - By Department, timeframe, status, etc.
- Alerts and broadcasts ('Pushed' information)
  - Weekly/Monthly status reports delivered
  - Alert emails to inform personnel of situations requiring attention
    - Provide portable analytical documents to support action
- Predicted vacancy and hiring
  - Issues based on forthcoming retirement trends driving proactive effort
- TBD based on data availability
  - Salary based Analysis
  - Population trends
  - Workforce specialization requirements
  - Geographical and situational analysis

Example HR dashboards IBI would demonstrate:





Department	Job Type	Quarter	Q1	Q2	Q3	Q4
Corp/External	Regular Full-time		11%	11%	16%	11%
	Temporary Full-time		86%	87%	86%	100%
Corporate	Regular Full-time		50%	11%	9%	8%
	Student		12%	12%	14%	12%
Corporate/External	Regular Part-time		52%	54%	8%	10%
Departmental	Temporary Part-time		56%	9%	10%	10%
Dept/Corp/External	Regular Part-time		58%	56%	53%	8%
Dept/Corporate	Temporary Full-time		12%	12%	16%	16%
Dept/External	Regular Full-time		51%	8%	9%	54%
External Only	Temporary Part-time		10%	53%	10%	8%

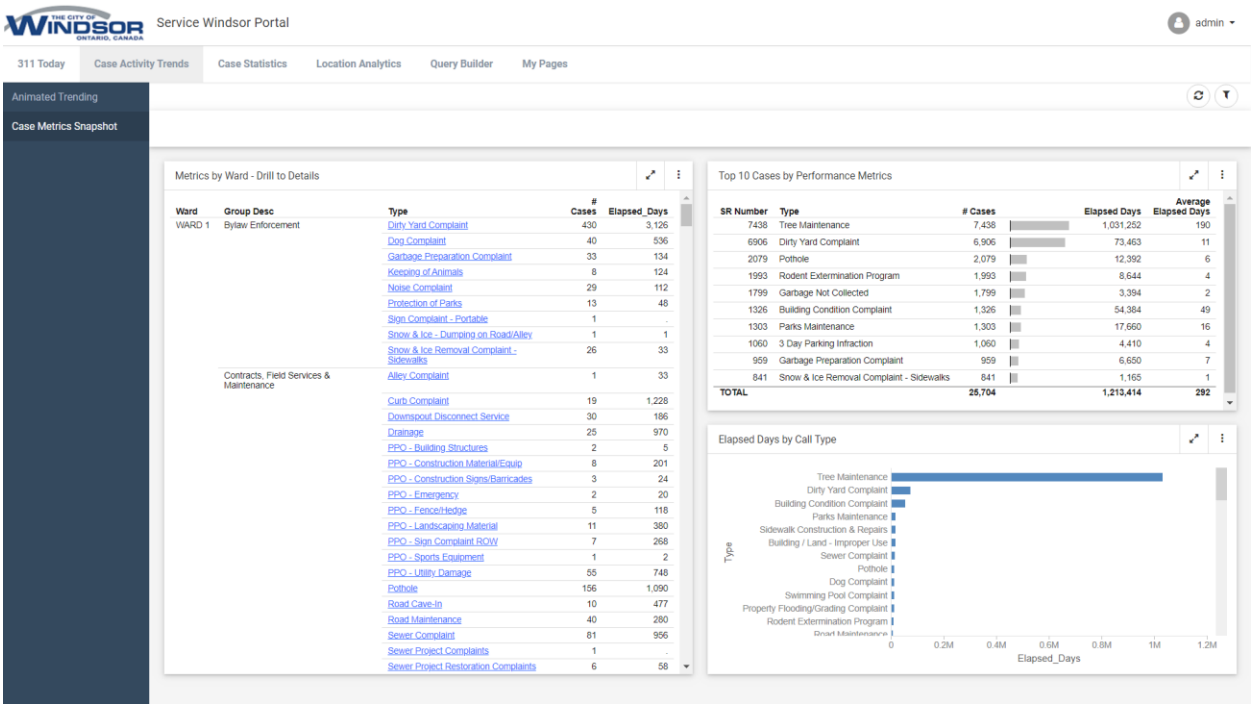
311- Service Windsor

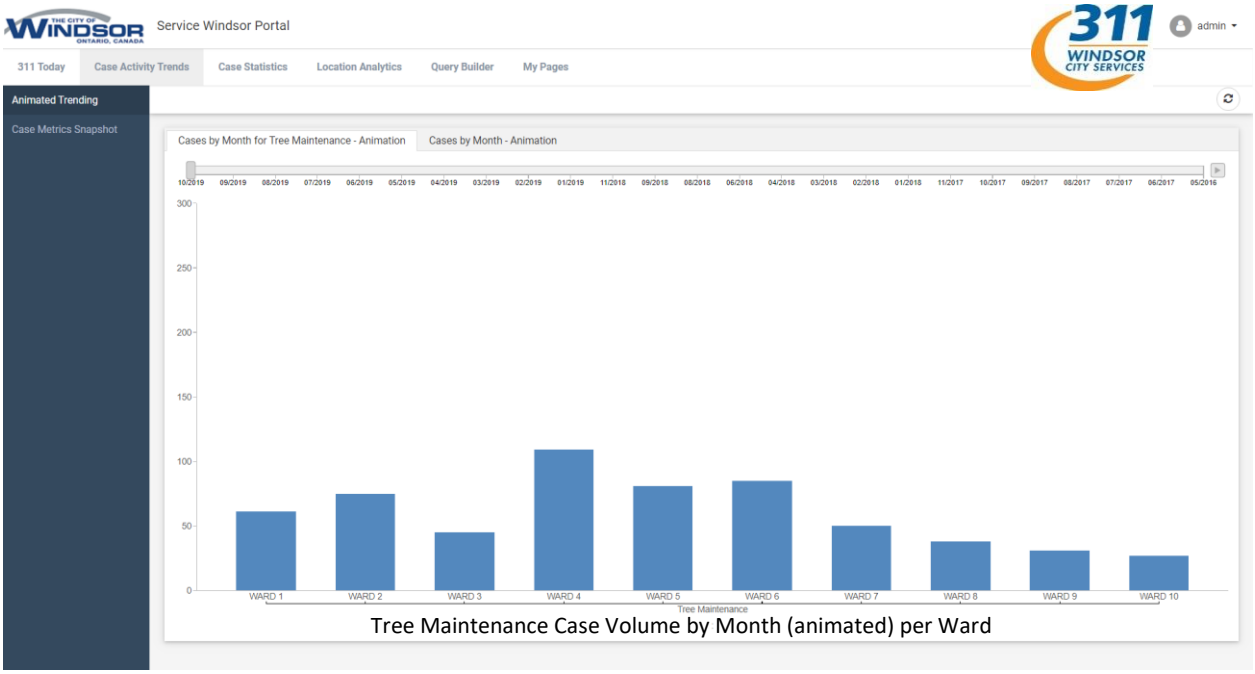
Discussion with relevant managers provided insights for the current needs of the 311 department. They also provided data to support a realistic 311 based analytical pilot.

The proposed BI functionality for this line of business (used by councilors, all departments, and potentially citizens and media) would potentially entail:

- Time based metrics:
    - Peaks and troughs of cases by timeframe
    - Time to respond. Time to close
    - SLA compliance
- Geographical Analysis
    - Wards
    - Route optimization
        - Fuel savings
        - Service personnel productivity via clustered location of case
- Complaints
    - Who, Why, When….
    - Resolution analysis
- External data analysis
    - Weather
    - Social channels
        - Sentiment of Windsor citizens
- Survey/Website activity/Voting analysis
- Predictive Analysis
    - What's coming down the pike?
        - E.g. Workforce adjustments based on historical trends

Examples of 311 Service Windsor dashboards IBI would demonstrate





Tree Maintenance Case Volume by Month (animated) per Ward

Automatic Customer Notification via BPA Integration – 311 and Permits

Discussions with personnel have identified a potential BPA pilot for Integration of processes in the Amanda system that would deliver automatic customer notification informing the City's customers of case status, which is typically done manually today (if at all)

- BPA would address the "It's taking too long" perception by the customers and also give informative case updates. Incomplete information would be detected and notifications would be 'pushed' to permit's customers via email proactively. Also, citizens could receive email notification of 311 case status (especially case closure) giving enhanced service deliveries. There is no service to inform the customers currently. Automatic Customer Notification is proposed for the BPA pilot project

Additional area of improvement uncovered:

- An area for BI Integration would regard the financial aspects of Permits. With the integration of the Permit and Financial data delivered via dashboards, reports and alerts, Analysts would be able to determine, for example, financial status and take action regarding Budget and Actual conditions. Current, predicted and trending based decisions would support healthy operations, tax-based decisions and other financial undertakings within The City of Windsor. This scenario is not proposed as a pilot project

By-Law Enforcement

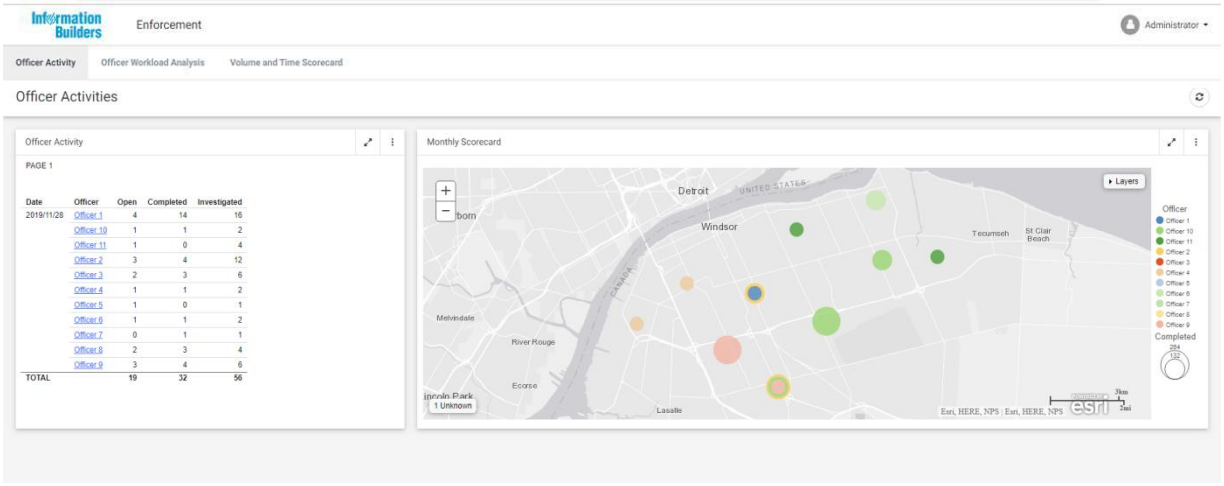
Discussions with By-Law enforcement personnel have identified a potential Business Intelligence pilot. We propose the automation of the daily report manually compiled by the by-law enforcement group that provides data for:

Ward	Total RFS	# ready for review	Signs	Over due by 2 months	New RFS	completed	investigated

This would illustrate the integration of data into the report and automatic broadcast to the user community.

Additionally, an example dashboard would illustrate analytical insights for By-Law Enforcement performance. IBI can leverage strong experience here as we have another Ontario city that has developed and deployed a comprehensive By-Law Enforcement system via our partnership

Examples of Enforcement Dashboards:

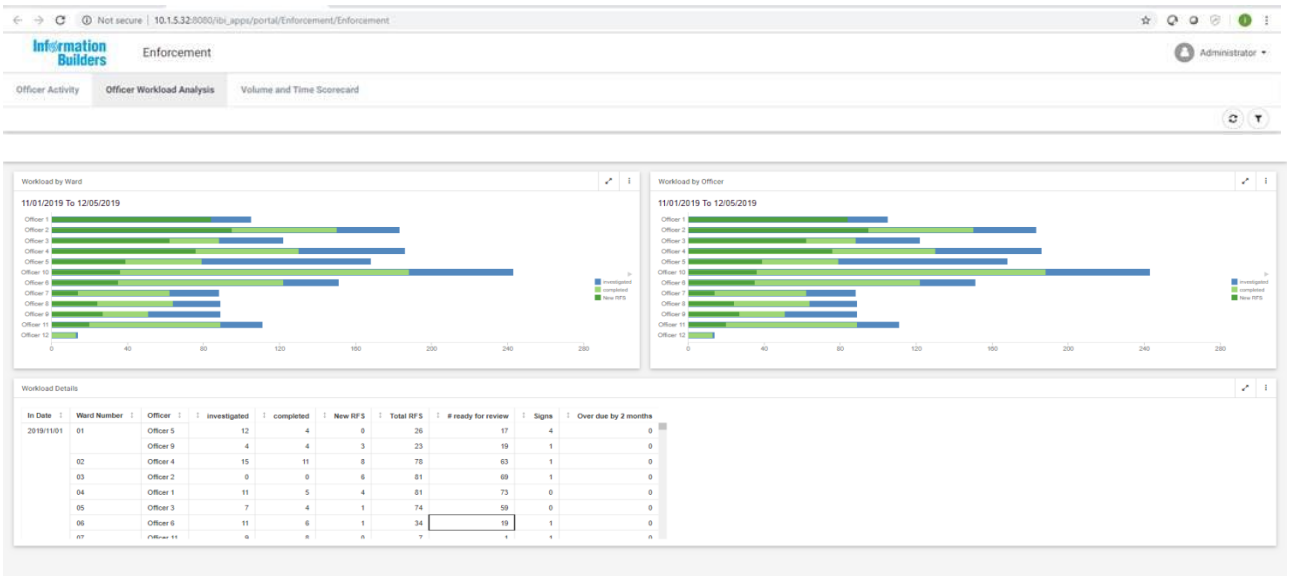


Drill by Officer

PAGE 1

Date	Officer	Folder Sequence	Folder Type	Address	Open	Completed	Investigated
2019/11/28	Officer Name	226599	VB	Address 1	0	0	1
		227216	DO	Address 2	0	1	1
		229842	DO	Address 3	1	1	1
		229909	DO	Address 4	1	1	1
TOTAL					**2**	**3**	**4**

Officer Workload



Technical Setup

IBI has installed and enabled the latest release of WebFOCUS and iWay Software in The City of Windsor IT environment and to facilitate onsite demonstrations and ‘hands-on’ experience

We would like to acknowledge the excellent help and support provided by Marnie Pastovich throughout this project

Recommendations

The findings from the study indicate the potential for significant benefits to the City and its residents with a combination of business and technology strategies. The two go hand in hand and are needed to support each other. Effective investment in and use of technology depends on clear business goals.

In 2015, the City began the shift from managing constraint to planning for the future with the development of a Strategic Vision[7] along with the recent 2019 Strategic Planning exercise undertaken by City Council to reaffirm key strategic objectives.

The effective use of data is a key element of any organization's business strategy. An integrated information management strategy will ensure that the City avoids investment in fragmented technology solutions and leverages the benefits of integrated access to data across the enterprise. The Information Management strategy[8] that was developed by the City administration in 2015 contains many elements that still apply today and should be refreshed based on the findings and recommendations in this report.

The 20-Year Strategic Vision proposed a "corporate view of data" and the proposed new information management strategy addresses this. Currently many departments have had to manage data in silos with direct access only to their own data, necessitating special requests (and additional work) to access data outside their department. In some cases, staff reported that they are not aware of what other data is available that might help them manage more effectively.

Information Management Strategy

The current information management strategy as described above has led to a number of barriers to information delivery, management, and timeliness that will be addressed by the proposed information management strategy. There are two main elements to the proposed updated information management strategy:

- Creation of a business intelligence and analytics architecture,
- Supported by a Business Intelligence Centre of Excellence (BI CoE).

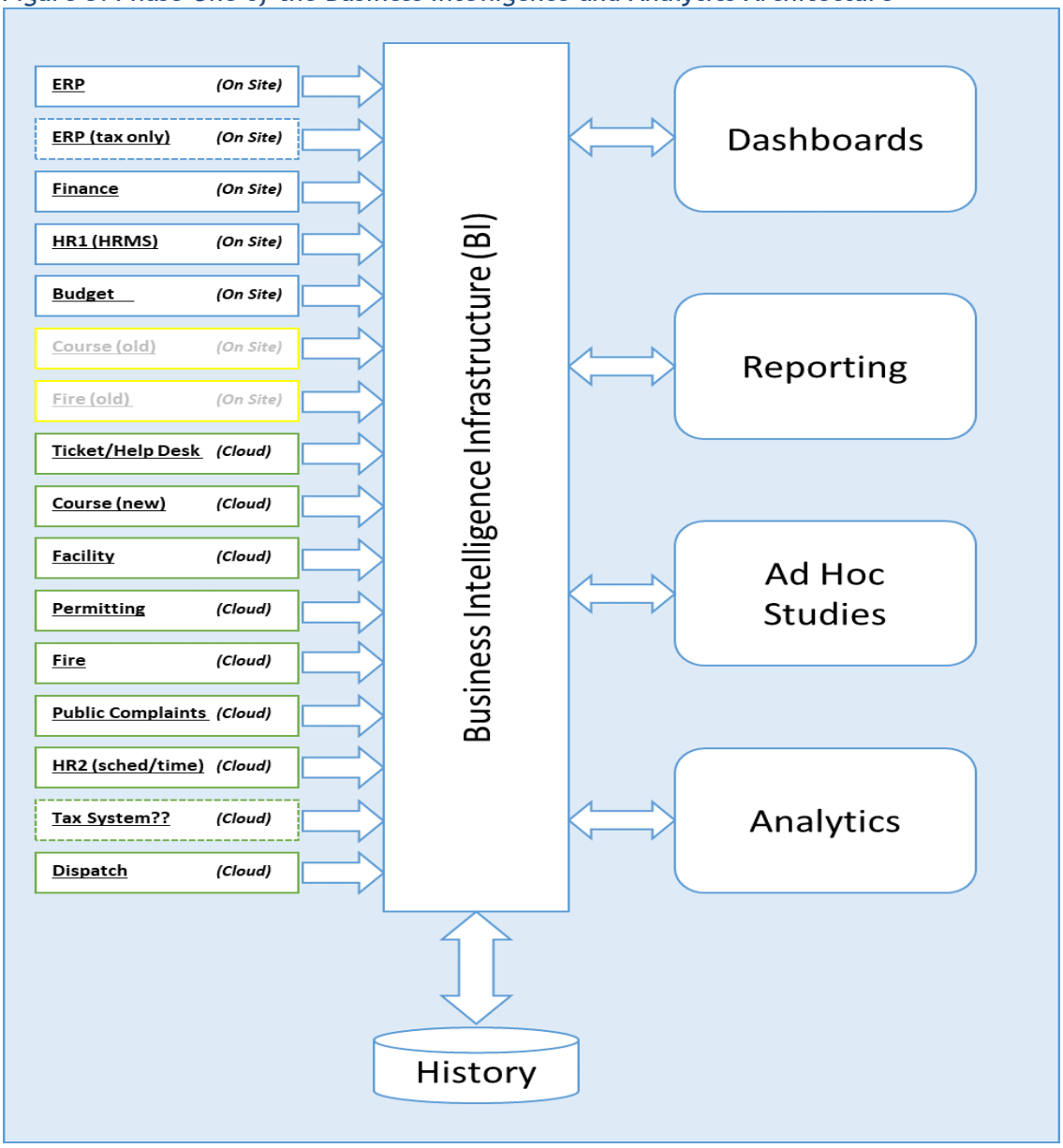
[7] 20-Year Strategic Vision, City of Windsor, 2015

[8] Information Management Strategy, City of Windsor, July 2015.

Business Intelligence and Analytics Architecture

The proposed business intelligence and analytics architecture would transition the City from the current siloed applications to an architecture that facilities improved access to data and ability to leverage it for benefits to the residents and the Corporation. Figure 5 below illustrates the first phase of transition to integrated use of existing data and technology assets.

Figure 5: Phase One of the Business Intelligence and Analytics Architecture



Phase 1 – Business Intelligence Infrastructure – Information Access Layer

Phase 1 of the implementation can happen in the early stages of implementation of a BI CoE and is designed to provide a single layer of information access to the entire data catalog of the City. The Best Practice to implementation of this layer is to build up the integrated catalog of data via numerous small projects (or Agile Sprints). This allows incremental improvements, with demonstrated value after each step.

In this case, the BI team would connect, ingest, and disseminate data from individual sources, such as 311 and Workforce applications. As each project is completed, the catalog of data would be available to enhance delivery of other projects, as well as, provide Ad Hoc analysis for analytics projects, and studies.

The selection process for each project (or Sprint) would be based on three criteria:

- ***Speed***: is the objective simple and concise enough to be delivered in a short period. Typical BI projects should be scoped to deliver value in 3 to 12 weeks. Larger projects should be divided into smaller delivery cycles to ensure scope is focused and deliverable.
- ***Data***: is the data available and is it of 'good' quality. In many cases, business needs require access to information that is either not available, or not complete.
- ***Need***: what value will the project bring to the business users. It is important to make sure the outcome will be of high value to ensure adoption.

Potential specific opportunities that could be completed in phase 1 include:

311 Dashboard – "Voice of the Citizen"

Opportunity	Provide dashboard summarizing current '311' tasks, as well as, historical trending.
Description	Help individual departments understand the demands, trends, and success of their department in servicing the Citizens. Also, provide an overall view to "top priorities", trends, and analytics (predictive/future).
Organization	All Departments, Management, Councilors
Data Sources	311 data
Sprint Description	Extract data updates nightly from source system Develop a data mart to store historical information across ticket types Design/Develop initial dashboard Provide Ad Hoc access to 311 data

Financial Budget/Variance dashboard

Opportunity	Provide Budget and Actuals across departments, and GL Codes, in a user accessible Dashboard
Description	Prior to monthly allocations, and other factors, provide access to the daily summary of Budget vs Actuals information to allow business units to

	track/manage financial performance. (Note: this information would be accurate for those categories that are updated daily, and would not include some monthly allocations, and/or GL items that are manually applied.)
Organization	Executive/Managers
Data Sources	Financials data
Sprint Description	XML data extracts of Month to Date GL, and Budget data, can be extracted nightly A Variance data mart for reporting, within the BI environment can be created and loaded nightly A dashboard, showing Budget vs Actuals currently in the financial system provided to all business groups

Fire Analytics Dashboard

Opportunity	Provide summary and drillable details for Fire Department
Description	Provide summary and detailed analysis of Call/Response metrics, Incident, Inventory, and Inspections (future). Provide historical trending and analytics (predictive) analysis capabilities. Also, provide Ad –Hoc reporting to support business and studies.
Organization	Fire, Executive
Data Sources	FMS
Sprint Description	Extract daily summary data Provide a historical data mart to load daily Develop initial dashboard with stakeholders Provide business friendly ad-hoc interface

Tender History

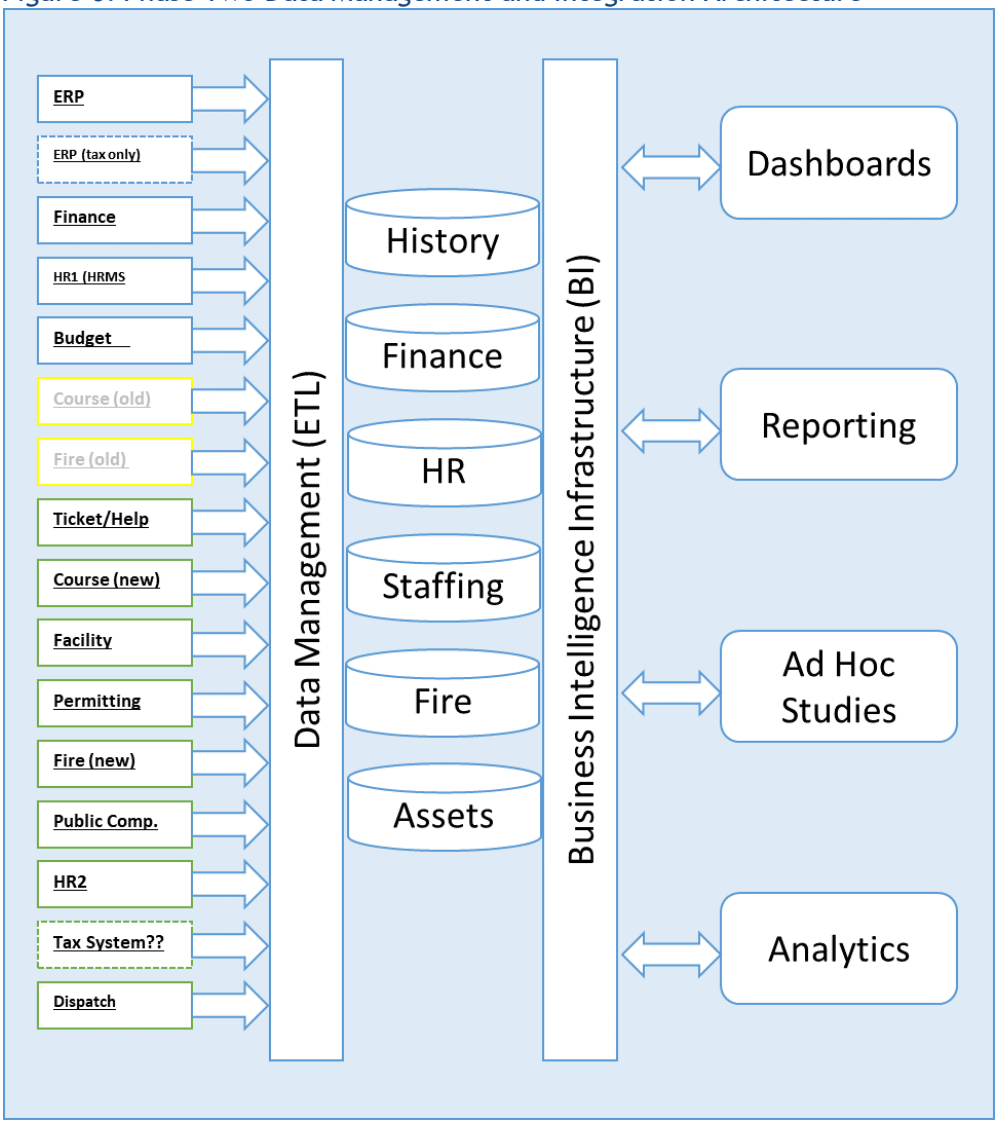
Opportunity	Provide business groups that deal with vendors and implementation projects a historical data mart of previous tenders/results.
Description	Dashboard and/or Information Application to provide: Historical analysis of tender results and submissions Understand seasonal variation; better optimize process Help manage cost estimating and timing of projects
Organization	Procurement, Project Management, Capital works, Maintenance
Data Sources	Procurement data (Engineering Spreadsheets?)
Sprint Description	Identify key bid information and extract daily updates into a historical

	datamart Provide an analytics dashboard to review/trend tenders

Phase 2 Data Management and Integration Architecture

Figure 6 shows the next stage of information delivery in Phase 2. In this phase, as more data sources are accessible from the source systems through the BI layer, new reporting can be developed joining together difference data sources. An example of this approach is combining HR information from Workforces and the HRMS systems into a single view to employees.

Figure 6: Phase Two Data Management and Integration Architecture



This phase expands the data access provided in Phase 1 by adding more data management capabilities to prepare new data sources (data marts) for delivery to stakeholders. This phase also continues to connect to new data sources to enhance reporting for the organization.

Potential specific opportunities that could be completed in Phase 2 include:

CAO Performance Dashboard

Opportunity	Provide an executive view on key metrics and city performance in a single location
Description	As data sources are available to the BI CoE through other projects, establish key metrics that could be included on Performance Dashboard. The CAO Dashboard continues to grow in scope as each data source is available the BI system.
Organization	Executive, CAO
Data Sources	All
Sprint Description	Start with “Voice of Citizen” reporting based on 311 Data Include “Budget Variance” reporting based on Financial Dashboard Include “Fire Dashboard” reporting based on FMS data Add new analysis to Dashboard as other Data sources become available This becomes a series of ‘small’ multi-day sprints that can be completed quickly

Access to HR data

Opportunity	Managing seniority and appropriate workload, need access to HR information, training, certifications, work schedules, etc.
Description	Currently a manager has to request/review reports on staff from multiple sources to ensure correct assignment, and/or, staffing for absences (Who should be called in?). A Dashboard that shows staff availability (scheduling data), training, certifications, and seniority information.
Organization	Workforce Management across departments Parks & Recreation Maintenance
Data Sources	HRMS Time & Attendance data Contracts/MOUs/MOAs
Sprint Description	Extract selected data from HRMS Extract selected data from T&AS

	Combine extracts and provide integration with Contract documents (if available) Develop guided analysis of staffing “at a glance” for line management

- Provincial Offences Dashboard (POA)
- Asset Analytics (Project/Procurement)
- Staff Allocation Dashboard (MyInfo)
- Community Development & Health Services Dashboard (various)

Two more phases of development will be necessary to achieve a mature information management system. These are illustrated in the figures below.

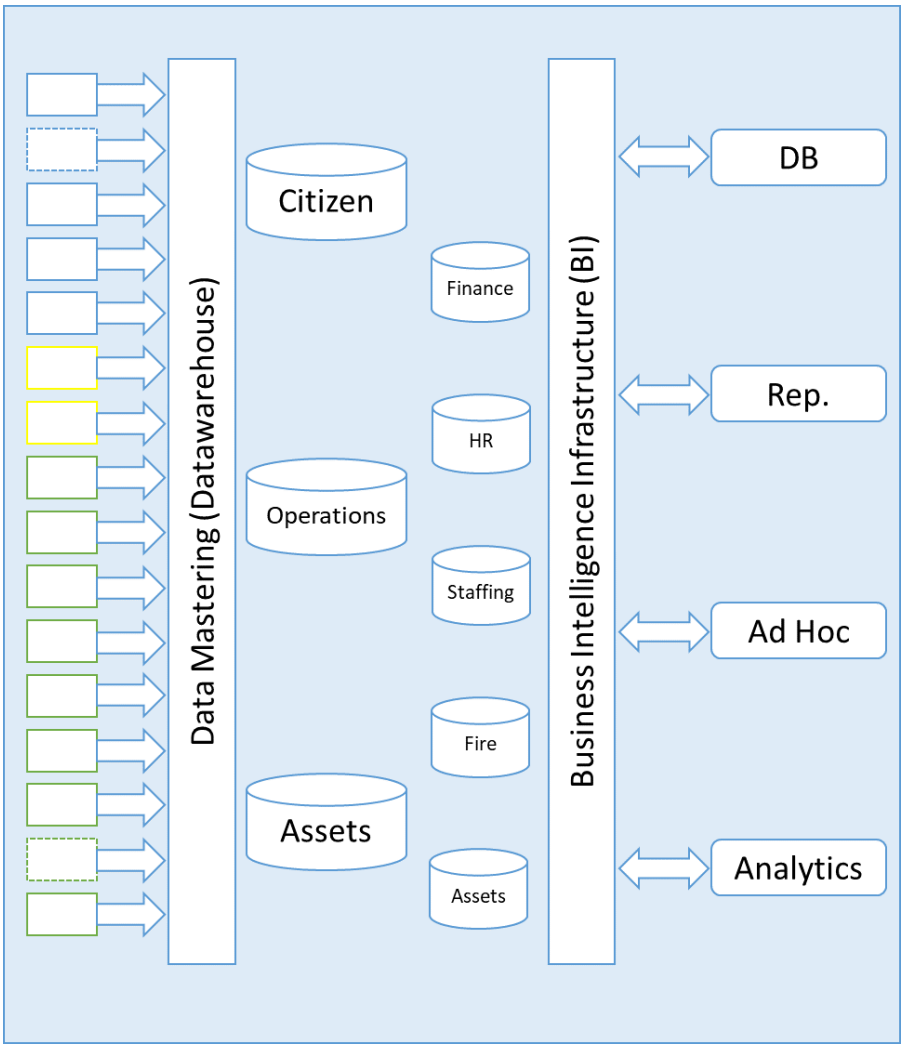
Phase 3 Data Warehouse and Data Mastering

Figure 7 shows an infrastructure that include data warehousing, Master Data Management (including data quality) components. In this phase the BI CoE can start to compile new integrated assets, as well as, ensure data quality and integrity issues can be resolved.

Examples could include:

- “360” View of Citizen
- All Asset Management View
- Operations (Work Orders) View

Figure 7: Phase Three – Data Warehouse and Data Mastering



Business Intelligence Centre of Excellence

Information needs evolve quickly as new approaches to leveraging data assets emerge and are adopted. Best practice organizations leverage the expertise of a Business Intelligence Centre of Excellence (BI CoE) to help business units, technical projects, and management better leverage valuable data assets across an organization and help bridge the data silos that develop over time. The BI CoE supports:

- Procurement and maintenance of reporting tools, data management, and analytics technologies;
- Provision of city-wide reporting, dashboards and insights;
- Investigations, proposals, and information requests;
- Provision of expertise to business groups to leverage corporate assets;
- Maintenance of centralized view/catalog of authoritative data sources;

- Capture of business/technical rules for accessing/leveraging data sources;
- Implementation of the information strategy as developed by executive and management teams; and
- Technology projects and ensure that data life cycle needs are included in new systems deployment.

The exact role of the BI CoE can change as the organizational maturity develops. A BI journey can be bracketed into the following phases:

- Adoption Phase
  Initial deployments of BI infrastructures are followed by latent demands and analysis. The BI CoE can help organize formal intake processes (Front Door), prioritization, and planning to ensure that the organization focuses on high value opportunities first ("low hanging fruit").
- Refinement Phase
  As user adoption increases, new more complex questions will arise that require consolidation of data sources, and data management elements become important. The BI CoE and invest in data extraction, transformation and loading (ETL) infrastructure to manage the abstracted data sources. The need to store historical information from sources that have been replaced starts to become important for long term trending and analytics. The historical data management starts to de-couple source systems from reporting allowing reduced migration efforts as new systems come online. The BI CoE is tasked with answering the questions "what are we going to do with all this history we can use in the new system".
- Advanced Phase
  Issues with data quality, integration and mastering required further skills of the BI CoE. The center evolves to answer questions that a 360 degree view of the citizen can provide (for example). This could be analysis of citizen life cycle needs; citizen/business centric views of value; and support value based budgeting.

Implementation

An implementation roadmap is proposed to transition from the current state to a modern information management structure. The roadmap has three phases:

- Phase One – Business Intelligence Infrastructure
- Phase Two – Data Management and Integration
- Phase Three – Data Warehouse and Data Mastering

The implementation plan needs to include both business and information management. Implementation of the expanded City's Strategic Vision will require attention to four areas that have been identified as key success factors in strategy implementation:

- Clients: attention to the desired benefits to the City's residents, business and community partners;
- Finances: allocation of finances to support the approved directions;
- Process: re-design of business processes to achieve the desired outcomes; and
- People: investment in the continuous learning at all levels of the organization to support the strategic directions.

The research on strategy implementation reveals a simple logic: that you cannot expect different results if you work in the same old way (processes), allocate your finances the same way

(finance), or fail to further develop your staff and organization capabilities. Most important is that the desired benefits to the City's residents, business and community partners must be kept at the forefront to ensure that they are achieved as implementation proceeds.

In addition, to further provide increased productivity and reduced costs in the information management strategy, collaborative development with other Ontario municipalities and public organizations can be leveraged. Many public organizations develop common applications and 're-invent the wheel' unnecessarily. The City of Windsor can establish relationships with other municipalities and public enterprises to share development efforts, experience, best practices and knowledge. There are ample opportunities (e.g., symposiums) for municipalities, law enforcement organizations and healthcare providers to facilitate knowledge transfer and application sharing. From these opportunities, collaborative effort can accelerate the implementation of the recommendations provided in this report.

Recommendations

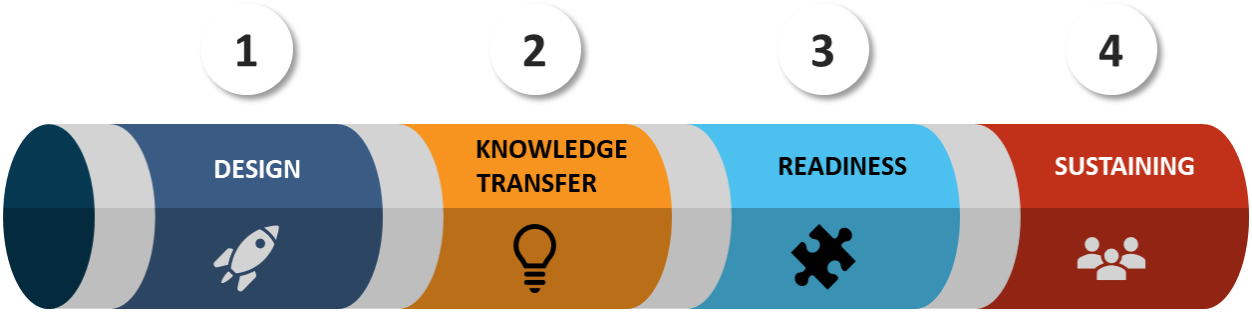
In summary, the following actions are recommended to achieve the goals set out at the beginning of the project:

1. Develop an integrated information management strategy to meet the goals in the City strategic vision;
2. Implement a business intelligence and analytics architecture in phases as described in this report,
3. Create a Business Intelligence Centre of Excellence (BI CoE) to support the successful implementation of the business intelligence and analytics architecture and the more effective use of data at all levels of the organization;
4. Invest in the business process re-design and change management that is essential to the success of the overall plan.

Change Management

The recommendations presented in this report highlight the importance of operationalizing the 20-Year Strategic Vision and the subsequent strategic planning initiatives. To fully implement this process, a change management approach is discussed below to ensure the staff are well supported through the requisite learning and development as well as the accountability system for the set of recommendations.

At a high level, the figure below illustrates the four-step process to ensuring the organization and the individuals are well informed and supported to implement the recommendations.



Design

The recommendations are organized in a sequential order where the logics behind the vision and the subsequent strategic directions are cascaded down to activities such as establishing the Business Intelligence Centre of Excellence. This change management phase is meant to involve the key participants in the Design phase to support implementation activities.

Key participant involvement is crucial as different internal stakeholders bring diverse perspectives that will enhance the overall outputs for each level of the cascade. Their inputs could:

- Inform the formation of the strategic plan
- Defining the scope and the expectations (key indicators and outcome metrics) of the information management strategy
- Identify the necessary activities to deliver on the strategic plan and the information management strategy. These activities would be accompanied by the required level of resources and the appropriate time frame
- Defining the mandate and the expectant outcomes for the Business Intelligence Centre of Excellence

Identification of the key participants should be strategic, and be:

- Accountable to the various plans throughout the cascade; these individuals will likely be those who will be responsible for reporting on the progress against the strategic plan and the 20-Year Strategic Vision
- Using the services, processes and tools. These service users are included to manage their expectations early on in the progress and to garner initial buy-in at the Design stage. Should the various plans share resemblance with the inputs they provided, their degree of change readiness should be higher in subsequent stages than otherwise
- Operating or be a part of the operations to maximize the value of the City's data. They are typically the experts in their respective areas and are well-suited to provide key inputs on the appropriate indicators and targets to monitor and measure performance

One of the most common barriers to success is not in strategy formulation but in strategy execution. A major cause lies within the failure to communicate the strategic intent to those executing the strategy. A lack of broader understanding of the strategic purpose outside one's scope of duty can result in resentment, change resistance and eventually performance issues in

executing the strategy. By including the key stakeholders early and engaging them meaningfully, supported by continuous reinforcement of accountability, the activities suggested in this phase establish a strong foundation for future success.

Knowledge Transfer

Knowledge Transfer includes both transferring technical knowledge but also includes general communications to the broader audience to ensure stakeholders stay informed about the implementation (and the progress) of a strategy that includes an information management strategic direction.

For staff who will be impacted by the recommendations, this includes those accountable, those who will be using the new data capabilities, and those who will be supporting/delivering the new data capabilities. This is the phase where the requisite formal training and development are provided to them. Depending on the implementation time frame, the time between formal training in this phase and Readiness (the phase where the stakeholders get to apply their knowledge) is minimized. The areas of formal training and development could include:

- Training of specific systems/products
- Training of new procedures
- Education on the application of business intelligence in municipal services (e.g., the case studies provided in early section of this report)

Broader knowledge transfer begins the reinforcement of the rationale behind the strategy (e.g., the opportunities identified in this report); a consistent messaging on this rationale buttresses the strategic intent and reminds the audience of the recent operational pains that were found common across the City. As various strategies are designed in the Design Phase, the plans ought to be socialized by the leaders as well as the key participants in the Design Phase to begin positioning them as change champions. The change champions should be encouraged to be as visionary and as vocal as possible to inspire buy-in for the strategies. The timing and cadence for broader knowledge transfer should be determined as appropriate to the strategy implementation timeline.

As part of the knowledge transfer phase, expert users may start to emerge as they would have demonstrated aptitude during formal training. These users may be recruited as Super Users to support their peers in the subsequent phases, in case they require additional technical support; in addition, those impacted by the strategies should be provided with training material and a single point of contact for all technical related issues.

Readiness

Consider this Phase as the warm-up phase before going full live. This is the opportunity to assess the implementation of the strategies in a low-risk but close-to-live environment, test and validate the end-to-end business procedures and the intended business objectives, identify opportunities

for improvements immediately for the launch as well as post implementation, confirm and test the contingency steps, and secure technology and process successes to increase user confidence in the strategy.

To achieve this purpose of a low-risk but close-to-live environment for testing and validation, there should be a gatekeeping role that reviews and validates information periodically and at the end. This role will require the definition of SLAs, as appropriate, which will serve as the evaluation rubric to determine which issues require immediate resolution and which issues can be integrated into future enhancements.

In addition, this is the phase to design a formal risk management plan for the implementation to ensure possible challenges are considered and there are clear mitigation/contingency plan in place should issues occur during go-live. Areas of risk could include:

- Staff capacity to change (e.g. change resistance; non-confidence in data, change fatigue)
- Public facing interfaces failure
- Loss of critical data
- Confidentiality of data compromised

A key principle of this phase is to catch all material issues internally before public-facing service delivery is impacted.

Sustaining

As the City prepares to go-live with the new tools/procedures/services, adequate resources need to be in place to ensure real-time support can be provided and there is sufficient capacity to engage any contingency plans if necessary.

Post go-live, as the City is stabilizing in its implementation of new tools/procedures/services, daily reporting on issues, resolutions and activities should be provided to staff, including those impacted by the implementation and the broader staff. Not only does this keep staff informed of the implementation process, any progress made on resolving go-live challenges can be leveraged as quick wins, and the ongoing stabilization process, when communicated, can further instill confidence in staff on the new tools/procedures/services. This process typically continues for a period of 2 week, the City should then be considered as stabilized.

The next mandate is to define the new state of normal. As operations is stabilized and enters “Business-As-Usual”, the utilization of new tools/procedures/services should be defined by the leaders as basic role requirements. By making this switch, the implementation changes from a change-management oriented approach to a performance-management oriented approach where leveraging data intelligence becomes a core part of the performance expectation and accountability.

Appendices

Appendix A: Authoritative Source Datasets (January 2018)

Dataset:	Information Owners:
Public's complaints (where/who/when the complaints gets handled internally)	311
Public's requests for service (where/who/when the request gets handled internally)	311
Corporate phone numbers	All departments
Capital budget information	Asset Planning
Public's requests for service (where/who/when the request gets handled internally)	Building
Permits (e.g. building, sewer)	Building
Work orders	Building
Public's requests for service (where/who/when the request gets handled internally)	By-law
Work orders	By-law
Grievances	CAO's Office
In-camera reports	CAO's Office
Delegation of Authority reports	CAO's Office
Corporate project list	CAO's Office
Risk assessments	CAO's Office
Council reports and resolutions (for public Council meetings)	Council Services
Box management	Council Services
Freedom of Information requests	Council Services
Election results	Council Services
Election polls (voting stations)	Council Services

Dataset:	Information Owners:
Election voter list	Council Services
Death records	Council Services working on behalf of the Registrar General
Water processing	Environmental Services
Building components (e.g. roofs, windows) and their routine maintenance (for buildings owned/operated by the Corporation)	Facilities
HVAC and building environment	Facilities
Building assets	Facilities
Work orders (corporate buildings)	Facilities
Properties (i.e. anything to do with an address in the City of Windsor including tax assessments and property information from MPAC)	Finance?
Tax accounts (roll numbers)	Finance?
Operating budget information	Financial Planning
CAD property records	Geomatics
Ortho (aerial) photos of Windsor	Geomatics
Employees	Human Resources
Employee photos	Human Resources
Employee time and attendance tracking	Human Resources
Work schedules for hourly workers	Human Resources
Training courses provided to employees via computer including a list of who took the courses and their marks	Human Resources
Tests given to individuals for corporate job positions	Human Resources
Employee card access	Human Resources
Huron Lodge patient records	Huron Lodge

Dataset:	Information Owners:
Huron Lodge patient nutrition, menus, and dietary restrictions	Huron Lodge
Pharmaceutical drugs administered to residents at Huron Lodge	Huron Lodge
Information Technology's incident calls and requests for service	Information Technology
Corporate computer listing (including laptops, VDI, VPN)	Information Technology
E-mail	Information Technology
Phones, cellphones, managed (i.e. trackable) computers, and BlackBerry inventory	Information Technology
Voice mail	Information Technology
Listings of agencies, boards, and commissions, Organization units, Distribution groups, Outside contacts	Information Technology
Security footage	Information Technology
Managed network devices	Information Technology
Web filter that (1) has authorized categories of sites that the Corporation allows its employees (and the public via public Wi-Fi) to visit and (2) tracks employee Internet activity	Information Technology
Spam filter that tracks the e-mail that has been received and quarantined in the past seven days	Information Technology
Work orders (I.T. service calls)	Information Technology
Windsor Public Library financial data	Library
Licences (e.g. for dogs, businesses)	Licensing
Licencee photos	Licensing
Public's requests for service (where/who/when the request gets handled internally)	Operations
Linear assets (e.g. roads, sewers, sidewalks,	Operations

Dataset:	Information Owners:
bridges, ditches), Sewer inspection ratings	
Parking Tickets and Enforcement	Operations
Snow plow and other vehicle GPS locations	Operations
Sewer inspection records and videos	Operations
Work orders (linear assets)	Operations
Work orders	Operations
Vehicles owned/operated by the Corporation including their fuel consumption	Operations, Transit Windsor, Fire, Police
Provincial offences convictions	Provincial Offences
POA court recordings	Provincial Offences Office
Permits (e.g. building, sewer)	Public Works
Purchasing card (P-card) transactions	Purchasing
City of Windsor course registrations	Recreation and Culture
Museum inventory	Recreation and Culture
Applications submitted for the Endowment for the Arts	Recreation and Culture
Social Assistance case files	Social Services
Public's requests for service (where/who/when the request gets handled internally)	Taxation
Work orders	Taxation
Farebox payments	Transit Windsor
Bus routes and schedules	Transit Windsor
Bus pass sales	Transit Windsor
Transit Windsor bus GPS locations	Transit Windsor
Tangible capital assets	Various departments

Dataset:	Information Owners:
Index of paper records	Various departments who organize their paper files via Livelink
Cashiering information from departments	Various departments who process payments made by the public to the Corporation
Fire incident information	Windsor Fire & Rescue Services
Fire	Windsor Fire & Rescue Services
Library books and patrons	Windsor Public Library

Appendix B: Impact on 20-Year Strategic Vision

The number of opportunities described in this report, if capitalized in a coordinated and comprehensive fashion, can have tangible and material impact on the goals expressed in the City's 20-Year Strategic Vision and subsequent Strategic Planning initiatives. Specifically, to do so, the City will need to approach each opportunity with a strategic rigour that considers the necessary financial resources, staff training and development as well as changes in business processes. Some possible examples that could link robust information data management and analytics to achieve desired outcomes might include examples as follows:

More jobs in Windsor

With a robust information management and reporting capability (e.g., data integration and data intelligence), the City possesses a wealth of valuable information that can support local economic development. As the business community considers locales to establish or to expand operations, access to local market intelligence to inform business planning is a requisite step. The City has taken a step toward making the City information available through the Open Data initiative. The current views in Open Data are segmented by the City's internal operations (e.g., departments); however, if the City can provide vital data integrated in a way that the business community can leverage, the data can be a powerful tool for business planning.

Access to timely and accurate intelligence will be a key enabler for the Council to make decisions under the 20-Year Strategic Vision. With the enhanced information management and reporting capability, the staff will be able to supply critical intelligence in real-time and efficiently.

A sustainable internal operation can be achieved to support the Council in its economic development vision. To thrive, businesses are looking for more efficient and expedient approval processes (e.g., development applications, etc.) from the City. This project identified opportunities to remove internal operation bottlenecks through the elimination of manual processes and to ensure current procedures are reflective of the City's most-up-to-date risk tolerance, all of which, if capitalized, can reduce barriers and attract more and diverse businesses.

Lastly, being situated at the Border, the City is uniquely positioned to attract talent from both Canada and the United States. Given the significant levels of turnover due to expectant retirements in the next 10 years, the availability of high-quality jobs within the City is a key employment attraction. As the recruitment operations are enhanced and the growing pains addressed, the City has the potential to become an employer of choice to residents across the border as well as to youth who are seeking diverse, long-term and meaningful employment.

Addressing Windsor's Reputation

The City's desire to be a hub for innovation and creativity as articulated in the 20-Year Strategic Vision needs to be translated into goals and objectives in the City's strategic and operational plans.

Organizing the City's data in consumable fashion for the public will further Council's commitment to a fair and transparent municipal government. The symbiotic relationship between an informed Council (with real-time and accurate information reporting) and an informed public (through further enhancements to the Open Data initiative) can be the bedrock for greater civic engagement. Further, partnerships with nearby municipalities can also be built on the enhanced information management and reporting capability to supply intelligence for regional decision-making.

Building on a history of having the discipline of operating under fiscal constraint for an extended period of time, the City has already demonstrated a "can-do" attitude due to the commitment and effort by the City staff. With the Council shifting focus from constraint to investing in the City, the opportunities highlighted in this project, with the appropriate strategic and accountability framework, can enable the City staff to deliver on the strategic vision and to demonstrate the same attitude again.

Improving Quality of Life in Windsor

The quality of life in Windsor is a function of the efforts of the City and many other stakeholders. With the different types of data that the City possesses, the City is well-positioned to support the efforts of many stakeholders through an integrated view of its data.

The next stage of development after data integration is data intelligence where integrated data provides insights that would not be possible otherwise. Data intelligence enables predictively intelligence where the City can have the capabilities to identify leading indicators to eventual safety, poverty, health challenges. By harnessing the power of the data maturity journey, data intelligence can enable staff to plan for development that works for the public, accurately target resources to strengthen the communities, and eventually implement upstream interventions to reduce adverse incidences (and lower downstream costs).

Consultation with the Parks, Facilities, Recreation and Culture department highlighted a number of process challenges that staff face. Addressing challenges to operational efficiency, the amount of time the leaders in this department spent on operations can be alleviated and enabling them to consider, on a strategic level, the opportunities to enhance the overall Quality of Life in Windsor through various arts initiatives, cultural activities, etc.

Lastly, 311 has proven to be an effective mechanism to engage the residents on civic matters. It provides valuable insights to City departments to monitor and measure performance against resident complaints. Currently, Open Data publishes a number of base metrics on 311 performance. By leveraging data integration opportunities discussed in the previous sections, more robust data on City's performance against 311 inputs can be made available to the public contributing to further transparency and to demonstrate measurable outcomes to service delivery.

Appendix C: Examples of Return on Investment

Case Study: Charlotte-Mecklenburg Police Department

Case Study Forum

CASE STUDIES

HIGHLIGHTS

Goal: The Charlotte-Mecklenburg Police Department wanted to more effectively use data analytics to reduce crime, make more efficient use of police resources, and reduce costs.

Solution: Information Builders LEA Predictive Analytics Solution

Results: Police officers have more real-time information they can act upon, and supervisors can more effectively assign officers to areas with a higher likelihood of criminal activity. Crime has been reduced, and police resources are used more effectively. The police department will see a projected, cumulative three-year net benefit of $7,772,486, with a return on investment of 529% and a payback period of five months.

CUSTOMER PROFILE

Charlotte-Mecklenburg Police Department
www.cmpd.org
Charlotte-Mecklenburg Police Department serves Charlotte and the unincorporated areas of Mecklenburg County in North Carolina.

Headquarters: Charlotte, North Carolina

Industry: Law enforcement

Charlotte-Mecklenburg Police Department Reduces Crime, Improves Efficiency, and Gains $7.8 Million in Net Benefits with WebFOCUS Law Enforcement Analytics

Information Builders' LEA solution has had significant financial benefits not only for CMPD, but for the entire region of Charlotte and Mecklenburg County. Crime has high personal costs, as well as direct financial costs, for a community. In 2009, a RAND Corporation study found that the economic impacts of crime go well beyond law enforcement costs, such as expenses associated with police, jails, and courts. The true cost of crime, the report concluded, includes lost property, treatment for injuries, and wide-ranging crime avoidance costs, such as lost revenue, private security expenses, and the economic impact of reduced usability in certain areas.

The study found that the societal cost of a robbery is $100,000, and that of a larceny from an automobile is $7,000. If you use the cost per crime calculated in RAND Corporation's study, and apply it to the reduction in crime in Charlotte and Mecklenburg County attributable to WebFOCUS (83 fewer robberies and 412 fewer larcenies from automobiles), you can see that the solution has had significant financial benefits for the entire region—an estimated reduction of $11,157,250 in costs from 2010 to 2011 due to fewer robberies and larcenies from automobiles.

Benefits

Objective	Benefits Achieved
Reduce crime	Supervisors can target areas with a higher likelihood of crimes being committed, and officers have real-time information in patrol cars, leading to a reduction in crime.
Reduce costs	As a result of increased productivity and efficiency gains, CMPD will gain a projected, cumulative three-year net benefit of $7,772,486.
Improve productivity and efficiency	Police officers can spend more time on patrol and less time in front of computers gathering data, and analysts can spend more time on value-added analytical work and less time on manual data gathering.

Crime Mapping and Analysis:
Reducing Crime, Increasing Productivity, and Reducing Costs

The Organization

The Charlotte-Mecklenburg Police Department (CMPD) serves the more than 700,000 citizens of Charlotte and the unincorporated areas of Mecklenburg County, North Carolina. The department employs 1716 police officers, as well as a civilian staff of 530.

The Strategy

Since joining the Charlotte-Mecklenburg Police Department, Chief Rodney Monroe has refocused the department on crime fighting and crime prevention through a more accountable organizational structure, new technology, and an enhanced strategy of community policing. To purchase the needed technology solutions, Chief Monroe sought funding through an Urban Area Security Initiative Homeland Security Grant.

One of the technologies the department deployed is Information Builders' Law Enforcement Analytics (LEA) solution. LEA provides an innovative predictive policing and business intelligence system for law enforcement. With its innovative predictive policing capabilities, LEA would better facilitate crime mapping and analysis for patrol officers. Since these professionals spend a great deal of their time on the street, they would reap the benefits of having up-to-date and comprehensive information as they patrol their assigned areas. Using the information culled from operational systems, patrol officers would be able to instantly spot trends in their areas, gain a better understanding of activity that has occurred during previous shifts, and develop a more global, macro view of significant developments that occur in outstanding cases. Before deployment of Information Builders' LEA solution, staff had to manually search out crime statistics data from numerous sources in an attempt to optimally assign patrol officers.

Overall Plan

- **Analyze information from disparate data sources more effectively.** The department had been collecting data for many years, but stored it in a variety of sources. Employees had to sift through data using a number of tools in order to analyze crime statistics, identify trends, and determine the best allocation of police resources. CMPD was looking for a solution that would integrate all the data, so it could be easily queried and analyzed.
- **Use data analytics to assign officers to areas with a higher likelihood of crime.** Supervisors and other staff wanted to be able to identify areas and times that had the greater likelihood of crimes being committed. The presence of officers could then deter crime, and if any crimes were committed, the perpetrators would be more likely to be caught.

- Information Builders' LEA solution has had significant financial benefits not only for CMPD, but also for the entire region of Charlotte and Mecklenburg County. Crime has high personal costs, as well as direct financial costs, for a community. In 2009, a RAND Corporation study found that the economic impacts of crime go well beyond law enforcement costs, such as expenses associated with police, jails, and courts. The true cost of crime, the report concluded, includes lost property, treatment for injuries, and wide-ranging crime avoidance costs, such as lost revenue, private security expenses, and the economic impact of reduced usability in certain areas.

The study found that the societal cost of a robbery is $100,000, and that of a larceny from an automobile is $7,000. If you use the cost per crime calculated in RAND Corporation's study, and apply it to the reduction in crime in Charlotte and Mecklenburg County attributable to WebFOCUS (83 fewer robberies and 412 fewer larcenies from automobiles), you can see that the solution has had significant financial benefits for the entire region—an estimated reduction of $11,157,250 in costs from 2010 to 2011 due to fewer robberies and larcenies from automobiles.

- **Provide officers with real-time information in the field in order to better fight crime.** If officers have the most timely, up-to-date information about crime and criminals, they would be more likely to find and arrest perpetrators. CMPD wanted to give officers better tools for more efficient crime-fighting.
- **Reduce costs.** CMPD continually looks for ways to make the most efficient use of its funding and resources. It wanted a solution that could not only provide better data analytics and help reduce crime, but also improve productivity and reduce expenses.

Key Benefits

Information Builders' LEA solution includes a predictive analytics tool called WebFOCUS RStat that has empowered the Charlotte-Mecklenburg Police Department to perform in-depth analysis of historical crime data, and use it to make predictions about future criminal activity. Through more precise crime forecasting, CMPD can take a proactive and effective approach to keeping its community safe.

1) **Increased insight into crime patterns.** The department can now uncover patterns in criminal activity, and monitor those trends as they change. As a result, the department can better determine the likelihood of certain crimes, who is most likely to commit them, and when and where they have the highest probability of occurring.
2) **Enhanced information dissemination.** With LEA, CMPD can better communicate and share information across the organization.
3) **Improved efficiency.** With LEA, officers have vital crime-related information right at their fingertips. This eliminates the need for them to waste time collecting and compiling reports and statistics, so they can focus their efforts on proactively preventing crimes before they occur.

Crime Mapping and Analysis in Action

With the Information Builders solution in place, command staff, crime analysts, and patrol officers have access to actionable, real-time information. Data is presented to users via predictive policing dashboards, which allow them to visualize which areas have the highest probability of crimes occurring during a four-hour window. Armed with that insight, the department can more intelligently allocate its resources, assigning officers to those locations where criminal activity is most likely to take place. LEA has helped reduce crime in a variety of ways. In one instance, an officer was assigned to an area where burglaries had a high probability of happening between 11 AM and 3 PM on weekdays. During his patrol, he received a call about a possible burglary in progress at a vacant house. Because he was already in the area, he was able to stop the crime and apprehend five suspects.

CMPD Chief of Police Monroe says that this is typical of the way in which LEA helps target crime. He explains, "The Information Builders system helps us focus our efforts. We can be very strategic and surgical when it comes to when and where we place our resources."

Crystal Cody, CMPD systems analysis and programming manager, adds that LEA "not only helps the department to reduce crime, but also ensures that police officers' time is used most effectively. The ability to target areas where crimes might occur allows us to deploy officers proactively, increase officer and citizen safety, and reduce the number of calls for service."

Officers on patrol find the system particularly useful, especially the Priority Offender Report, which provides information about priority offenders on mobile units in patrol vehicles. Before the use of LEA, officers had to search multiple databases to get this information.

Chief Monroe says that the Information Builders system helps police officers prepare themselves at the beginning of their shifts, which helps them to better fight crime.

> "The Information Builders LEA solution dashboards and predictive analytics software help us more accurately assign officers to areas that have the greater likelihood of criminal activity, and help us reduce our costs as well."
>
> Rodney Monroe, Chief of Police
> Charlotte-Mecklenburg Police Department

"Officers prepare themselves for duty in many ways—becoming aware of any crimes that have occurred in the previous shift, knowing whether to pay attention to certain businesses, or looking for stolen vehicles, for example," he says. "The faster they can do that, the more productive they can be. With LEA, they don't have to be sitting at a computer to get this information—they can gather it right from their patrol cars."

As a result of this and other benefits, "Our response times have improved because officers have the information close at hand, and don't have administrative down time."

CMPD has also seen significant financial benefits from the solution, due to increased productivity and efficiency. Weekly statistics are now automatically created and sent to division commanders at the start of every week. Previously, a crime analyst had to manually prepare these reports using Excel spreadsheets and Access just before the weekly 9 AM meeting.

Summing up the benefits of LEA, Chief Monroe says it helps better protect citizens, and has helped CMPD to reduce costs.

"Information Builders LEA dashboards and predictive analytics software allow staff at every level of the police department to deal with facts in real time," he says. "We are better equipped to optimally assign officers to response areas with the highest likelihood of criminal activity, resulting in reduced crime and lower operating costs."

■ Charlotte-Mecklenburg Police Department's bottom line for the project: a projected, cumulative three-year net benefit of $7,772,486, driven by increased productivity and cost avoidance. The project will have an ROI of 529%, and a payback period of five months.

Bottom Line Results

CMPD was able to achieve a significant return on its investment in Information Builders technologies due to productivity improvements and savings—a projected, cumulative three-year net benefit of $7,772,486 with a return on investment of 529% and a payback period of five months. (For more details, see the sections Project Costs and Calculating the Return on Investment.)

The following chart provides a detailed, three-year analysis.

Project Summary	
ROI	529%
Payback Period (in months)	5
Cumulative Net Value	$7,772,486
Average Annual Benefit	$3,080,987
Average Annual Total Cost of Ownership	$490,158
Net Present Value	$6,314,463

Project Costs	Start Up	Year 1	Year 2	Year 3	Total
Investment	$75,000				$75,000
Maintenance		$1,230,628	$82,423	$82,423	$1,395,474
TOTAL PROJECT COSTS	$75,000	$1,230,628	$82,423	$82,423	$1,470,474

Benefits	Start Up	Year 1	Year 2	Year 3	
Total Officer Productivity Savings		$2,669,423	$2,802,894	$2,943,039	$8,415,356
Total Crime Analysis Savings		$262,523	$275,649	$289,432	$827,604
TOTAL BENEFITS		$2,931,946	$3,078,543	$3,232,471	$9,242,960

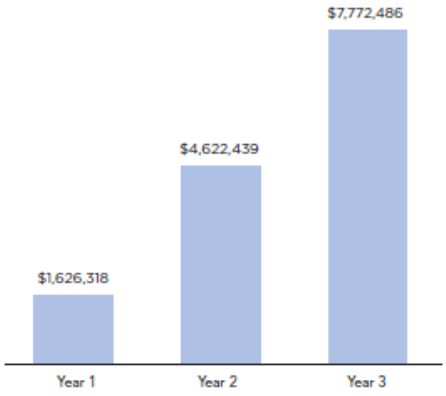
Financial Analysis	Start Up	Year 1	Year 2	Year 3	Total
Net Value	-$75,000	$1,701,318	$2,996,120	$3,150,048	$7,772,486
Cumulative Net Value	-$75,000	$1,626,318	$4,622,439	$7,772,486	

Project Costs

The project cost CMPD $1,470,474 over three years—$287,117 for software, $861,088 for consulting services, $247,269 for maintenance, and $75,000 for the expenses that CMPD had to bear internally for the work required to switch to a new system.

Calculating the Return on Investment

Police officer productivity has been improved considerably, leading to substantial financial benefits. With LEA, police officers, response area commanders, and patrol command staff spend less time gathering and analyzing data at the start of shifts, and during daily and weekly reviews. At the start of shifts, 1,300 police officers in the department save approximately 15 minutes per day each in gathering and analyzing data. Given an average salary of $68,000, that results in a saving of $2,071,875 in the first year, $2,175,469 in the second year, and $2,284,242 in the third year.

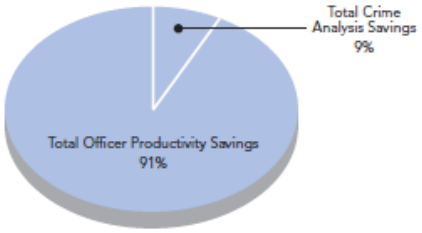


Cumulative Net Benefit

Thirty-nine response area commanders each save an hour per day during their daily reviews, because they no longer need to spend time manually gathering and analyzing data. Given an average salary of $73,936, that results in savings of $360,438 for the first year, $378,460 for the second year, and $397,383 for the third year.

Twenty patrol command staff members each save an hour per day during daily and weekly reviews, because the need to manually gather and analyze data has been eliminated. Given an average salary of $94,844, that results in savings of $237,110 during the first year, $248,966 during the second year, and $261,414 during the third year.

All these savings, when totaled, result in a three-year cumulative cost savings of $8,415,356.



3-Year Net Benefit – $7,772,486

CMPD will also see substantial savings because crime analysts no longer need to perform a variety of manual tasks. This frees them up to focus on higher-value activities. Eleven crime analysts each save 90 minutes per day through automated report and data processing with the Information Builders' solution.

Given an average salary of $59,890, that results in savings of $123,523 for the first year, $129,699 for the second year, and $136,184 for the third year.

In addition, because of productivity improvements, CMPD will avoid having to hire two additional crime analysts, for a savings of $139,000 in the first year, $145,950 in the second year, and $153,248 in the third year.

These savings, when totaled, result in an additional three-year cost saving of $827,604.

In all, CMPD will see $9,242,960 in savings. When the project costs of $1,470,474 are subtracted from that, the CMPD will gain $7,772,486 in benefits over a three-year period.

Defining the Numbers

Return on Investment (ROI) is the percentage return expected over a period of time. In this instance, we are measuring ROI over a three-year period. ROI is the total benefit divided by the total costs. CMPD achieved a three-year ROI of 529%.

Payback Period is the time it took for the CMPD project to yield a positive cumulative cash flow. Expressed simply, it is the time it takes for the financial benefits to exceed the cost of the project. In this instance, the Payback Period was five months.

Cumulative Net Value shows the total benefits achieved by the project—the total benefit minus the project costs. For this project, the Cumulative Net Value is $7,772,486.

Net Present Value is an easy way to determine if a project has generated a profit, and if so, how much. It shows the ongoing benefit of a project in terms of today's money. It is calculated by taking the cumulative present value of the expected return of a project over a specified period of time minus the initial costs of the project. The Net Present Value for this project is $6,314,463.

Average Annual Benefit is the annual benefit divided by the number of years, regardless of costs. In this instance, it is $3,080,987.

Average annual Total Cost of Ownership is the total costs divided by the number of years in the project. For this project, it is $490,158.

About Charlotte-Mecklenburg Police Department

The Charlotte-Mecklenburg Police Department is the primary police department of the City of Charlotte and Mecklenburg County, in the state of North Carolina. The department employs over 1,716 officers and 530 civilian staff, and covers an area of 438 square miles with a population of more than 713,455.

About Information Builders

Information Builders' award-winning combination of business intelligence and enterprise integration software has been providing innovative solutions to more than 12,000 customers for the past 35 years. WebFOCUS is the world's most widely utilized business intelligence platform. It provides the security, scalability, and flexibility needed at every level of global extended enterprises. Its simplicity helps create executive, analytical, and operational applications that reach dozens to millions of users.

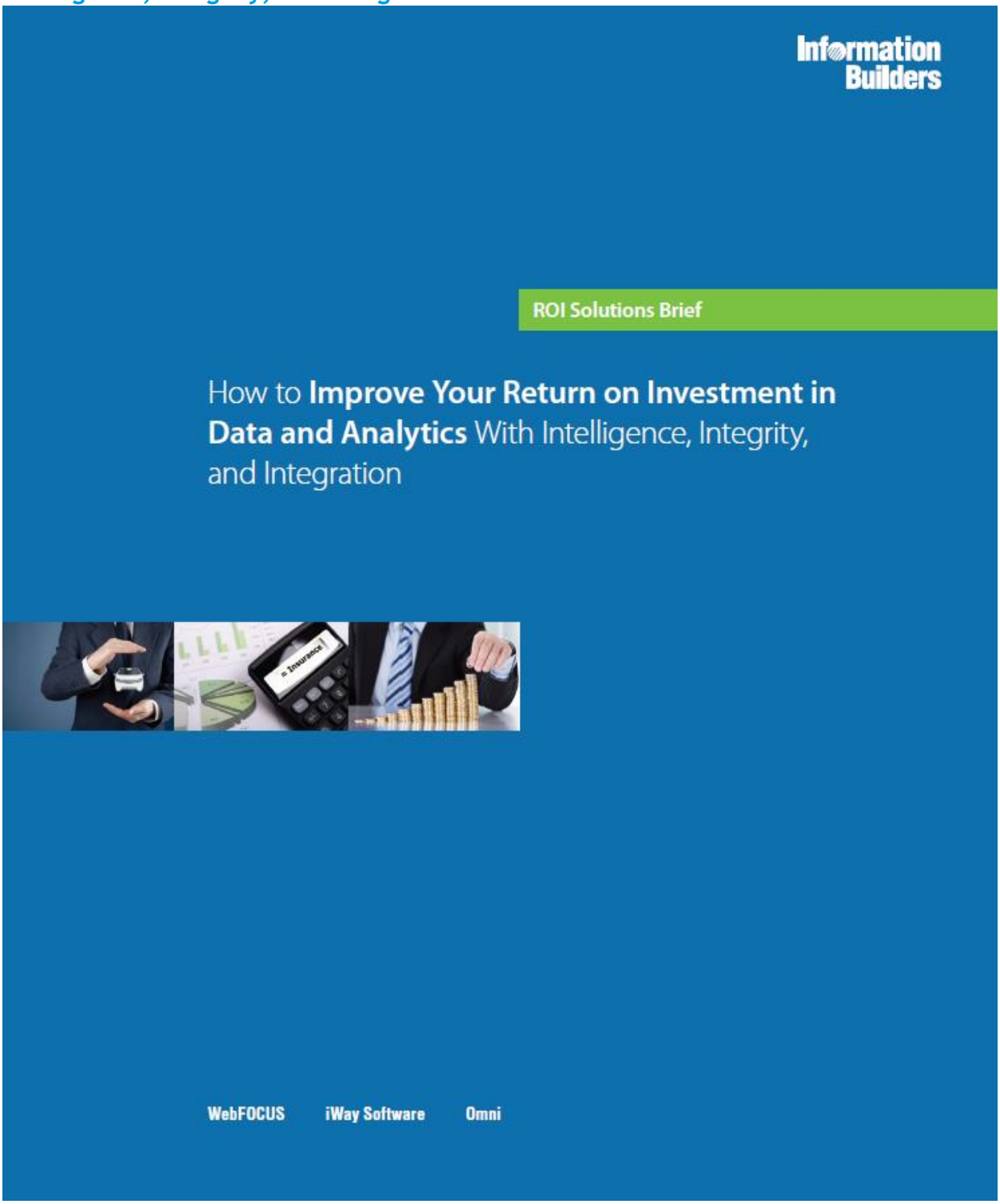
Information Builders' iWay Software suite provides state-of-the-art, multi-purpose, pre-built integration components that address all SOA, application, data and information management requirements. Its integration adapters have been adopted by the leading software platform providers. Information Builders also offers solutions in the performance management, business activity monitoring, and enterprise search markets. The company's comprehensive enterprise product offerings give Information Builders' customers the ability to grow and innovate according to their needs.

Information Builders' customers include most of the Fortune 100 and U.S. federal government agencies. Headquartered in New York City with 90 offices worldwide, the company employs 1,450 people and has more than 350 business partners.

About Case Study Forum

Case Study Forum is the leader in the writing and production of ROI-focused Case Studies. In addition to a customer success story, each ROI Case Study provides insight into the business impact—the revenue, productivity and cost savings the customer achieved as a result of the investment made in the solution or service. For more information, please contact Case Study Forum at 508-380-8886, or visit www.CaseStudyForum.com.

How to Improve Your Return on Investment in Data and Analytics With Intelligence, Integrity, and Integration



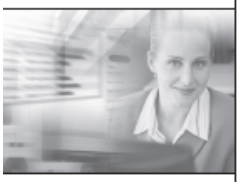
What Our Customers Say

"With the kind of capacity we have created here we can realistically expect to generate an additional $250 million in annual sales volume across all of the products that we deliver to customers. That translates into millions of dollars in bottom-line lift for us."

Mike Henry
EVP, Retail Payments, Deposits & Lending
Scotiabank

"Having to code manually would have taken at least a year. Missing our target date would have cost us several million dollars and possibly impacted revenues. iWay has given Coty great ROI, including project payback within two months."

Siebe Talma
Global Director of Custom Application Integration
Coty



"In this economic climate, we have to work harder to get new accounts. WebFOCUS helps us sign new clients, make sure they are satisfied, and keep our own business running more effectively. It has become an extremely important competitive edge for us."

Sandy Lee
Executive Vice President
Plus Relocation

"With WebFOCUS, we have been able to launch multiple quality improvement programs, which helps improve patient outcomes. We have also been able to significantly reduce costs and gain a significant return on our investment."

Dr. Thomas McGill
CIO, Vice President for Quality and Safety
Butler Health System

Business Intelligence, Analytics, and Data Management That Delivers Better ROI

As technology budgets continue to tighten and profit margins remain slim, companies must justify every purchase by demonstrating tangible business impact. The solutions and services they implement must deliver substantial return on investment (ROI) through increased operational efficiency, improved customer acquisition and retention, higher market share, or reduced costs.

Information Builders' customers achieve significant financial benefits through the use of our business intelligence (BI), data integrity, and integration technologies. By empowering organizations to better leverage or monetize their data, our solutions ensure that they get the greatest possible returns from their information assets. Our success stories offer rock-solid proof that our solutions have a direct, profound, and positive influence on such crucial performance metrics as revenue, growth, and profitability.

Our technologies deliver accelerated ROI with:

- A unified environment for BI and analytics, enterprise integration, and data management
- A single platform to meet all analytical and information needs
- Unmatched scalability, reliability, and performance
- Rapid deployment and fast time-to-value
- A robust architecture that minimizes total cost of ownership

Customer Successes

Appvion – Integration and integrity solutions are helping this manufacturer of paper coating and chemicals to overcome problems associated with a disparate information environment. Data warehousing, combined with data quality, helps to consolidate enterprise information and ensure its accuracy. From there, users can access InfoApps™ built with Information Builders' WebFOCUS BI and analytics platform to analyze inventory operations. New InfoApps for finance, procurement, and accounting will soon be rolled out. By allowing users to work in a unified environment with consistent, high-quality data, Appvion has decreased administration time and expects to reduce maintenance and support costs by more than $100,000 annually.

Arcadia – This large European clothing retailer, with more than 2,500 branches and eight brands, wanted to combat decreasing customer loyalty by better understanding customer behavior. An enterprise-wide BI environment gives thousands of users across the company the ability to access and analyze information about finance, purchasing, marketing, merchandising, and more. This has significantly enhanced market basket analysis, reduced costs, lowered total cost of ownership, improved productivity, and increased sales in its retail stores. Arcadia will see a projected, cumulative five-year net benefit of £7,699,330, with an ROI of 609 percent and a payback period of five months.

Butler Health System – To improve patient care, reduce costs, and increase operational efficiency, this Pennsylvania-based health network put data analysis capabilities directly into the hands of business and clinical users, and created BI environments to support infection surveillance, orthopedics, and quality control. Butler will hire fewer developers, avoid additional software costs, and generate more revenue due to increased patient volumes, achieving a projected, cumulative five-year net benefit of $2,989,071, with an ROI of 459 percent and a payback period of seven months.

Charlotte-Mecklenburg PD – Officers of this agency, which serves more than 700,000 citizens, needed more actionable, real-time information in the field. Predictive policing dashboards give command staff, crime analysts, and patrol officers access to data, presented in a way that allows them to visualize which areas have the highest probability of crimes occurring during a four-hour window. Crime has been reduced and police resources are used more effectively. The department will see a projected, cumulative three-year net benefit of $7,772,486, with an ROI of 529 percent and a payback period of five months.

Coty – The world's largest beauty company will see a net benefit of more than $8 million and an ROI of 415 percent through its use of Information Builders' iWay integration solutions. Coty's aggressive growth-through-acquisition plan requires the ability to rapidly integrate the IT environments of acquired companies into its own. iWay brings together multiple, disparate systems from production plants and offices around the globe; easily incorporates new acquisitions; and brings Coty closer to being a real-time organization.

Ford – Operational BI and data visualization empower Ford dealers to quickly identify and resolve problems with warranty repair costs, and compare their warranty performance with other dealers. Greater transparency into service and repair trends has resulted in 40 percent fewer dealers being audited or entering Ford's global warranty counseling process. Stakeholders can also leverage 15 years of historical data to glean new insights about vital operations to assess manufacturing efficiency, supplier quality, and more.

Indaver – This Belgium-based company is one of Europe's leading waste-management specialists. To meet customer demands and give executives greater insight, it deployed a comprehensive web-based portal with a supporting data management infrastructure. Customers can receive all certificates of recovery, treatment, or disposal, and generate their own internal and legally mandated reports. Employees can monitor waste management processes, spot anomalies and trends, allocate expenses, and facilitate internal cost reduction programs. The work it takes to create reports has decreased by 30 percent. Indaver has also improved customer acquisition and retention, reduced costs, and improved compliance – resulting in an estimated five-year cumulative net benefit of €1.45 million, a five-month payback, and an ROI of 149 percent.

International Car Operators (ICO) – Efficient logistics is the foundation for success for companies like ICO, a world leader in loading and unloading ships and handling roll-on/roll-off cargo operations. Integration and intelligence solutions facilitate the smooth integration of data from multiple platforms, dramatically increase the use of electronic data interchange (EDI), address the operational reporting needs of large numbers of users, and help customers track information about their vehicles. ICO has increased operational efficiency, improved communications with customers, reduced costs, and increased revenue. The company will gain a three-year net benefit of €2,978,015, a six-month payback, and an ROI of 424 percent.

OmniCare – Two diverse systems for dispensing information and prescriptions made consolidated reporting a challenge for this leading provider of pharmaceutical care for seniors. It was also difficult to re-submit claims to insurance providers in a timely fashion. The company used iWay Software to build a data mart for pharmacy dispensing systems to simplify patient data retrieval. Information about new patients not covered by insurance is sent to a company that checks and confirms Medicare eligibility. OmniCare has been able to identify and recoup close to $40 million in rejected reimbursements since the environment went live.

Plus Relocation – Recognized as a global leader in the design, implementation, and management of domestic and international relocation programs, Plus wanted to improve services to customers to gain a competitive edge. A sophisticated self-service portal for clients was built using WebFOCUS. Users can track the status and cost of relocations, estimate future costs, and compare expenses against estimates. As a result, Plus has gained new customers, better retained existing ones, improved productivity, and reduced costs, leading to a projected, cumulative three-year net benefit of $3,423,600. The project has an ROI of 196 percent, and a payback period of nine months.

Quinte Health Care – This Canadian healthcare firm relies on Information Builders' integration and BI solutions to measure processes and scrutinize patient information to uncover ways to cut $10 million from its operating budget. More than 300 decision-makers, from executives to nurses, can easily identify areas where money could be saved – for example, where costs may be higher than average or where length of stay is longer than average across the province.

Scotiabank – iWay and WebFOCUS were leveraged to replace an outdated sales information infrastructure at Scotiabank. A new, comprehensive sales reporting environment captures data from multiple retail banking systems and delivers weekly sales reports to the bank's 1,024 branches. By accelerating its ability to open new channels and improving the way sales officers reach out to customers, qualify leads, and align customer profiles with the product mix, Scotiabank expects to generate an additional $250 million in annual sales across all its products.

Information Builders helps organizations transform data into business value. Our solutions for business intelligence (BI) and analytics, integration, and data integrity enable smarter decision-making, strengthen customer relationships, and drive growth. WebFOCUS, iWay, and Omni products work together to seamlessly cover all your information needs.

Intelligence

The WebFOCUS BI and analytics platform delivers rich, consumable, interactive information to the widest range of users.

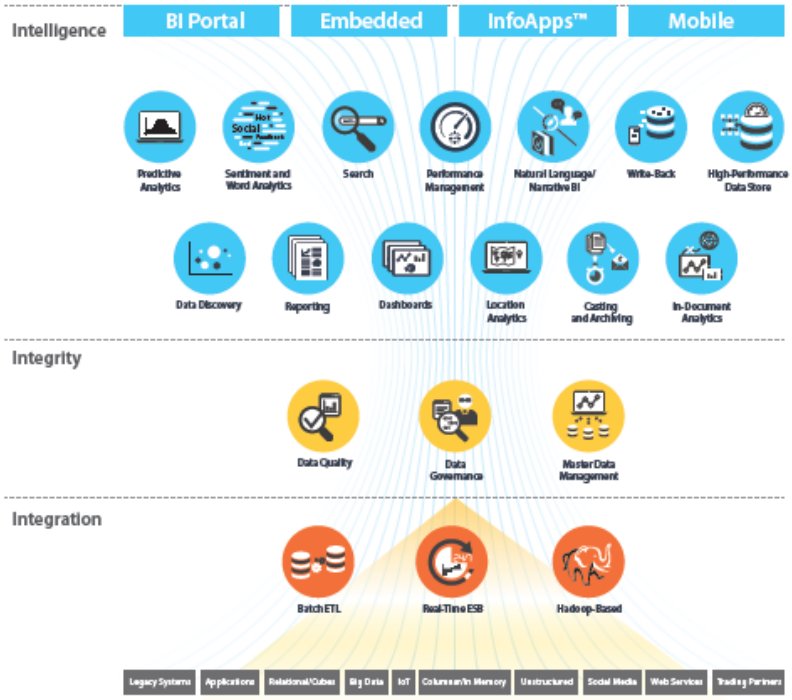
Integrity

The iWay Data Quality Suite and Master Data Management Suite enable profiling, analysis, merging, managing, and cleansing of data from any source – structured or unstructured. Omni applications enable a single, complete strategic and operational view of key business services.

Integration

The iWay Integration Suite is the most flexible and agile integration foundation available, providing interoperability between disparate systems and data for faster time to market on IT and business initiatives.

Intelligence, integrity, and integration solutions help our customers seamlessly navigate the full spectrum of information management for sharper insights and fact-based decision-making.



*To learn more about how intelligence, integrity, and integration can improve your ROI, visit our online **ROI Resource Center** at informationbuilders.com/solutions/roi.*

Information Builders

Solutions Brief

Worldwide Offices

Corporate Headquarters
Two Penn Plaza
New York, NY 10121-2898
(212) 736-4433
(800) 969-4636

United States
Atlanta, GA* (770) 395-9913
Boston, MA* (781) 224-7660
Channels (770) 677-9923
Charlotte, NC (980) 215-8416
Chicago, IL* (630) 971-6700
Cincinnati, OH* (513) 891-2338
Dallas, TX* (972) 398-4100
Denver, CO* (303) 770-4440
Detroit, MI* (248) 641-8820
Federal Systems, D.C.* (703) 276-9006
Florham Park, NJ (973) 593-0022
Houston, TX* (713) 952-4800
Los Angeles, CA* (310) 615-0735
Minneapolis, MN* (651) 602-9100
New York, NY* (212) 736-4433
Philadelphia, PA* (610) 940-0790
Pittsburgh, PA (412) 494-9699
San Jose, CA* (408) 453-7600
Seattle, WA (206) 624-9055
St. Louis, MO* (636) 519-1411, ext. 321
Washington, D.C.* (703) 276-9006

International
Australia*
Melbourne 61-3-9631-7900
Sydney 61-2-8223-0600

Austria Raffeisen Informatik Consulting GmbH
Wien 43-1-211-36-3344

Brazil
São Paulo 55-11-3372-0300

Canada
Calgary (403) 718-9828
Montreal* (514) 421-1555
Toronto* (416) 364-2760
Vancouver (604) 688-2499

China
Peacom, Inc.
Fuzhou 86-15-8800-93995
SolventoSOFT Technology (HK) Limited
Hong Kong 852-9802-4757

Czech Republic InfoBuild Software CE s.r.o.
Praha 420-234-234-773

Estonia InfoBuild Estonia ÖÜ
Tallinn 372-618-1585

Finland InfoBuild Oy
Espoo 358-207-580-840

France*
Suresnes +33 (0)1-49-00-66-00

Germany
Eschborn* 49-6196-775-76-0

Greece Applied Science Ltd.
Athens 30-210-699-8225

Guatemala IDS de Centroamerica
Guatemala City (502) 2412-4212

India* InfoBuild India
Chennai 91-44-42177082

Israel SRL Software Products Ltd.
Petah-Tikva 972-3-9787273

Italy
Agrate Brianza 39-039-59-66-200

Japan KK Ashisuto
Tokyo 81-3-5276-5863

Latvia InfoBuild Lithuania, UAB
Vilnius 370-5-268-3327

Lithuania InfoBuild Lithuania, UAB
Vilnius 370-5-268-3327

Mexico
Mexico City 52-55-5062-0660

Netherlands*
Amstelveen 31 (0)20-4563333
- Belgium
- Luxembourg

Nigeria InfoBuild Nigeria
Garki-Abuja 234-9-290-2621

Norway InfoBuild Norge AS c/o Okonor
Tynset 358-0-207-580-840

Portugal
Lisboa 351-217-217-400

Singapore Automatic Identification Technology Ltd.
Singapore 65-69080191/92

South Africa InfoBuild (Pty) Ltd.
Johannesburg 27-11-064-5668

South Korea
Dfocus Co., Ltd.
Seoul 02-3452-3900

UVANSYS, Inc.
Seoul 82-2-832-0705

Southeast Asia Information Builders SEAsia Pte. Ltd.
Singapore 60-172980912
- Bangladesh
- Brunei
- Burma
- Cambodia
- Indonesia
- Malaysia
- Papua New Guinea
- Thailand
- The Philippines
- Vietnam

Spain
Barcelona 34-93-452-63-85
Bilbao 34-94-400-88-05
Madrid* 34-91-710-22-75

Sweden
Stockholm 46-8-76-46-000

Switzerland
Brugg 41-44-839-49-49

Taiwan
Azion Corporation
Taipei 886-2-2356-3996
Galaxy Software Services, Inc.
Taipei 886-2-2586-7890, ext. 114

Tunisia North Africa Business Consulting
Bizerte 215-22-86-85-79

Turkey Paladin Bilisim Danismanlik A.S.
Istanbul 90-532-111-32-82

United Kingdom*
Uxbridge Middlesex 44-20-7107-4000

Venezuela InfoServices Consulting
Caracas 58212-763-1653

West Africa InfoBuild FSA
Abidjan 225-01-17-61-15

* Training facilities are located at these offices.

Find Out More

We can help you succeed. Talk to your local Information Builders representative to learn how. Visit us at **informationbuilders.com**, e-mail **askinfo@informationbuilders.com**, or call **(800) 969-4636** in the U.S. and Canada. To improve your skills, visit **education.ibi.com**.

DN7508557.0117

Appendix D Cost Benefit Estimates

COST BENEFIT ANALYSIS – ESTIMATES

Estimated Investment Costs (subject to some variability)	Capital (i.e. number or range)*	Annual Operating (i.e. number or range)**
Information Management Strategy	$100,000	
Business Intelligence Centre of Excellence	$250,000 software + $200,000 Services	$50,000
Business Intelligence, Integration and Data Quality/MDM	$250,000 Software + $200,000 services	$50,000
Phase I • Phase II • Phase III	$300,000 Software+ $300,000 Services	$60,000
Change Management	$150,000	

(* Capital costs include consulting resources, City staff allocations would be in addition. Consulting resources are for development of Use Cases described)

(** Operating costs are for annual Software Support and Maintenance only. This provides all product bug fixes and enhancements as well as 24x7 technical support. These costs do not include any resources costs to support a division and staff for the Business Intelligence Centre of Excellence. The number of staff for the BICoE would range from 2 to 3 people with an anticipated cost of $135,000 to $175,000.)

(*** Training is not included in these costs, but can be estimated as $4,000 per developer for a subscription annual training pass)

Use Case	Improvements	Efficiencies*	Potential/Estimated Annual $ Value of Saving*
Financial Reporting	Automate reporting and processing	40 to 50 weeks	up to $100k
	Self-Service - save manager efforts	50 to 70 weeks	up to $150k
Transit Self-Service	Centralized reporting/ Self-Service	40 to 52 weeks	up to $ 90k
Bylaw Self-Service	Automated data extraction & history	4 to 8 weeks	
	Automated email processing	40 to 52 weeks	
"311" Dashboard & Reporting	Automated extract and self-service for managers	10 to 25 weeks	
	Automated extract and self-service for decision support	10 to 26 weeks	
HR Dashboard	Consolidated view of HR data	60 to 120 weeks	up to $250k
Total		**254 to 403 weeks**	

(* The above value information is based on high level estimates which are subject to significant variability. Actual efficiencies or savings cannot be quantified with any degree of accuracy at this stage as all potential changes are conceptual in nature and would in many cases result in redirected effort to more value-added services. Further analysis is required to refine these calculations to reflect a more accurate observation.)