Data and Analytics (DnA)

MASTER PLAN 2023 TO 2026

Together, putting data to work

York Region

CONTENTS

DnA 2.0 lays the groundwork for a future where the strength of our analytics will be as important as our data management.

INTRODUCTION: TOGETHER, PUTTING DATA TO WORK

Welcome to York Region's Data and Analytics (DnA) Master Plan – 2.0.

While our first DnA Master Plan (1.0) dealt with data, DnA 2.0 deals with analytics and how we're "putting data to work."

When it was implemented in 2019, DnA 1.0 broke ground with its focus on data. Its key principles and initiatives continue to guide data and analytics within the Region. But as we continue our story of change, DnA 2.0 gives us much to look forward to.

DnA 2.0 lays the groundwork for a future where the strength of our analytics will be as important as our data management. New programs, insights and directions outlined in DnA 2.0 reflect both technical and organizational capabilities largely unavailable just four years ago. And we're already increasingly using data to drive impact and innovation as our data access, sharing, integration and analytics improve.

Four years from now? We expect continued positive change, driven largely by anchor projects like YorkData, advanced analytics (including artificial intelligence), stewardship, data sharing and data literacy. These "must-have" projects will continue to build the Region's maturity in our 11 knowledge areas and our DnA foundation, enabling a data-informed and data-empowered culture throughout the organization. Whether you've followed us though DnA 1.0 or are reading about our work for the first time, we are pleased to share highlights of our data and analytics change journey with you.

QUESTIONS? Connect with us!

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WHY DATA AND ANALYTICS (DNA) AND WHY A DNA MASTER PLAN?

With an appropriate data management foundation and analytics capabilities like AI, data and analytics can change lives and create better outcomes for citizens by informing our policy development and by transforming and personalizing our programs and services and their delivery.

Since 2019 the Region's departments have become more consistent in their data management, using the first DnA Master Plan to guide their efforts.

Like virtually any large, federated organization, we had departmental focus. Pockets of data and analytics excellence and ownership supported each department's policy, program and service needs with little incentive or opportunity to coordinate across departments on many things, like data management.

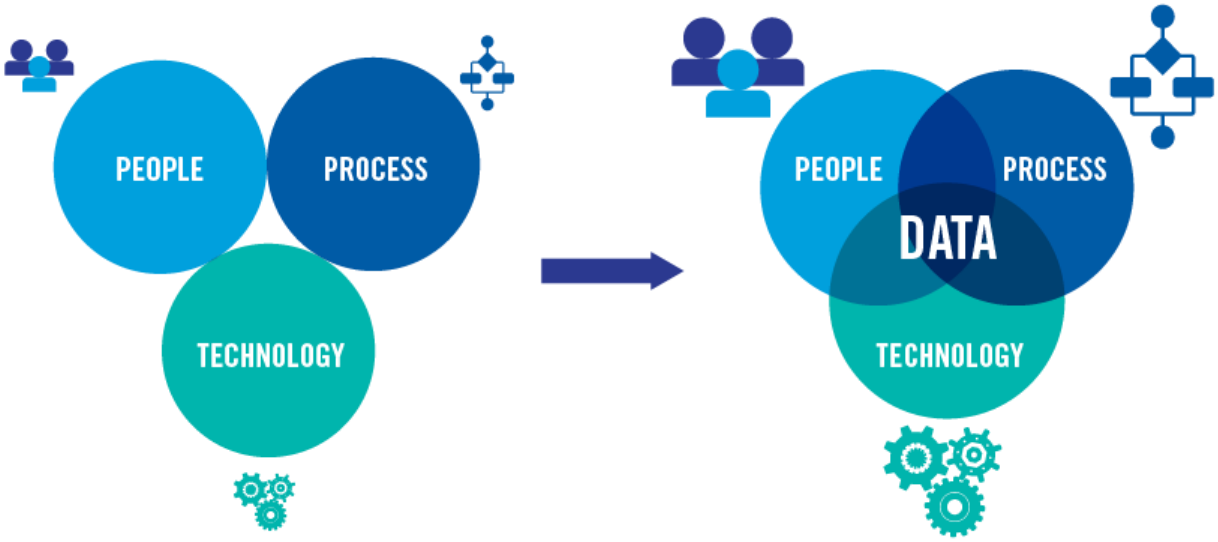
> "Data is nothing without strategy."
>
> *Bernard Marr, Author and Business/Technology Influencer*

The DnA Master Plan gave the Region a way to take a more *corporate approach* to data and analytics services, and to share our data and experience. It gave us a corporate vision and approach that leverages the capabilities and learnings from across the Region.

Specifically, the DnA Master Plan looked at the maturity of our DnA components and provided key projects, and mechanisms to build the data management foundation required to help drive insight into our programs and services.

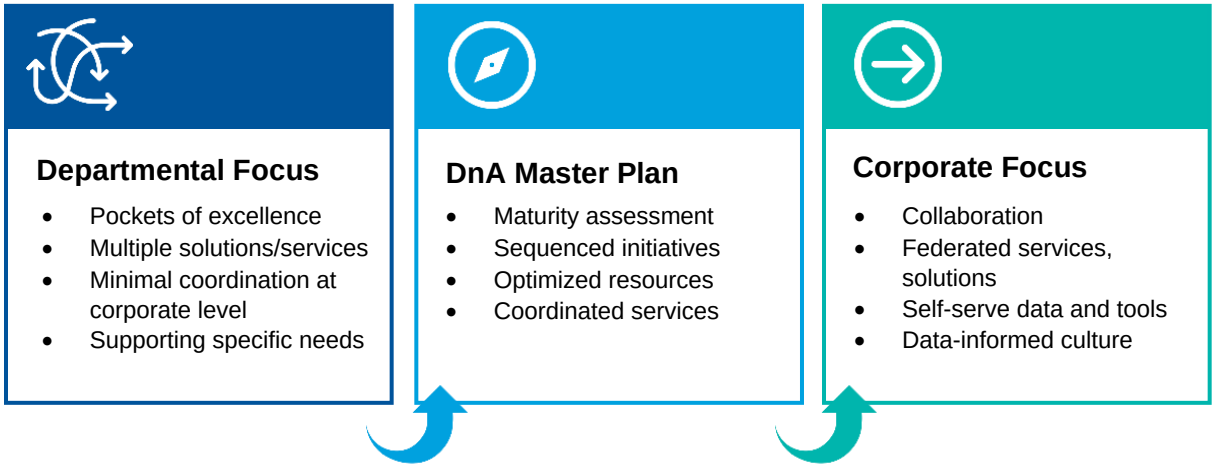
Data is Central to Digital and Business Transformation

The diagram below (from Gartner) illustrates how business transformation and growth can be enabled through data, bringing the three components of people, process and technology together and enabling interaction, understanding and change.



Establishing a Corporate Focus

The Master Plan process diagram below from the DnA 1.0 helps illustrate the original state of the organization, the clarity and structure the Master Plan applies, and the resulting state of the Region with the Plan's implementation.



DNA MASTER PLAN 1.0 (2019 TO 2022)

York Region's initial DnA Master Plan in 2019 provided a four-year strategic approach to the management and growth of DnA. The plan sought to establish a data-informed culture at York Region, to increase the value of data as a corporate resource and to build a partnered approach to data and analytics across the organization – with minimal additional resources.

OUR ASPIRATION:

"Together, putting data to work"

Pillars

Five pillars defined the desired foundational goals and impact of the 2019 to 2023 Master Plan:

Data Informed Culture

Foster an organizational culture that supports data-informed activities and outcomes.

Establish Governance

Establish and adopt horizontal and vertical governance, with clear accountability.

Enhance Capabilities and Literacy

Provision access to training and adoption tactics to promote and enhance data literacy.

Appropriate Access to Trusted and Timely Data

Provide appropriate access to the right data at the right time to support decision-making.

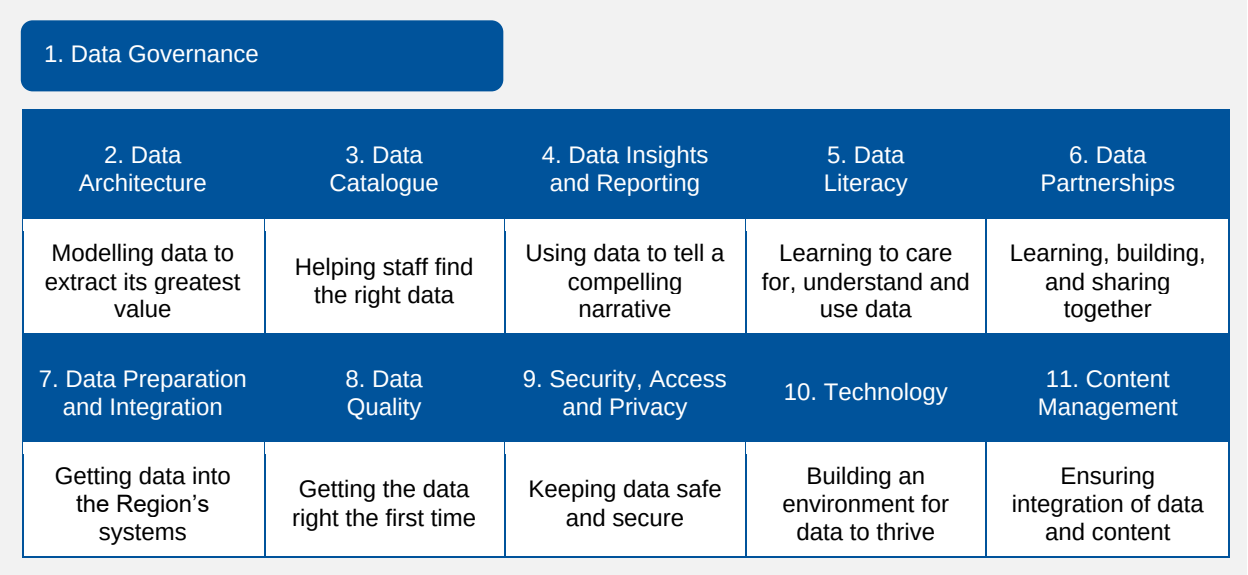
Tools for Self-Service Data and Analytics

Equip staff with access to tools for self-service enablement.

Knowledge Areas

The Region adopted eleven knowledge areas (with one, Data Governance, that supports the other 10) to measure the progress and maturity of DnA across the organization. These knowledge areas closely reflect DAMA's "DMBOK" (Data Management Book of Knowledge) and its knowledge and analytics area definitions.

The knowledge areas are:



Anchor Projects (2019 to 2022)

Over the last four years, York Region initiated and delivered several anchoring data and analytics projects that put the Region on a path toward becoming a data-informed organization. These include:

YorkData

YorkData is a central platform for sharing and centralizing data from all of the Region's departments where data is searchable and usable through self-serve analytics and publishing tools. YorkData is to be a single trusted source for certified, high-quality data from programs throughout the Region so staff and management using the analytics and publishing tools, and potentially leveraging the dashboards and analysis already published, can make more informed and data-informed decisions.

"Everyone from DLT to doers are aligned to the vision. That is a success in itself."

"Data visualization standards and branding have been successfully applied across departments."

Dashboard Catalogue

Now part of YorkData, the dashboard catalogue is a “one-stop shop” of the Region’s dashboards. Whether a manager is looking for a dashboard to illustrate a relevant HR inquiry like their team’s vacation bank status or a data analyst is looking for inspiration from other published dashboards, the Dashboard Catalogue provides the first step(s) they need to create their own analysis and dashboard from their data – which others can then build from once its published.

The project’s objective was to reduce time and effort in collaborating on dashboarding needs across departments at York Region, and to simplify access to the dashboards staff need. The 2023 advanced analytics use cases study found more than 1,400 dashboards created in the Region – so this has been quite successful.

PwC found the original dashboard catalogue presented to be a challenging user experience, limiting its effectiveness. Its incorporation into the YorkData architecture and the added emphasis on and availability of training within the Digital Academy is helping build familiarity and understanding of how to create dashboards and use the catalogue.

COVID-19 Response

It’s helpful to recall just how *un-planned* COVID-19 was, and yet it became the focus across the organization, the province and beyond. It tested our ability and willingness to transform our ways of working and our ability to collect, use and report data. COVID-19 illustrated the need to be flexible and agile in the projects building our DnA foundation (the 11 knowledge areas) while emphasising the need for the anchor projects. Our COVID-19 response increased maturity in many knowledge areas as staff became more self-reliant DnA users, and there was new need to share among organizations.

The **Healthy Data, Healthy Response** project implemented at the height of the pandemic helped Public Health, emergency operations, and others make data informed health care decisions. It was the Region’s response to many of the challenges the pandemic introduced. Its many components included different project management tools such as a map-based vaccine reporting system, as well as several proprietary tools for front-line professionals. The most recognizable impact of the initiative is an integrated online dashboard with multiple topics and analyses on the Region's website, which received more than three million hits.

“Eliminating duplication and the need for data entry in multiple disparate systems and spreadsheets.”

“Improving the integrity of our data from data entry all the way through to reporting.”

Digital Academy and Competency Assessment: Creating a Digital Mindset

Digital literacy describes skills and knowledge to keep up with changing technology, the ability to use technology to communicate effectively, as well as competency in caring for, understanding, analyzing and using data.

The Digital Academy is the Region's primary initiative supporting the development of data literacy among employees through learning and development offerings such as online and in-class training, workshops and webinars.

The primary objective of the initiative was to increase data and digital literacy of our workforce and decrease reliance on DnA experts in pockets across the organization.

The past five years have seen 137 sessions with almost 1,500 learners. Learning is a common interest as illustrated by 71% of participants in the PwC study, indicating they participate in a Community of Practice to share knowledge. An online assessment is available through the Digital Academy for staff to help build data competency.

> "Courses like 'Dashboard in a day' and 'Discover data' helped to reduce reliance on technical experts."

> "Staff can get YorkData platform training like Power BI, SSIS, etc. without having to seek out their own trainers."

Figuring Out Federated and the Playbook

We undertook an initiative to define how data and analytics services can be delivered in a partnered approach across our federated organization.

York Region's federated model has long meant:

- valuable data in departmental systems isn't being shared;
- specialized staff skills remained untapped by others; and
- the delivery of DnA-related services was duplicated or unclear.

In 2021, the Region completed a rigorous and ambitious project to identify and define the DnA services and then determine the accountability and delivery process **for each** within a "**Service Interaction Diagram**" (an example of which is shown here) which illustrates who does what and in what order.

The project determined which of the 56 identified services are better provided corporately and which are better provided within each department (see the updated "Periodic Table" below). More services likely will arise as groups such as Information Technology Services (ITS) and Information Asset Management (IAM) go through similar modeling exercises.

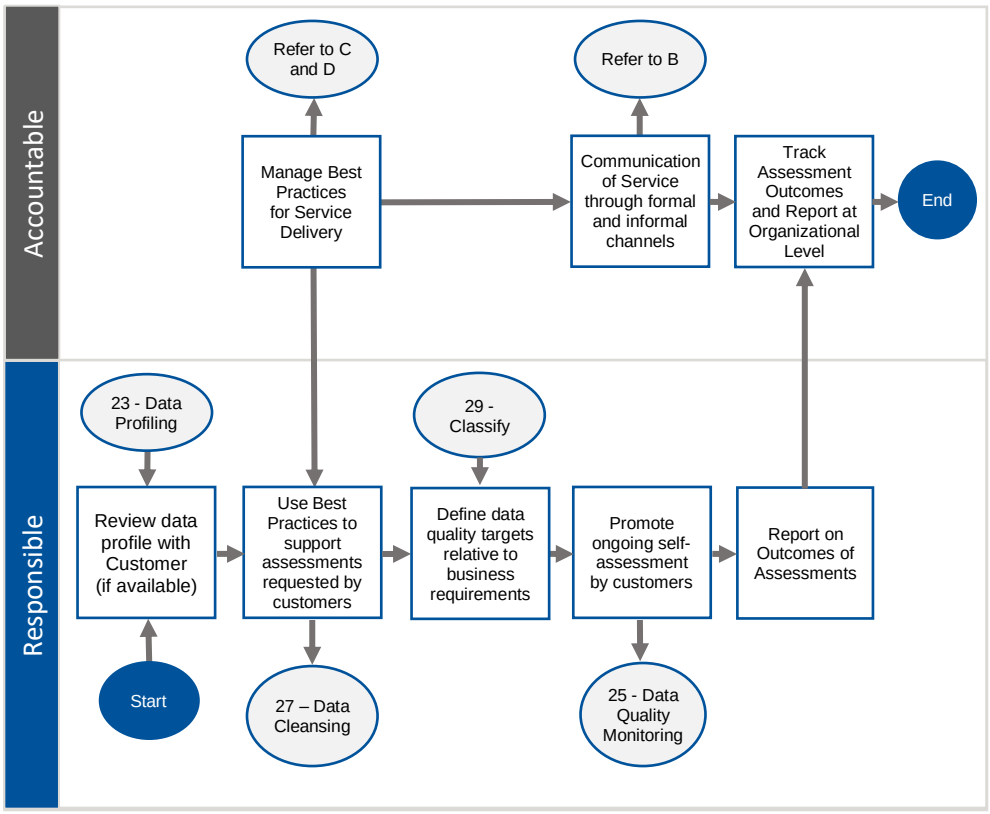


Figure: Example of a Service Interaction Diagram

The intent is that departments will provide DnA support for several services through this model, working together across business lines to serve and advance data and analytics.

At the time, the *process* of identifying these services and each service's steps and responsibilities for delivery helped bring our federated corporation together through many robust debates and discussions, enabling points of view to be shared, minds changed and agreements reached. We even wrote a book about it!

In 2022 we started developing the Service Catalogue, accessible through our intranet. We must **continue to develop these services** to make them fully accessible to every staff member, so the power of data and analytics can be used for any business purpose. Over the next four years, we'll be making services more robust, easier to access and deliver through request forms, self-service toolkits, user resources, contacts, and educational materials. We anticipate business value from the clarity and guidance these provide to staff, giving any staff member access to the service, regardless of where they sit in the organization. At the back-end, service requests can be triaged and routed either to Corporate Services staff, or departmental staff for fulfilment.

Their full implementation remains a key objective for "figuring out federated" and a requirement of our corporate ability to "put data to work."

PwC Review (2021)

In 2021, PwC surveyed data-engaged staff in each department to get subjective ratings on how mature they felt data management was in each knowledge area. These ratings may be affected by how aware each staff member was of different initiatives, but overall the survey provides a good indication of progress.

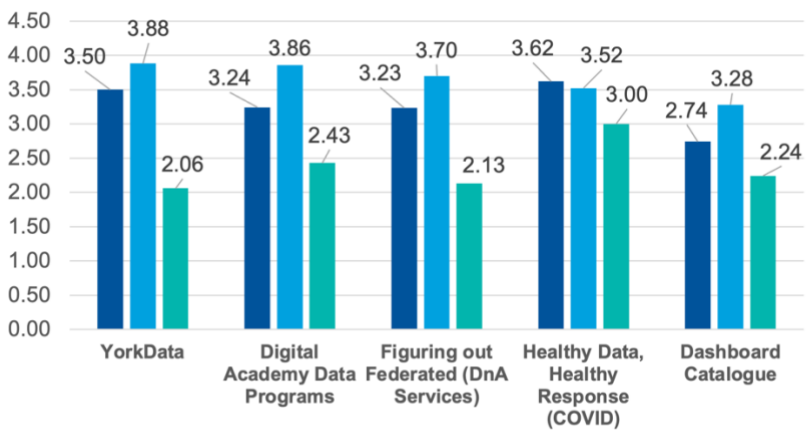
Purpose

1. Analyze and understand the organization-wide impact of five key strategic DnA projects
2. Analyze and understand the change in DnA maturity across York Region's 11 knowledge areas
3. Summarize overall quantitative and qualitative benefits of the work at York Region and offer a high-level path forward

Review of Five Initiatives

PwC did a deep dive on five DnA programs that were key to DnA 1.0:

1. YorkData
2. Dashboard Catalogue
3. Healthy Data, Healthy Response (COVID-19 Response)
4. Digital Academy (Data Stream) and Competency Assessment
5. Figuring Out Federated (DnA Services)



Change management and adaptability: To what extent was the initiative successful across the organization, and adaptable?

Resource allocation and scalability: To what extent are the initiative's costs justified by its benefits and potential value?

Effectiveness: To what extent did the initiative achieve its business objective?

Scale:
0.00 – 1.00: strongly disagree / very low
1.01 – 2.00: somewhat disagree / low
2.01 – 3.00: somewhat agree / medium
3.01 – 4.00: strongly agree / high

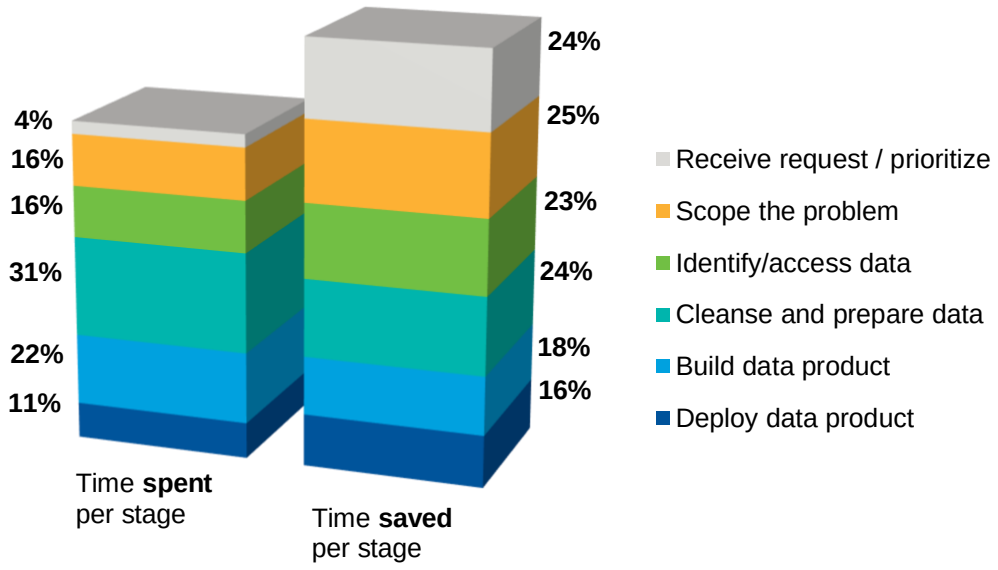
Overall Findings

We've grown in overall DnA maturity (from 2.4 to 2.8). For example: **Data Insights & Reporting** grew by 1.1, largely due to the numerous dashboards created; **Data Partnerships** grew by 1.1, largely due to the continued leadership and collaboration with external partners through YorkInfo Partnership and more; and **Data Literacy** grew by 0.8, largely due to the Digital Academy and the Region's COVID-19 response.

A greater focus is needed in addressing our **Data Architecture**, **Data Catalogue**, **Master Data Management**, **Data Preparation & Integration**, and **Data Security, Access & Privacy**.

We're also saving time in DnA projects. For example, staff spend 16% to 25% less time at each stage of the DnA lifecycle; there's an average 23% less time spent for each use case; and, most (57%) of the time saved is re-allocated for more analytics.

Typical Time Reduction in DnA Projects



PWC's Recommendations

The following high-level recommendations target data's role in digital transformation improvements:

Each department has made great strides in their DnA journey, but often without collaborating across departments.

a) Allocate budget and resources strategically. The Region has made significant strides in becoming a data-informed organization with limited resources and funds. However, staffing and funding allocation can be more strategic.

b) Improve the user experience and design. Non-technical staff sometimes struggle using the programs/applications. Spend the time needed to design better tools tailored to their needs.

c) Focus on governance. Each department has made great strides in their DnA journey, but often without collaborating across departments. High-level strategic guidance and oversight or an integrated plan fitting the independent projects together is needed.

d) Enable federated and standardize processes. To enable a federated model, departments must deliver the services ready for roll out. This will standardize processes and help achieve the intended benefits of "Federated."

e) Transform through advanced analytics/AI. York Region has significantly increased the use of analytics and AI over the last two years. Prepare and enable analytics use cases that link to business value.

Summary of PWC's Review

DnA 2.0 projects will continue the maturation of the knowledge areas, build experience, develop new skills and replicate best practices in the Region.

A shift to advanced analytics-based initiatives, many with AI and intelligent automation opportunities, will emerge.

DnA is part of the Region's Digital Plan and key to its digital priorities.

DnA 2.0 will continue to align, advise and interact with other corporate strategic and departmental plans while drawing on best practices and industry trends.

DNA MASTER PLAN 2.0 (2023 TO 2026)

Developing the Plan

The feedback from the **PwC review** (above) was integrated into this DnA Master Plan along with findings from an **Environmental Scan** (from recent literature), the **Advanced Analytics Use Case Review** (2023), the **Web Mapping Strategy** (2023 to 2026), the **corporate Digital Plan**, and the many lessons learned through our anchor projects and growth.

> "In DnA 1.0 we set the data management foundation. Now, we focus attention on putting data to work."
>
> *John Houweling, Director, Data, Analytics and Visualization Services branch*

Several anchor and core projects for each knowledge area have been identified. These will continue to mature each of the 11 knowledge areas over the next four years. These projects will build experience, develop new skills, and require staff to develop techniques and best practices that can subsequently be replicated for other projects across the organization. Their success will continue to validate how effective our strategies and tactics have been and will build confidence that the Pillars set remain strong and relevant.

Although a data emphasis remains in the plan, more future-focused, analytics-based initiatives will emerge defining and implementing new solutions that incorporate advanced analytics, AI and intelligent automation opportunities.

ENVIRONMENTAL SCAN

The (Hidden) Cost of Managing Data

Managing data isn't cheap! The cost is difficult to quantify as it is often buried within business operations.

McKinsey estimates data management accounts for about 5% of an organization's total budget.

For York Region, with a budget of about $2B, that means we could be spending about $100M on data management.

Let's get the most value from this public investment!

Data may be abundant but managing data isn't cheap.

Many organizations are unaware of just how much they are spending on data because costs are diffused across the enterprzise.

Third-party data expenditures might come out of the business unit's budget, for example, while reporting cost resides in relevant corporate functions, and data-architecture spend is managed in IT.

When pulled together, the tally can be jarring. A midsize institution with $5 billion of operating costs, for example, spends more than $250 million on data across third-party data sourcing, architecture, governance, and consumption.

Source:
Reducing data costs without jeopardizing growth
July 31, 2020 | McKinsey Digital Article
By Davide Grande, Jorge Machado, Bryan Petzold, Marcus Roth

Dataversity Report

In 2022, Dataversity Education LLC and Global Data Strategy published a report titled "Trends in Data Management – A 2022 Dataversity Report."

This highly regarded report provided data and insights based on responses from 181 organizations worldwide, with 78% from the private sector, 12% from the public sector and 10% from education or non-profit.

"*The increased importance of data has driven the need for Data Management fundamentals to establish trusted data that can drive organizational success. As a result, Data Governance, Data Quality, Data Security and a solid Data Architecture are in greater demand.*

To support this demand, Data Literacy and technical data skills are needed, and many organizations struggle to find qualified staff with the skills needed to support a data-driven digital organization. The need for education and training around data is a growing priority" (Dataversity).

The main findings from their report included the following six insights – which are refreshingly close to the directions the Region is taking as well:

Digital transformation is a priority for organizations; however, its realization has shifted toward the use of digital technologies and data, rather than as an effort in and of itself (i.e., shifting from **theory** to **practical**).

As data becomes an increasingly important business asset, more organizations look to **self-serve analysis and reporting** as well as **data governance.**

To do this, **data literacy** is needed but there is often a **skills gap** to meet the high demand for technical, data-centric skills.

Organizations **implement a data management initiative** to:

- Gain insights from data analytics (74%)
- Save costs and increase efficiency (66%)
- Improve customer satisfaction (63%)

Top already-undertaken **data management initiatives**:

- Business intelligence and reporting
- Data warehousing
- Data governance

Notable 10% rise in organizations reporting "**self-serve analysis and reporting** initiatives."

Top planned **data management initiatives:**

- Data governance
- Data quality
- Master data management
- Metadata management
- Data strategy

Data literacy was a common theme.

As organizations become data-driven, they need to **increase the awareness and knowledge** of core data management fundamentals.

From the information provided by the Dataversity environmental scan, we take away the added realization that our DnA strategy is going in the right direction, and that our organization's focus on digital and establishing a digital mindset – through continued maturity and improvement to our management and use of data – is broadly identified and supported in the private and public sectors.

(For more information from the Dataversity environmental scan, see Appendix 2.)

Current State of Analytics Projects

Earlier this year, a small team from the Data, Analytics and Visualization Services (DAVS) branch undertook a corporate-wide "Advanced Analytics Use Case Review" to identify the impact of analytics within the Region (see Appendix 2 – Advanced Analytics Use Cases for more detail).

The following graphic illustrates the analytics "journey" for organizations. Considering the introduction and use of analytics within the Region, we will be approaching the end of our journey within the context of the DnA 2.0 Master Plan.

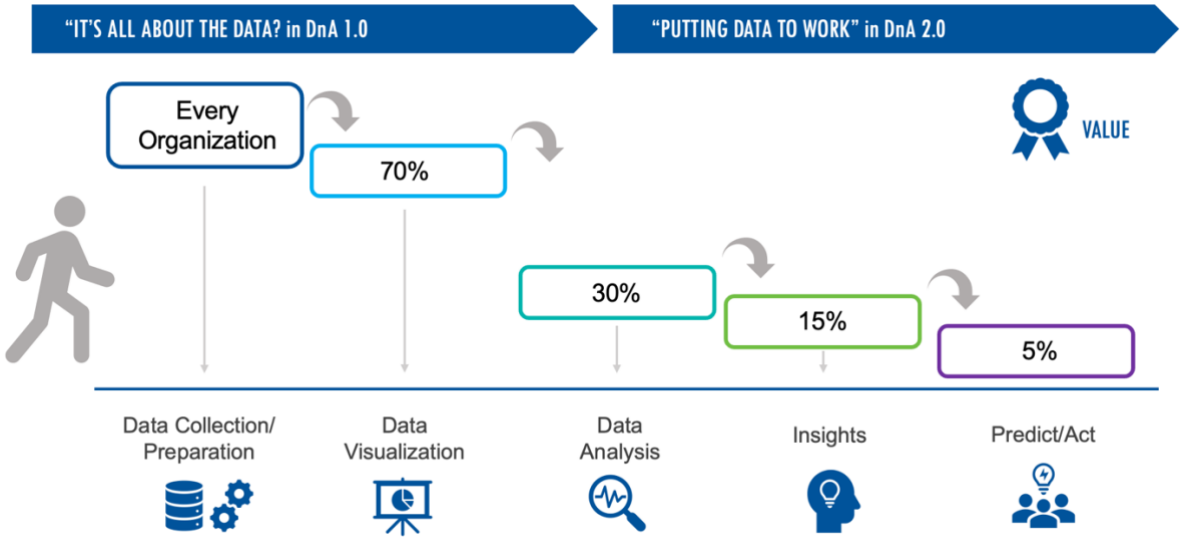


Figure adapted from Forbes "Data Analytics Marathon: Why Your Organization Must Focus On The Finish" (Jan 2022).

The further we go on this journey, the greater the value and insights, and the higher the difficulty – as the Analytics Ascendancy Model shows in the section "Focus On: Advanced Analytics" (below).

DNA 2.0 PILLARS

Revisiting the Pillars

The 2019 to 2022 DnA Master Plan was organized around five pillars that defined foundational goals to improve our data management capabilities across the corporation. While there is still further work to be done in each area, the original goals the pillars represented have been realized, and going forward they have been streamlined to better reflect our current context, our raised maturity, and our ambitions.

The four new pillars build on our original goals and anticipate the future, where analytics strength will be as important as data management competency. The pillars focus on continual improvement of data and analytics capacity **while adding innovation and impact in the digital delivery of services**.

ACCESS & SHARING

Data is efficiently accessed and shared to drive digital delivery

CULTURE & TALENT

Organization recognizes data as key to operations and decisions and develops data literacy and capabilities of staff

TRUST & GOVERNANCE

Roles and responsibilities are defined and data stewardship structures span the organization

ACTIONABLE INSIGHTS

Staff are empowered with actionable data insights from self-serve, advanced analytics

1. Reinforce **Access and Sharing**: For the flow of data to drive digital delivery, staff need to efficiently access data and securely share it with collaborators and partners.
2. Enhance data **Culture and Talent**: Along with data, staff awareness, understanding and capability are central to the functioning of our organization.
3. Build **Trust** and extend practical (hands-on) data **Governance**: Continue to define roles and responsibilities and build data stewardship structures that span data lineages.
4. Make **Actionable Insights** that inform business decisions through analytics: Introduce advanced analytics that provide predictive and prescriptive results to inform business decisions.

Data and Analytics have become integral pieces of the Region's Digital Plan and key to advancing the corporation's digital priorities. The DnA Master Plan 2.0 will continue to align, advise, integrate and interact with other corporate strategic and departmental plans while drawing on external best practices and industry trends.

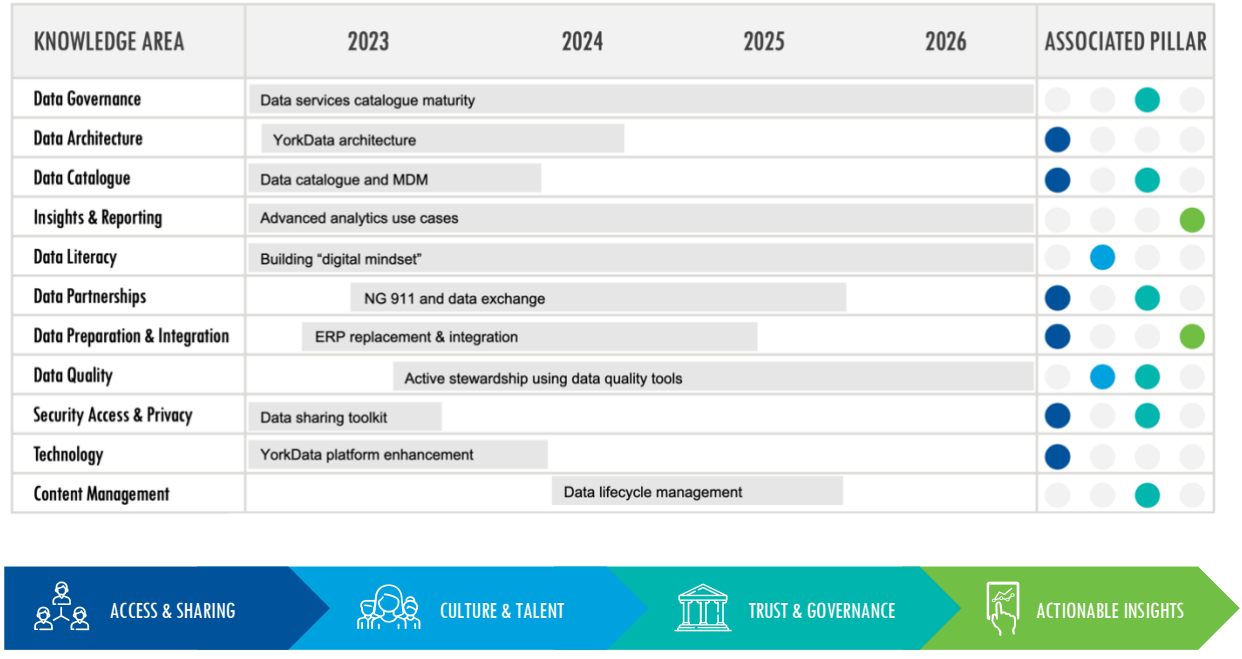
DNA 2.0 KNOWLEDGE AREAS: ANCHOR PROJECTS

The knowledge areas are how we continue to **build our foundation** in data and analytics.

> "Knowledge areas are the beating heart of the 2023 to 2026 DnA Master Plan."
>
> *Andrew Satterthwaite, Manager, Special Projects, Data, Analytics and Visualization Services branch*

Each knowledge area has an anchor project, supported by several other projects. Anchor projects are intended to develop new capabilities for the Region, which can be used in all departments. By design, some of the anchor projects are led by departments so that we increase data and analytics maturity in all parts of the organization, and then learn from each other. These are all projects that departments had already identified as priorities.

The diagram below identifies the anchor project for each knowledge area. The five highlighted projects in the diagram for architecture, insights and reporting, data literacy, data quality and security, and access and privacy are described in further detail below. All the anchor and supporting projects are outlined in more depth in other sections.



FOCUS ON: YorkData

A "giant leap" transformative project

What is YorkData?

YorkData is our corporate platform for data and analytics with self-serve access (via the Data Catalogue) to data, analytics tools, processes, dashboards, and publishing. It's a common, connected way for collaboration.

> "If you really want to create this culture of people working with data, consuming data, making decisions based on data, it starts with having easy access to data."
>
> *Ferd Scheepers, Chief AI Architect, ING*

Why is YorkData important?

YorkData is our corporate source of certified, trusted data. Curated data from throughout the Region and beyond are available to be used for analysis, insights, dashboarding, reporting, mapping and more to support our programs and services.

Where YorkData really makes a difference is that data from different areas can be discovered, then joined and analyzed together, providing new perspectives into our programs and services.

What has already been done?

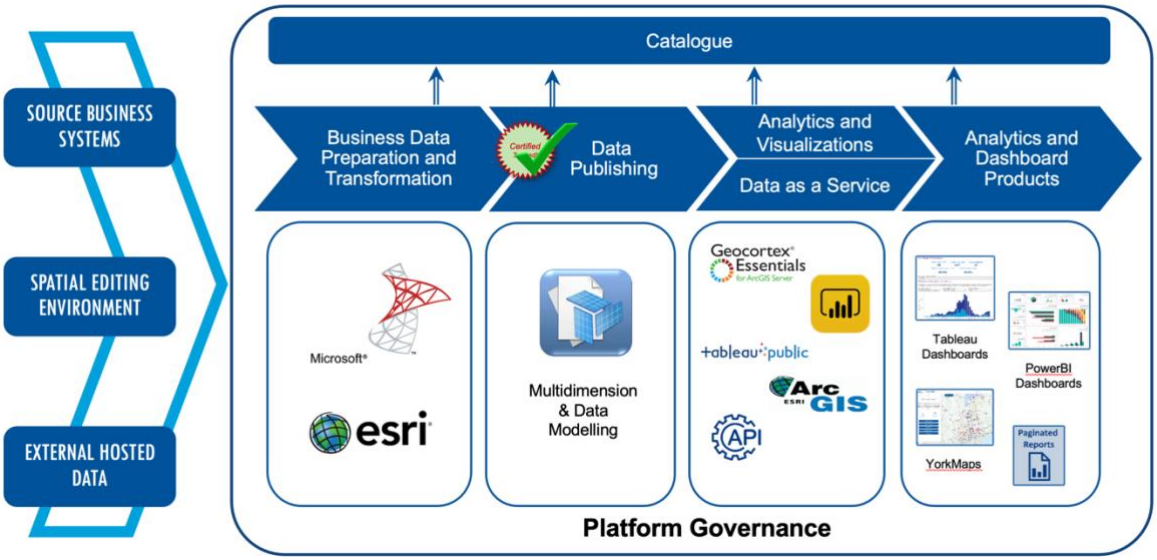
A data warehouse has been created, and data stewards have loaded key components of their operational data. Several dashboards now run against this data, following established best practices. Usage continues to increase. Governance has standardized how data is loaded, so users have a more consistent experience across different datasets.

What can we expect over the next four years?

Data stewards throughout the Region will continue to load and share core, usable elements of their operational databases, following a prioritization framework. The technical environment will be enhanced with a new data catalogue and data quality tools to aid discovery and trust. Eventually, staff will be able to directly access curated views of the data that address their needs and use this data in their own processes with the self-serve analytics and reporting tools.

How YorkData works…

Key components of internal and external business databases (left side) are certified and published by data stewards (first two sections) for use by staff with self-serve analytics and publishing tools (last two sections). Everything is searchable (in the catalogue).



FOCUS ON: Advanced Analytics

Actionable insights from trusted data

What is advanced analytics?

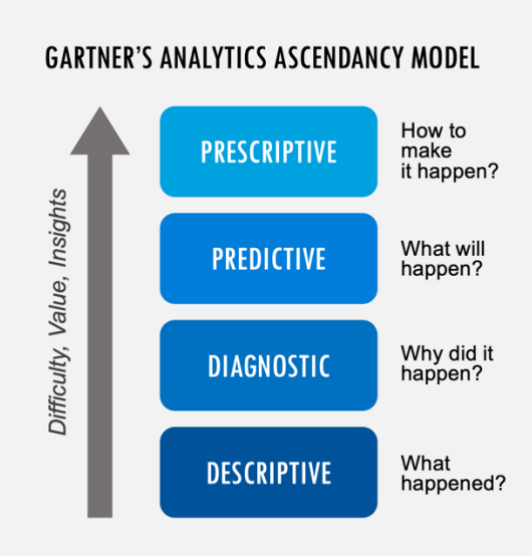
Advanced analytics enables predictive and prescriptive insights that can generate insight and guide decisions.

> Any intelligence, artificial or otherwise, needs data.

While basic descriptive analysis provides a view of what has happened or is happening, for example through trends and condition assessments, advanced analytics can help automate complex analysis processes often with large datasets and provide insights that aren't readily apparent or otherwise possible.

Analytics Ascendancy Model

Gartner's Analytics Ascendancy Model (shown here) provides a quick understanding of how analytics becomes more difficult, yet with more value and greater insights, as it gets more advanced.



Why is advanced analytics important to the Region?

The Region has many operational processes that generate large amounts of data. Applying advanced analytic techniques will provide insights and, by processing complex data automatically, make recommendations that can be acted on (e.g., quickly processing an application).

What has already been done?

Advanced analytics models have been developed for courts, transit, road maintenance and water/wastewater operations.

What can we expect over the next four years?

Advanced analytics models will increasingly support how we do business. The advanced analytics area is extremely dynamic, with new natural language processing models and other artificial intelligence tools emerging, so it will be important for the Region to stay agile in its approach to realizing value. Projects may be quite diverse, for example:

- **Document Retention**: Leveraging AI technology to assign values to document files to automate the process of determining whether and how they should be archived.
- **Talent Progression Analysis**: Understanding historic talent movement within the Region to extract organic career journeys to support this movement.
- **Fleet Management**: Predicting/optimizing fleet management and maintenance.
- **Inflow and Infiltration**: Enabling Public Works staff to better understand and predict the effects of inflow and infiltration from storms; providing predictive analysis of storm impact on wastewater capacity and help guide upgrade decisions and priority setting.
- **More AWARDS**?!: The Public Works I&I solution came in first in the Intelligent Water System challenge at the Water Environment Association of Ontario annual conference in April 2023.

How will artificial intelligence impact data and analytics at York Region?

Novel forms of artificial intelligence (AI) such as ChatGPT and MS Turing emerged in 2023, able to generate text, code and images in response to natural language inputs. Additional new tools are on the horizon, some of which will be available as services.

They augment existing analytics-based tools such as chatbots, machine learning (ML) and robotic processing automation (RPA). Overall, AI and related tools identify and analyze patterns in data, documents and images to make predictions. They can help us process data and analytics tasks much more efficiently, and in turn help our residents, if we deploy them responsibly. Biases inherent in some AI tools raise ethical issues that will require vigilance, especially when providing services directly to residents.

While AI tools can help us serve residents more efficiently, they can only do so if the data is right. So, introducing AI requires the data we collect to be well-managed and to ensure it can be trusted.

The Region will take a cautiously optimistic path in adopting AI into our data and analytics business processes. As of 2023, our approach is to:

- Develop robotic process automation to speed routine data processing tasks
- Provide guidance to staff around using free AI tools
- Pilot with a licensed version of paid-for AI tools, through a service bureau
- Bring AI capabilities into back-office functions, such as a custom conversational chatbot implementation
- Establish governance and an AI solution registry
- Take careful account of the impact of bias in data, and be ethical and transparent in how we are using AI

Given the speed at which AI is developing, other actions may be taken within the span of this masterplan.

FOCUS ON: Stewardship

Take control, we all have a role

Not all staff are stewards, but we all have a role in DnA. Our most important role is to learn and develop our digital mindset, to become familiar with data and the various tools available to use, manipulate, display and manage data.

> Data producers must have a data-sharing mindset.
>
> *Gartner Insights, 2021*

There are many self-serve tools available in YorkData and corporately; and there are many opportunities for learning via the Digital Academy. Managers need to foster an environment of learning.

What is Stewardship?

Stewards ensure the data holdings they are responsible for are fit for purpose and available to users. Stewards need to consider the various uses of the data, listen to user needs, and ensure those needs are reflected in how the data is collected, maintained and used. Their major focus is data quality. For this to happen, the Region must ensure data stewards have the confidence and training they need, as well as appropriate tools for cataloguing and data quality.

Why is stewardship important to the Region?

As we would for any corporate asset, it's important someone be responsible for managing any program's *data holding* across its lifecycle. Formalizing that role and responsibility while ensuring they have the training and tools to do the job, results in better data because it can more easily be trusted and used by colleagues and others.

What has already been done?

Some good examples of stewardship are in place, focusing on data quality. We have a consistent approach to data quality across the organization, and staff are actively monitoring and improving data quality. Stewardship best practices have been documented and shared at the dataset level, and several "Communities of Practice" or COPs have been established to share expertise. Stewards are ensuring dashboards are being published with appropriate metadata, so users know how to interpret and use them.

What can we expect over the next four years?

Stewardship will become a **recognized role throughout the organization**. Stewards will be identified / appointed so they can manage metadata and data quality, enabling data users to easily find, access, understand and trust the data they access. Stewards will be trained to use data catalogue and data quality tools, so we have a consistent approach to curating data across the organization.

FOCUS ON: Data Literacy

And the Digital Academy

Our goals for data literacy are to increase awareness of data and analytics, enable staff to self-assess their skills, deliver the training they need, and empower them with a digital mindset.

Maturing the data literacy across the organization is fundamental to coping with the ongoing digital disruption and building our data-informed and data-empowered culture. It's key to establishing a digital mindset and ensuring those characteristics are reflected in our core competencies.

> . . . data literacy is an underlying component of digital dexterity — an employee's ability and desire to use existing and emerging technology to drive better business outcomes.
>
> *Gartner Insights*

We're taking a deliberate approach to improving data literacy through the Digital Academy and helping staff develop attitudes and behaviours that motivate them to consider data and analytics and embrace the opportunities that they provide.

According to the Harvard Business Review (May-June 2022), those with a digital mindset are more likely to succeed and have more work satisfaction.

Key Data Literacy Projects 2023 to 2026

Data Literacy "Fundamentals" Training for Leaders and Staff

Online course materials for staff to learn core skills in data management, statistics, and analytics so they capture, manage, analyze, and interpret data more effectively. A data literate workforce is essential for digital service delivery.

Data literacy and digital mindset awareness

A digital pulse survey in 2023 will help business areas assess the data literacy of their teams and help staff become aware of their own capability levels and opportunities to improve. Raising awareness at the group and individual levels is an important component in creating a data literate workforce.

Targeted learning opportunities

Data literacy supports other data knowledge areas with targeted courses that focus on skillsets necessary for data services delivery.

Digital Academy Delivery Mechanisms

The Digital Academy was formalized in 2023 with the expectation of becoming a fully resourced corporate program in 2024. The Digital Academy provides robust learning opportunities for all staff through eLearning and instructor-led programs.

eLearning

- eLearn Together
- Self-directed

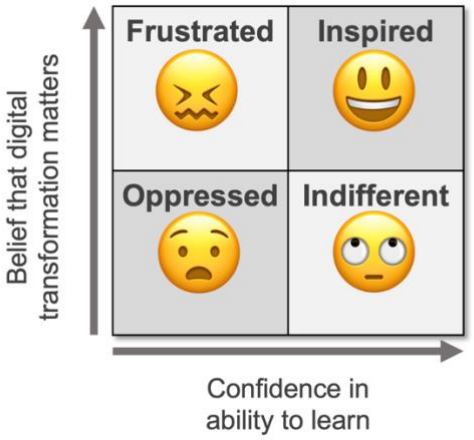
Instructor-led

- Request a course
- “Register your interest” sourced (external) and scheduled (e.g. SSIS, DAX, T-SQL, R, Python)
- Custom delivery (e.g., Data Literacy Boot Camp)
- Planned and scheduled (e.g., Discover Series, Power BI, GIS, Excel, PowerPoint and several others)

The Digital Transformation Adoption Matrix

Developing our data-informed culture requires the willing acceptance and adoption of digital transformation by staff.

The Harvard Business Review (June 2022) published this adoption matrix idea showing the four personas/attitudes associated with their acceptance of digital transformation in the workplace. On the Y-axis is the relative belief that digital transformation matters (from low to high) and on the X-axis is the confidence of the individual in their ability to learn. The four quadrants therefore represent the following attitudes:



Oppressed: I don't think I can learn digital content, and I don't see any benefit.

Frustrated: The Region and I would benefit if I learned digital content, but I don't think I can.

Indifferent: I can learn digital content, but I don't see the benefit.

Inspired: I can learn digital content, and it would be good for me and the Region.

Now, ask yourself "Where do you/your staff fit in this matrix?" And, "How can the Digital Academy help?"

FOCUS ON: Data Sharing

Open and accessible to the greatest extent possible

What is Data Sharing?

Data sharing is the exchange of data internally between branches and departments and externally with other organizations, businesses and the public. All shared data first needs to have its security classification determined – which will tell you how and with whom the data can be shared (considering things like privacy, confidentiality, intellectual property and legal agreements).

> To be data driven, we must first be data-sharing.
>
> *Gartner Insights, 2021*

Examples

1. Early in the COVID-19 pandemic, hospitals were not able to share COVID-19 patient data with the Region's Public Health unit, so COVID-19 records were difficult to keep up-to-date in the provincial COVID-19 tracking system. It took a long time to get appropriate agreements in place to share data.
2. The YorkInfo Partnership saves the partners financially because data acquisition costs are shared, and agreements made with vendors permit the sharing of the data among all.

Why is Data Sharing important?

Sharing data adds value by supporting others' work and by reducing duplication of effort and the cost of acquisition. Externally, we share data broadly and through multiple mechanisms. Anyone can access a trove of Regional data through our Open Data website. Municipal and other partners access Regional data through the YorkInfo Partnership and the Data Co-op. Our consultants get the exact data they need through Self-Serve Data Depot. Internally, we've got YorkData, along with an online Data Sharing Toolkit to encourage and enable sharing.

What has already been done?

In early 2023, the Region is introducing a Data Sharing Standard and an online Data Sharing Toolkit with the information needed to implement the Information Security Classification standard and to share data responsibly.

What can we expect over the next four years?

Expect to hear a lot about Data Sharing! With the new Data Sharing standard, new Digital Academy training opportunities, new Data Sharing Toolkit with its decision tree – the Region is taking this seriously. Data won't stay in a program silo when it's easy to share!

HOW DO I/WE FIT IN?

All of us at the Region have a role in supporting, delivering, and using data and analytics to create a more data-informed culture.

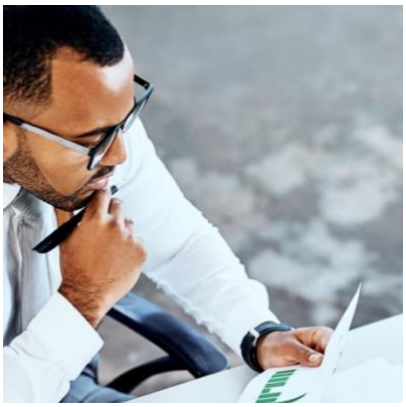
Becoming a more data-informed culture will have a significant impact on our staff, partners and the residents of York Region, because of changes YOU introduce in the Region's decisions, programs and services with our DnA.

Staff

- Become increasingly comfortable and capable with the use of and manipulation of data
- Generate and publish new analytics and reports to support work
- Interact more confidently with customers and partners in matters supported by data
- Learn more about other Regional programs through the use of DnA tools like YorkData

Data Stewards/Analysts

- “Champion” data and analytics within their program
- Lead data sharing – which YorkData and the data sharing toolkit makes easier
- Create new datasets through integration with shared data to support program needs
- Generate and publish new analytics and reports, some that use AI/ML to predict results



Managers

- Track performance with more clarity through program analytics
- Confidently and more adroitly communicate program results and impacts
- Ask deeper questions of the data to uncover new insights
- Encourage and support staff in becoming more data-informed professionals

Senior Managers

- Build a digital mindset – ask questions and make decisions based on data, and advocate its use
- Understand more clearly and easily the status of their programs and services
- Do more with less (i.e., meet those ever-increasing expectations!)
- Give York Regional Council better, more timely information in support of Regional direction

The message for staff is to get used to using data in your work and in interactions with customers and partners; use analytics to support your work by learning and applying YorkData and other DnA tools and services.

For **data stewards** and **data analysts**, your focus is on being a local/departmental “champion” for DnA; using YorkData to share data and create new datasets with other data; and generating insights with advanced analytics.

“Employees need a digital mindset: a set of attitudes and behaviors that enable people and organizations to see how data, algorithms, and AI open new possibilities and chart a path for success.”

Tsedal Neeley & Paul Leonardi
Harvard Business Review, 2022

For **managers**, the keys are to use analytics to track program performance, communicate impacts and probe your data for deeper insights, and to encourage staff to do the same.

Senior managers must be DnA advocates and build a digital mindset within their team and the Region. They must be comfortable using and trusting data to make decisions, to better understand programs/services, and to provide timely, responsive reports to Council.

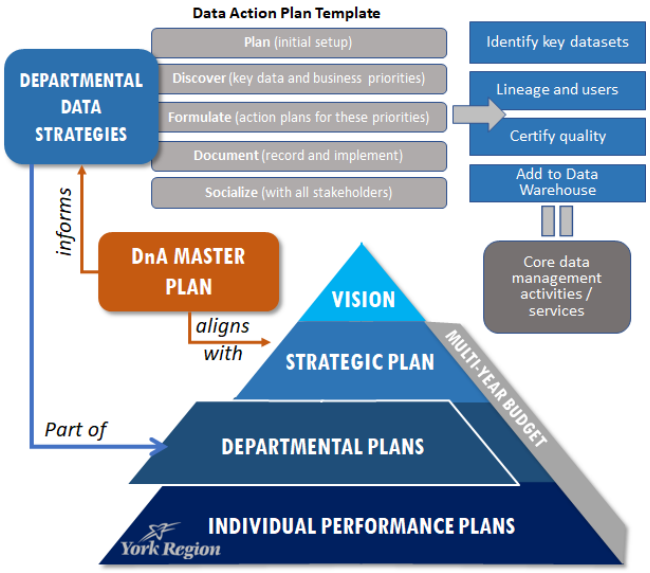
HOW DO THE DEPARTMENTS FIT IN?

The DnA Master Plan is a corporate plan, not just a DAVS plan. DAVS supports projects where it is not the lead and helps provide consistency across the organization through governance and training. DAVS also works on the fundamental data infrastructure, along with the Information Technology Services branch, supporting all data management and analytics activities.

The DnA Master Plan guides departments' responsibilities for DnA use and service delivery while informing their Data Plan. Departments have both a strategic and operational role.

Strategic Role

Strategically, departments create a **Departmental Data Plan** which is a core component of the overall Departmental Plan. The DnA Master Plan, which itself is aligned with the Corporate Strategic Plan and is a key part of the corporate Digital Plan, informs those Departmental Data Plans.



Specifically, Departmental Data Plans can leverage the pillars and knowledge areas in the DnA Master Plan, taking guidance from the goals associated with the Pillars, and establishing departmental DnA projects associated with the Knowledge Areas that support their programs and services.

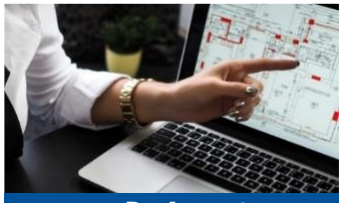
Along with their Departmental Data Plans, the departments will continue to identify use cases for analytics that will "put data to work!"

Operational Role

Operationally, departments should:

1. **Support** the corporate **anchor projects** (noted above with their timing and associate pillars)
2. **Use YorkData** to contribute new datasets, create new datasets, and produce analytics
3. **Share data** corporately by using YorkData and other accepted sharing platforms (as outlined in the Data Sharing Toolkit)

Delivering DnA Services



DnA customers want to:

Make decisions / deliver programs with data

Requires them to

Access, understand, and use trusted data

Requires them to

Find the appropriate DnA service

To meet those needs, ***DnA stewards:***

Use YorkData to centralize data and enable access and use

Help departments create aligned DnA strategies

Build talent and capacity

Support Regional experts to provide the DnA services

As the graphic above illustrates how staff want and need to be able to find, access and use data to support their work. This often means finding the appropriate DnA service. The Region, through its DnA services, has a model to do that. Specifically, those delivering or supporting the delivery of DnA services (the stewards) must use YorkData, help build capacity, show/train others to provide services, and get involved in the creation of departmental DnA strategies.

DnA services are delivered throughout the organization – these services are not just corporately delivered. Departments also play a key role in the delivery of many of the data and analytics services. Of the now 56 services in the DnA Services Catalogue, departments have the corporate responsibility to deliver 21 of them.

Defining the DnA services was a key deliverable of the previous DnA Master Plan. It was, in fact, broadly identified as a catalyst to “figure out federated” – or in other words, better enable the Region to work without the departmental silos that typically exist between different business units.

Figuring Out Federated

Our work leading up to DnA 1.0 highlighted how York Region functions in a federated model, with multiple departments, each with unique systems producing and consuming data. Each department is successful in delivering its programs and services, but their typically “siloed” approach meant no one was capitalizing on the opportunities that shared data and integration could bring to themselves, the corporation, or our customers. As well, the abilities and knowledge of staff with specialized skillsets remained “hidden” from others outside their business unit or department.

The DnA Master Plan 1.0 recognized that figuring out a partnered approach within a federated organization would be one of the plan’s most important outcomes. In 2021, 58 core services were defined and a series of coordinated workshops helped produce service integration diagrams showing how best to deliver them. Through this process we recognized some services are better provided corporately and some are better delivered departmentally. As well, a Playbook was generated as a blueprint for us and others to use during their implementation.

As noted earlier, **we must continue to *develop* the services to make them fully accessible to every staff member, so the power of data and analytics can be used for any business purpose.** Each year we’ll be making various services easier to deliver by using the JIRA platform and Drupal website and providing request forms, self-service toolkits, user resources, contacts, and educational materials. This will give any staff member access to the service, regardless of where they sit in the organization.

The “Periodic Table” of DnA Services

One of the primary outcomes of the DnA 1.0 was the establishment of the 58 services (now 56 with the combining of three related metadata services). Each service is related to a knowledge area. The following table with all of these services has been updated to show whether a service is delivered centrally or by the departments, and where a few services associated with the “Insights & Reporting” knowledge area have had toolkits developed. Note, some services’ delivery methods may change as we continue to evolve.

DATA ARCITECTURE	MASTER & METADATA MANAGEMENT	INSIGHTS & REPORTING		DATA LITERACY	DATA PARTNERSHIP	DATA PREPARATION & INTEGRATION	DATA QUALITY	SECURITY, ACCESS & PRIVACY	TECHNOLOGY	CONTENT MANAGEMENT
		Report Generation with Data C 🔧	Geo-demographics D							
Data Modelling C		Dashboard Generation & Maintenance C 🔧	Descriptive & Diagnostic Statistical Analysis D			ETL & Data Preparation D				
Data Flows D	Classify C	Analytics Consulting D	Exploratory Data Analysis C	Training Awareness C	Partner Coordination D	Cleansing C			Requirements Gathering D	
Data Asset Management C	Metadata Collection D	Scenario-based Analysis D	Artificial Intelligence & Machine Learning C	Skills Assessment C	New Partner Negotiation	Integrating & Matching to Master & Reference Data C	Profiling D		Solution Architecture D	
Tactics for Integration C	Metadata Publishing C	Analytics Needs Development D	Data Visualization C	Learning and Development C	Data Purchasing C	System to System Integration C	Assessment D	Open Data Publishing C	Solution Deployment C	Capture D
Data Migration and Planning D	Master & Reference C	Location Analysis D	Storytelling with Data C 🔧	Communities of Practice Coordination C	Creating & Negotiating Data Sharing Agreements C	Integration to Portal C	Monitoring D	Data Deliveries to Consultants C	Maintaining Sharing Platform C	Store and Dispose C

DATA GOVERNANCE										
Strategic Objectives C	Monitoring Readiness Progress C	Issue Resolution C	Best Practices C	Enterprise Policies & Standards C	Local Procedures D	Stewardship D	Data Audit D	Data Valuation C	Promoting Data Culture C	Communi-cations C

D Departmentally delivered

Centrally delivered

🔧 Toolkit developed

WHAT 2026 LOOKS LIKE ("11 @ 4.0")

"11 @ 4.0" refers to our goal to have all 11 knowledge areas reach a maturity level of 4.0. The target is aspirational, with some knowledge areas already close to that goal while some will need more focused attention, but we can be confident we will make substantial progress. Level 3.0 maturity reflects standardized processes, clear roles and responsibilities, and sharing between departments, while level 4.0 reflects consistent processes across the organization that align with strategic goals. As we advance data and analytics maturity by working through priority projects, rather than in competition with them, we achieve that alignment.

Digital Transformation

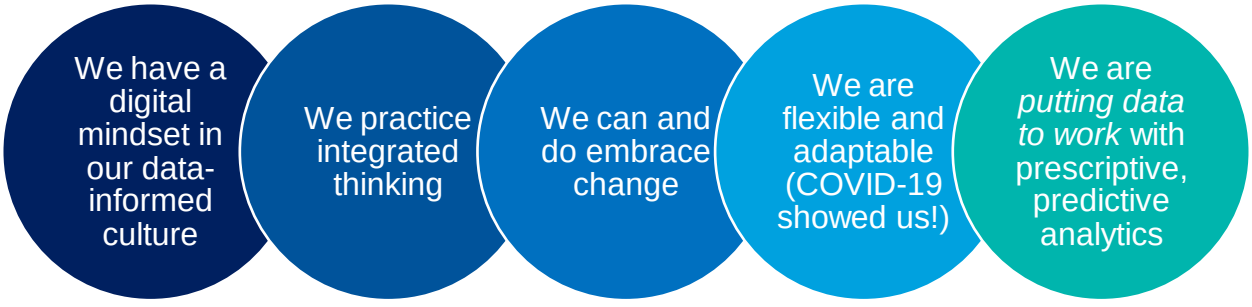
We're undergoing a digital transformation. The evidence is already overwhelming and the projects and plans now in place make it clear.

The transformation is not just with data and our use of analytics, it's our people. Once a digital mindset is established and our data-informed culture matures, much of how we work and make decisions will change – in quality and in breadth.

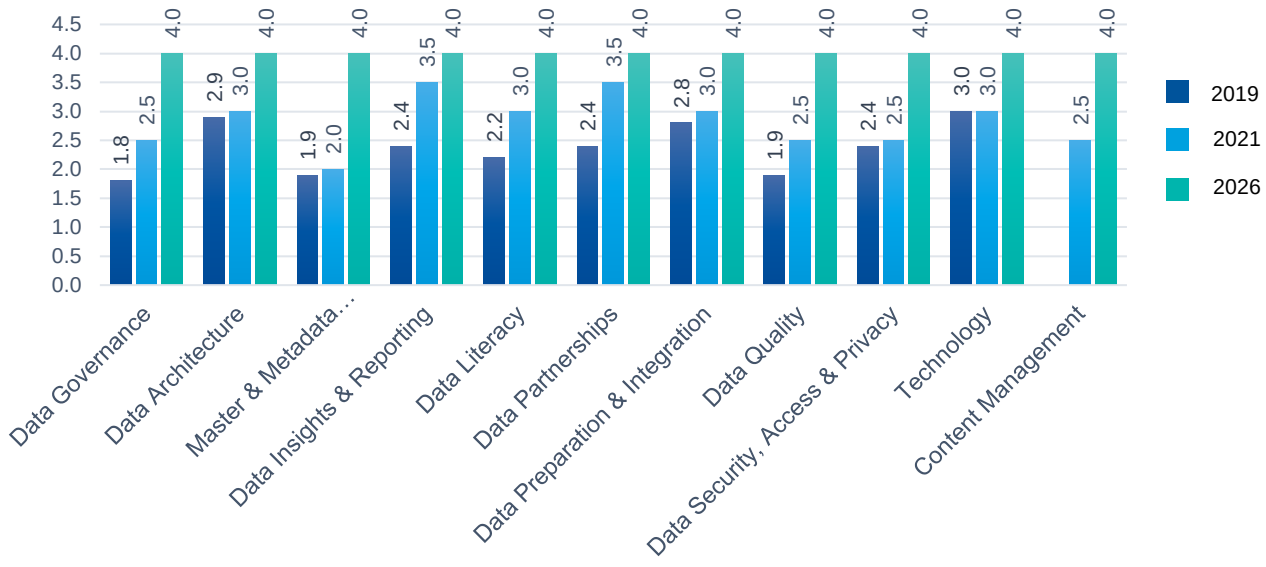
The key is to use data.

Data removes subjective roadblocks and moves the conversation *from opinion to fact*.

Implementation of DnA 2.0 will produce a robust data foundation and help us achieve maturity levels of 4.0 in each of the 11 knowledge areas. This diagram below illustrates the high notes of what being "11 @ 4.0" means. Integrated thinking, embracing change, being flexible and adaptable, using data to solve problems that haven't even occurred yet – all will make us more responsive and capable.



The real work toward our digital transformation will be happening within each of the knowledge areas as we implement both corporate and departmental initiatives that mature each of them. Detailed project outlines and timing for many of these projects are provided in Appendix 1 below.



It's All About the Data

We've been saying this for years, and it's still true. It is all about the data.

Maturity of the DnA will take us from data-driven, to data-informed, to ***data-empowered***. Like water, data will flow to fill gaps, be re-used, enable growth and life (insights/change) and meet multiple needs.

Deriving Value from Data

The maturity of the DnA Master Plan will also ensure the three keys to deriving value from data:

- Align data strategy with business strategy
- Foster a culture of data literacy throughout the organization
- Seed data and data-powered initiatives that might otherwise be siloed in the departments/programs where they originate throughout the organization

Source: https://www.linkedin.com/pulse/driving-value-from-data-bernard-marr

"It's not about data management, it's about data empowering … yes, we still need to figure out what data we have, we need to design a model – that's not going away – but we need to change the mindset about why we are doing it. We're not doing it to manage the data. We're doing it to empower the business – to take significant action based on that data."

Heine Krog Iversen, CEO, TimeXtender

Our Remaining Challenges

There are still obstacles and challenges to face and overcome in our projects, organization and culture…

Projects

- Keeping the number of projects manageable
- Maintaining a focus on priorities

Organization

- Consistency across the organization
- Departments move at different speeds on data management
- Equity – there are still “haves” and “have nots”

People and Culture

- Effectively advancing DnA literacy
- Staff turnover
- Resources
- Collaboration

ADVANCING MATURITY IN EACH KNOWLEDGE AREA

The 2021 assessment done by PwC found maturity improving in all knowledge areas (Technology stayed high at 3.0). It also showed that creating a more data-empowered cultural transformation is among our greatest needs, as this will enhance Data Literacy, a key driver of the transformation.

Overall, the Region wants to reach a **level 4.0 maturity** in all dimensions by 2026, meaning the Region would be proficient at many DnA functions and coordinated in their approach across the enterprise. Level 3.0 maturity reflects standardized processes, clear roles and responsibilities, and sharing between departments, while level 4.0 reflects consistent processes across the organization that align with strategic goals.

Link to each knowledge area for more details on their projects:

Data Governance

Data Architecture

Master & Metadata Management

Data Insights & Reporting

Data Literacy

Data Partnerships

Data Preparation & Integration

Data Quality

Security, Access & Privacy

Technology

Content Management

DATA GOVERNANCE

Ensuring a framework of rules and best practices for data.

DEFINITION

	2019	2021	2026
Maturity	1.8	2.5	4.0

2026 Target: Governance applied to more areas. Staff are aware of data governance tools relevant to their roles.

The Data Governance knowledge area is responsible for the overall guiding principles, strategic direction, strategic goals and related policies that govern the management and availability (including security and access) of DnA at York Region. It informs and supports program areas throughout the Region in their implementation of DnA initiatives and their delivery of services and activities.

ANALYSIS

- Key areas for governance development are stewardship, service catalogue, YorkData, data sharing and governance for security, access, and privacy.
- Need more recognition of governance as a program that is run by ITS, DAVS and IAM with communications support.

SUCCESSES

- Dedicated data governance position standardizes data governance across the organization.
- Governance was established for YorkData, Data Co-op, ArcGIS Online, PowerBI, Dashboard Catalogue, stewardship, data quality and data sharing processes.
- Started data valuation for transportation as part of corporate asset management program, which will provide better understanding of resources needed to manage and sustain data assets.

GOAL

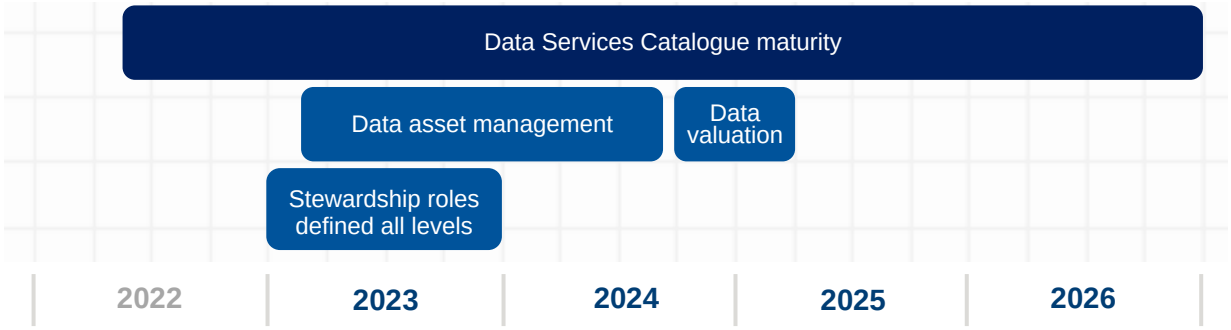
- Data stewardship is widely understood across the corporation and formalized for significant data assets.
- Continue to iterate on governance for data-related processes and products.
- Staff understand where to find data governance information and support.

DATA GOVERNANCE: PROJECTS

Core Projects

PROJECT	MATURITY MEASUREMENT
ANCHOR PROJECT Associated Pillar: Trust & Governance (P3) **Data Services Catalogue maturity:** Part of digital services catalogue, this will make it easy for staff, especially new staff, to request data services or access data tools, knowledge bases and took-kits to do their jobs. Data service requests will be routed to appropriate service providers across the corporation.	Uptake of data services catalogue – number of requests and page views for toolkits increasing year over year.
Stewardship roles defined all levels: Departmental data stewards will be established, preferably through changes to the data and analytics job families, and a Data Stewardship Council in place to provide an infrastructure for knowledge sharing and decision-making. This will define roles and responsibilities around data maintenance, quality control and data tracking.	Significant percentage of core datasets and data products in each department with formal stewardship roles.
Data asset management: Project to provide governance around how data assets should be created, maintained, and disposed of, and what would constitute a valid digital twin. It would determine the value of data to help guide decisions about where best to invest in data and data management activities.	Number of datasets with a value assigned.
Data valuation: Evolve to a continuous corporate data audit standard (possibly via automation) and data valuation to consistently evaluate data and the ROI associated.	

Timing



Success Measure

- At least 20 datasets in each department have formal stewardship roles assigned.

Other Potential Projects

PROJECT	DNA SERVICE	OTHER KNOWLEDGE AREA(S)
Establishing DG as a program (structure)	01 - Strategic Objectives	
Evolving governance structures to reflect changing maturity (structure)	02 - Monitoring Readiness and Progress	
Develop KPIs (structure)	02 - Monitoring Readiness and Progress	
Process for challenging refused data requests through issue resolution process (service catalogue, new service)	03 - Issue Resolution	Partnerships
Rolling out Public Works DG experience to other departments (roles and responsibilities, standards, consistency)	04 - Best Practices	Data Quality
Platform governance for cloud data storage and analytics (roles and responsibilities)	04 - Best Practices	Technology
Videos of service(s) by the people who deliver them (service catalogue, literacy)	06 - Local Procedures	Data Literacy
Data Audit and Evaluation (service catalogue, new service)	08 - Data Audit (Standards Compliance)	Security Access & Privacy
Audits in relation to breaches, and whether recommendations have been implemented (security, access, privacy)	08 - Data Audit (Standards Compliance)	Security Access & Privacy
Data valuation (service catalogue, new service)	09 - Data Valuation	
Emphasis on DnA change management (structure, literacy)	11 - Communication of DnA Program	
Engaging staff on governance (roles and responsibilities, structure, literacy)	11 - Communication of DnA Program	
Peoplesoft data liberation, YorkData data model approach (architecture)		Data Architecture
Service bundling and consolidation (service catalogue)		

DATA ARCHITECTURE

Modelling data to extract its greatest value.

> "Good data architecture eliminates silos by combining data from across the organization, along with external sources as needed, into one place to eliminate competing versions of the same data.
>
> In this way, data is not bartered among business units or hoarded, but is seen as a shared, company-wide asset."
>
> *Talend*

DEFINITION

The Data Architecture knowledge area leverages technologies to connect disparate applications and data sources to answer a business question.

	2019	2021	2026
Maturity	2.9	3.0	4.0

2026 Target: Integrated architecture with business problems viewed in a corporate context, not just case-by-case.

ANALYSIS

- Project areas should develop an integrated approach to their data architecture with governance, data flow, YorkData architecture and cloud processing, and automation.
- Getting to a better state in architecture will make a difference in how well the Region delivers digital services.

SUCCESSES

- Departments have improved database design, storage, and relationships.
- New positions developed: Data Engineering/Enterprise Data Architect.
- Much progress modelling data for data warehouse use.
- Data models and flows for COVID-19 case tracking and financial reporting.

GOAL

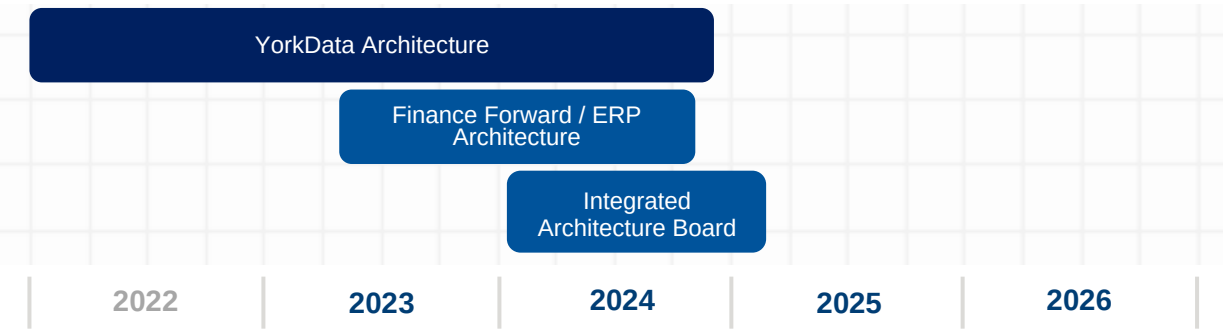
- To create an enterprise data architecture capability to support digital services.
- To develop data and information warehouses that provide data to meet business functions and to support quick and effective analysis.

DATA ARCHITECTURE: PROJECTS

Core Projects

PROJECT	MATURITY MEASUREMENT
ANCHOR PROJECT Associated Pillar: Access & Sharing (P1) **YorkData Architecture:** Some Region datasets cannot be easily processed on the Region's servers. Taking advantage of powerful cloud-based analytics platforms, when necessary, will extend capabilities.	Successful proof of concept and on-going use for operational insights.
Finance Forward/ERP Architecture: Introducing a new Enterprise Resource Planning (ERP) solution for Finance and HR will require architecture services to ensure the system integrates with other systems, so data flows achieve intended outcomes.	Data flows for ERP are documented and understood.
Integrated Architecture Board: They will assess the business, data, information, and systems requirements, considering corporate context and existing information infrastructure, and promote solutions that consider all users and costs (ties strongly to Technology Master Plan and Information Management Master Plan).	Integrated Architecture Board reaches agreements, set standards, and provides recommendations that the organization must adhere to and provide lasting value.

Timing



Success Measure

- Measuring effectiveness of data architecture (refer to www.firstsanfranciscopartners.com/blog/data-architecture-metrics/).

Other Potential Projects

PROJECT	DNA SERVICE	OTHER KNOWLEDGE AREA(S)
Lake-house architecture (storage)	12 - Data Modelling	
Data capabilities of Azure (processing)	12 - Data Modelling	Technology
Modelling and documenting data flows (flow)	13 - Data Flows	
File exchange modernization (flow)	13 - Data Flows	
Data-as-a-service – system architecture (flow)	14 - Data Asset Management	
Service orchestration (automation)	14 - Data Asset Management	
Develop standard approach for integration (integrated approach)	15 - Tactics for Integration	
Governance around enterprise data architecture (integrated approach)		Governance
Training materials for documenting data flows		Literacy

MASTER & METADATA MANAGEMENT

Helping staff find the right data.

DEFINITION

Metadata provides information about a dataset to make it intelligible, searchable, accessible and useful for users.

Master data identifies and manages the most valuable and critical datasets shared across multiple business functions.

	2019	2021	2026
Maturity	1.9	2.0	4.0

2026 Target: Achieve through attention to metadata, stewardship of master data records, attention to updating processes.

ANALYSIS

- Projects for Master Data Management (MDM) and metadata fall into several categories: metadata governance, cataloguing tools, classification implementation, establishing MDM records, and their use.
- Development work on Next Generation (NG) 9-1-1 will start in 2023. Tools for MDM would help accelerate this initiative and other projects like it.

SUCCESSES

- Departments have been collecting metadata and have data and dashboard catalogues for finding the right data.
- Awareness of the value of metadata has increased.
- Established an approach to tackling MDM data and started designing formal master data management data structures.

GOAL

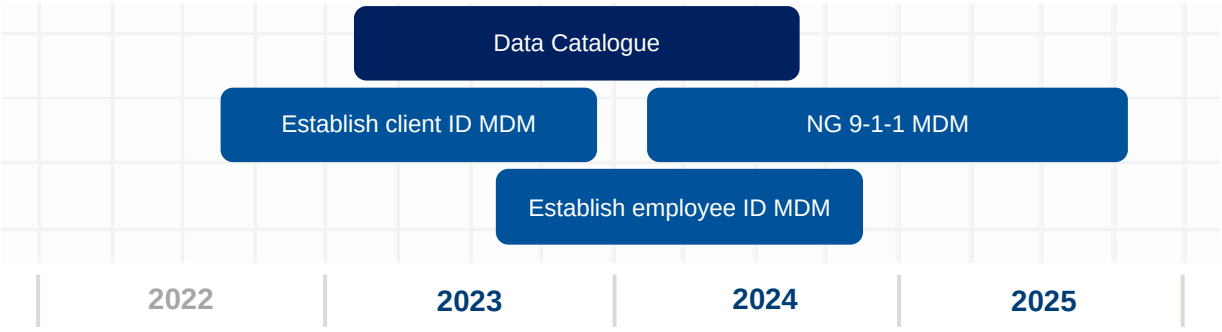
- Establish robust automated data and data product catalogue tools so the Region's data can be found and understood.
- Establish key, well-curated master data records that can be shared across systems, allowing roll-ups for reporting.

MASTER & METADATA MANAGEMENT: PROJECTS

Core Projects

PROJECT	MATURITY MEASUREMENT
ANCHOR PROJECT Associated Pillar: Access & Sharing (P1), Trust & Governance (P3) **Data Catalogue:** A new data catalogue will automate metadata collection and provide improved access to the Region's data, data products and data tools including ETL routines.	Catalogue populated with data resource information and used by staff to find and access data.
Master Data Management, establish IDs (client and employee): Several initiatives on unified client ID, employee ID, facility ID, business unit ID and GL codes will allow different datasets to be combined to enable better service to residents and staff.	Master data regularly updated and used in multiple systems.
NG 9-1-1 MDM: NG 9-1-1 calls require up-to-date accurate locations to direct responders to cellphone callers. Consolidating new addresses as they are created and supplying this data to the emergency call centres and dispatchers requires strong data management.	Bell, police, fire and ambulance services using the same up-to-date location data.

Timing



Success Measures

- Number of datasets, data products, data fields catalogued.
- Number of metadata records accessed by staff annually.
- Number of unique staff accessing metadata records annually.
- Number of systems connecting to master data records.
- Number of calls for and changes to master data records.

Other Potential Projects

PROJECT	DNA SERVICE	OTHER KNOWLEDGE AREA(S)
Using security classification for all data and data products (classification)	19 – Classify	
Link to Information Management Master Plan (metadata governance)	20 - Metadata Collection	Content
Automation on field level metadata (TRN) (catalogue)	20 - Metadata Collection	
Data glossary (catalogue)	20 - Metadata Collection	
Dashboard Catalogue operational (catalogue)	21 - Metadata Publishing	
Support data asset management with reporting from Data Catalogue (catalogue, reporting)	21 - Metadata Publishing	
Surface NG 9-1-1 address data though Locator Services (MDM project, metadata governance, MDM use)	22 - Master & Reference Data Management	Technology
Establish corporate working group for MDM sustainment (metadata governance)		Governance
Establish corporate working groups for Data Catalogue (metadata governance)		Governance
Minimum standards for metadata capture (metadata governance)		Governance
Training materials and staff training regarding the value of metadata and master data		Literacy

DATA INSIGHTS & REPORTING

Using data to tell a compelling narrative.

DEFINITION

The Data Insights & Reporting knowledge area provides the management, promotion and creation of guidelines, analytical approaches, and outputs to deliver insights, tell stories and foster business knowledge from data that engages users, and to increase their desire to use data to support decision-making.

	2019	2021	2026
Maturity	2.4	3.5	4.0

2026 Target: Introduce advanced analytics to better our understanding of complex issues and reduce time to decisions.

ANALYSIS

- Advanced analytics and, to a lesser extent, automation, are key focus areas for the next four years.
- Governance and ethics need to be considered particularly as AI takes hold and novel modes of AI emerge.
- In 2023, a detailed internal review of Advanced Analytics Use Cases throughout the organization was conducted by a team from DAVS branch. Its findings can be found in Appendix 2 while the projects the review identified are provided below.

SUCCESSES

- Departments are comfortable creating informative reports with compelling narratives.
- More people are trained to use reporting tools.
- Dashboards provide visual representations of operational activity.
- Dashboards are accessible through the catalogue, providing a wider audience with information they need.
- Areas with more advanced analytics abilities are emerging.

GOAL

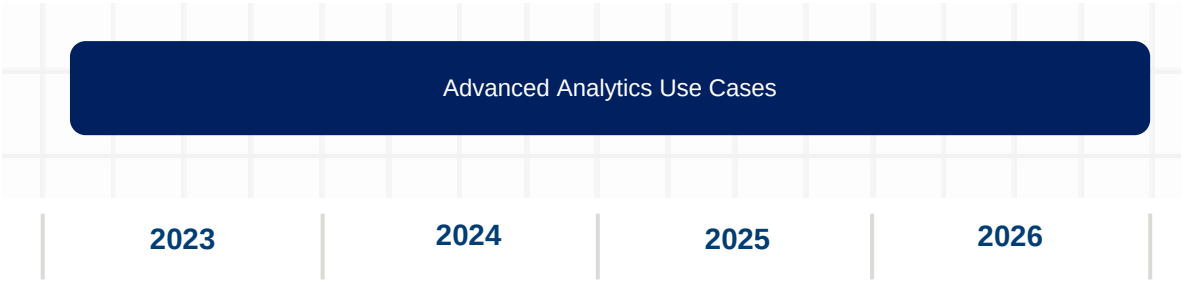
- Move the Region toward advanced analytics, with predictive and prescriptive outcomes.
- Introduce AI/ML/RBA into production processes.

DATA INSIGHTS & REPORTING: PROJECTS

Core Projects (see extensive list on following page)

PROJECT	MATURITY MEASUREMENT
ANCHOR PROJECT Associated Pillar: Actionable Insights (P4) **Advanced Analytics Use Cases:** Identifying use cases for business areas to use advanced analytics methods that provide predictive and prescriptive results and improve business outcomes. These methods include advanced algorithms for decisions (artificial intelligence), self-learning and pattern recognition tools (machine learning) and data process automation (robotic process automation, or RBA).	Number of advanced analytics use cases developed each year.

Timing



Success Measures

- Number of Advanced Analytics Use Cases introduced each year.
- Number of processes incorporating AI/ML/RPA.
- Oversight mechanism for advanced analytics in place that ensures privacy, equity and ethics through a review mechanism.
- Cross departmental working groups identifying RPA/AI use cases.

Analytics Core Projects

These are the core projects identified throughout the corporation via the Advanced Analytics Use Cases Review in 2023. We will take an agile approach in supporting these or similar projects that will provide business benefits.

Name & Type	Business Unit	Details
Document archival content classification Automation project	Corporate Services – Information Asset Management	An example of Machine learning (ML) and natural language processing (NLP) (like ChatGPT). Scan network drives and determine if information content (pdf, word documents, PowerPoint presentations, emails) are of archival value. Create a computer program to read files and determine if the content is worth archiving (text classification). Reflects the increasing importance of text analysis/natural language processing, as a lot of datasets are unstructured data (data that does not have a data model – text, images, videos, sound).
Fleet vehicle maintenance and vehicle turnover prediction Prediction project (using data to show how to maintain assets)	Public Works – Transportation (Fleet Services)	The Region's Fleet M5 Asset Works asset management system tracks all vehicle data. This includes tracking the vehicle history over time. Goals for Analytics: • Optimize preventative maintenance schedules based on planned, unplanned maintenance. • Build a model to advise when best to dispose of a vehicle based on performance, age, mileage, residual value, maintenance, repair, deprecation, uniform annualized costs, etc. • Identify the vehicle makes, models that cost the most for the Region to operate.
Modernization of development charges forecast Optimization project	Finance – Treasury Office	Forecast development activity and DC rates, showing payment timing and anticipated amounts for input to the Region's capital budget (Read about this in the 2023 Data Hero – Fiona Chan article). This is a modernization/enhancement of work already being done in Excel and with Excel Macros. It will provide improved forecasting and scenario analysis within the Treasury Office.
Operationalizing inflow and infiltration (I&I) priority model Prediction project	Public Works – Environment (Infrastructure Asset Management)	They use proprietary software to estimate I&I values/metrics for a 25-year storm. We use machine learning to recreate the I&I values from historical data and automate the generation of the I&I metrics. The data comes from sensors and is large (over 900 million data points since 2013). A lot of the work is operationalizing the data pipeline. The in-house machine learning (ML) Intelligent I&I tool is streamlining the formerly time consuming and resource intensive process of analyzing these large datasets. Inflow and infiltration occur when water other than sewage enters sanitary sewer systems. Excessive I&I can lead to basement flooding, system overflows to the environment and consumes system capacity, triggering early-stage servicing challenges and reducing asset life expectancy.

Name & Type	Business Unit	Details
		Notably: the team from Public Works came in first in the Intelligent Water System Challenge at the WEAO (Water Environment Association of Ontario) annual conference in April 2023.
Water & wastewater system resiliency and redundancy analysis EDA project	Public Works – Environment (Operations, Maintenance & Monitoring)	Understand asset prioritization (ex. one pipe supplies X% of water to a given municipality, if it breaks then we lose X supply). Geometric network showing importance and priority per pipe. Can layer on population, volume of water capacity, etc. to provide deeper insights.
Solar potential of rooftop Reporting, Mapping, Dashboarding project	Public Works – Environment (Strategy & Innovation)	Using GIS data (LiDAR) to estimate the solar potential of municipal building rooftops – as part of clean energy, climate change initiatives. The idea came from https://learn.arcgis.com/en/projects/estimate-solar-power-potential/. Several municipalities are also looking into the potential of solar.
Talent progression analysis People Insights project	CAO – People, Equity and Culture (HR)	Analytics to help understand talent movement to extract organic career “cow paths” (career journeys; ladders, lattices). Better understand historic movement by job types particularly where there is churn. This could help build interim roles, new levels, empowering roles, identify “stretch roles.”
Territory and workload optimization automation Optimization project	Community Health and Services – Social Services	This is an automation project that will generate territories of equal workload among inspectors (childcare, early interventionist, food inspectors, safe water, IPAC (infectious protection and control)) to “remove the human” from the process and save time. ESRI example: https://pro.arcgis.com/en/pro-app/latest/help/analysis/business-analyst/what-is-territory-design-.htm

Other Potential Projects

PROJECT	DNA SERVICE	OTHER KNOWLEDGE AREA(S)
Analytics Use Cases from internal review (advanced)		
Advanced Analytics Use Cases (advanced)		
Oversight mechanism for advanced analytics		
Toolkits for self-service – potential investment area (organization)	31 - Report Generation with Data Toolkit	
Assessment of why business is slow to take up advanced analytics (governance)	33 - Analytics Consulting	
Develop decision support/science capacity (organization)	35 - Analytics Needs Development	
GIS analysis, keeping pace (GIS)	36 - Location Analytics	
Process analytics (advanced)	39 - Exploratory Data Analysis	
Build understanding and implement Robotics Process Automation (RPA) and AI to improve processes and decision-making (governance)	40 - Artificial Intelligence & Machine Learning	
Investigate AI Chatbots for Economic Development & AccessYork (automation)	40 - Artificial Intelligence & Machine Learning	
Business analytics – move beyond the dashboard (advanced)	41 - Data Visualization	
Stay aware of cloud visualization technologies (currency)	41 - Data Visualization	Technology
Initiate AI committee (organization)		
Bringing communications into data storytelling (organization)	42 - Storytelling with Data Toolkit	
Training materials for insights and reporting		Literacy

DATA LITERACY

Learning to care for, understand and use data.

"…data literacy is an underlying component of digital dexterity — an employee's ability and desire to use existing and emerging technology to drive better business outcomes."

Gartner

DEFINITION

The Data Literacy knowledge area strengthens capacity in the workforce to care for, understand, and use data.

	2019	2021	2026
Maturity	2.2	3.0	4.0

2026 Target: Staff know their data capabilities and have access to learning opportunities to improve.

ANALYSIS

- There is still awareness work to do! And assessment!

SUCCESSES

- Dedicated Digital Education Program Specialist position to advance data literacy across corporation.
- Digital Academy provides online course materials available to all staff.
- Data literacy assessments are available for staff to self-assess capabilities, with specific training identified.
- Data Fundamentals course launched.

GOAL

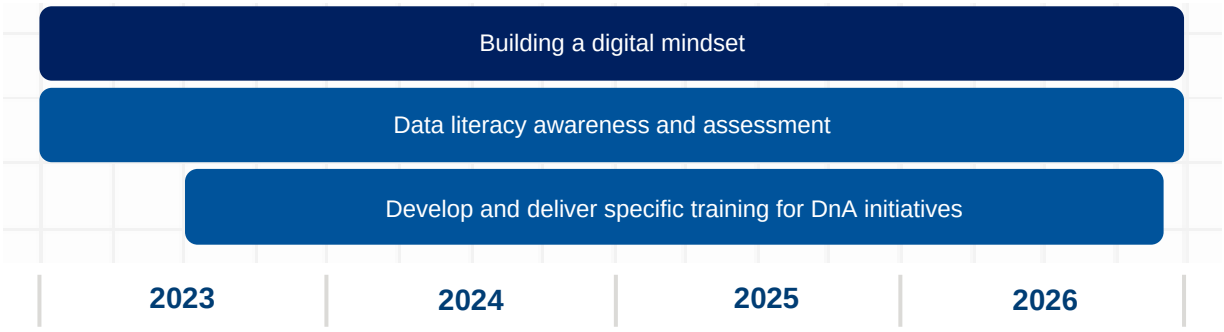
- Increase awareness of data and analytics, enable self-assessment of skills, deliver appropriate training for staff.

DATA LITERACY: PROJECTS

Core Projects

PROJECT	MATURITY MEASUREMENT
ANCHOR PROJECT Associated Pillar: Culture & Talent (P2) **Building a digital mindset:** This project builds on our advocacy and awareness-building, the maturity of the courses and other digital academy offerings, and the use of staff competency assessments and learning paths that identify digital capacity. Continue developing the Digital Academy including: the **Data Literacy fundamentals** online course materials for staff to learn core skills in data management, statistics, and analytics so they capture, manage, analyze, and interpret data more effectively; and the addition of a data literacy **course for leaders**. A data literate workforce is essential for digital service delivery.	Percentage of staff who have taken Data Fundamentals course or Level 1 data course. Number of management staff taking the leader's course.
Data literacy awareness and assessment: Business areas should assess the data literacy of their teams, helping staff become aware of their own capability levels and opportunities to improve. Business areas can also help raise corporate awareness by identifying staff making exceptional contributions so that they can be recognized as a "**Data Hero**" as part of the ongoing DAVS initiative. Raising awareness at the group and individual levels is an important component in creating a data literate workforce.	Percentage of staff who have had a data capability assessment.
Develop and deliver specific training for DnA initiatives: Data literacy supports other data knowledge areas with **targeted courses** that focus on skillsets necessary for data service delivery. As well, we will need to add courses to support the key digital priorities of the organization.	Number of specialized data and analytics courses available.

Timing



Success Measure

- Number of people taking courses through Digital Academy.

Other Potential Projects

PROJECT	DNA SERVICE	OTHER KNOWLEDGE AREA(S)
Raising understanding of DnA importance in organization (awareness)	43 - Awareness	
Focus on awareness for DnA supporters, e.g., legal, risk – plain language materials – demystify (awareness)	43 - Awareness	
Communications – “horse to water” issue – Public Works training matrices expanded to the rest of the organization – WIIFM (awareness)	43 - Awareness	
Impact of Drupal on Digital Academy portal (awareness, delivery)	43 - Awareness	Technology
Microlearning (delivery)	45 - Learning and Development	
Expand using providers such as Viva Learning (provider)	45 - Learning and Development	
Enhance benefits and accessibility to Communities of Practice Coordination for data leaders (organization)	48 - Communities of Practice Coordination	
Engage HR’s Corporate Learning with Digital Academy (organization)		Governance
Develop Digital Academy into a sustained program (2023)		Governance

DATA PARTNERSHIPS

Learning, building, and sharing together.

DEFINITION

The Data Partnerships knowledge area fosters data and analytics-oriented partnerships, internally and externally, with the goal of increasing access to data, acquiring new data and sharing knowledge.

	2019	2021	2026
Maturity	2.4	3.5	4.0

2026 Target: Leverage the Data Co-op for additional purposes to streamline automated data transfers.

ANALYSIS

- Planning data and NG 9-1-1 represent major data sharing projects for data partnerships.
- Partner coordination may help further data sharing initiatives.
- Templated data sharing agreements and a toolkit.

SUCCESSES

- YorkInfo Partnership remains a strong mechanism for sharing data, technical and knowledge.
- Data Co-op expanding usage/content with more “all” initiatives (all-pipes, all-construction), combined view of local and regional infrastructure and activity.
- Development of data sharing framework to streamline data sharing with other organizations.
- Multiple joint data purchases.

GOAL

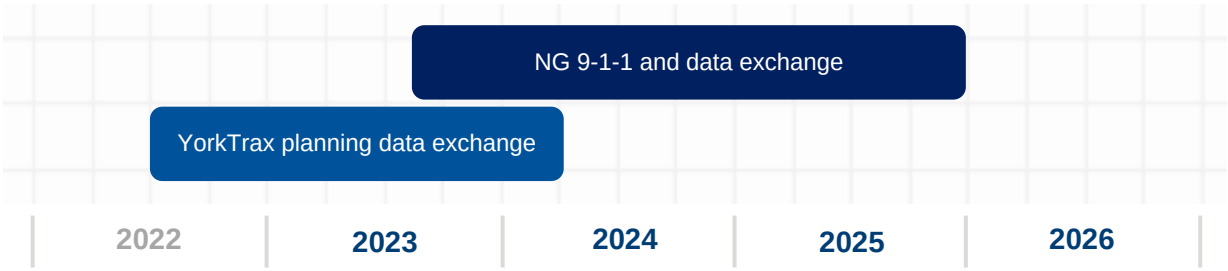
- Increased use of automated data sharing mechanisms with local municipalities to improve speed and availability of common program data.
- Better understanding of how to share data among Regional and partner organization staff.

DATA PARTNERSHIPS: PROJECTS

Core Projects

PROJECT	MATURITY MEASUREMENT
ANCHOR PROJECT Associated Pillar: Access & Sharing (P1), Trust & Governance (P3) **NG 9-1-1 and data exchange:** Addresses generated by local municipalities and supplied through the Data Co-op will be collated in YorkData to provide to Bell for their call processing, and police, ambulance, and fire dispatch (for NG 9-1-1). Accurate location information enables 911 calls from cellphone to be processed.	Address data is supplied to Bell and dispatch systems meeting NG 9-1-1 protocols.
YorkTrax planning data exchange: Data exchange or "Planning Engagement Portal" between the Region, MPAC and local planning and building systems via the Data Co-op will help achieve the goals of Bill 23. Comprehensive data capture will enable robust service forecasting to support growth.	Planning data flows through the Data Co-op.

Timing



Success Measures

- Number of data sharing use-cases added to Data Co-op annually.
- Number of partners using each use case.

Other Potential Projects

PROJECT	DNA SERVICE	OTHER KNOWLEDGE AREA(S)
Implement business cases for Data Co-op (municipal sharing)	46 - Partner Coordination	
Dedicated resource for Data Co-op (municipal sharing)	46 - Partner Coordination	
Clarity between the YorkInfo Partnership and the Data Consortium	46 - Partner Coordination	
Creation of a new YorkInfo Partnership work plan	46 - Partner Coordination	
Metadata on shared data from other organizations (April 2024 to June 2025) (municipal sharing, metadata)	46 - Partner Coordination	Master & Metadata
Moving partnership coordination further to understand how far data can be shared – how mature do we want partnerships? (partner coordination)	46 - Partner Coordination	
Sharing analysis (partner coordination, analytics)	46 - Partner Coordination	Insights & Reporting
Communication toolkit for partner organizations (communications)	46 - Partner Coordination	
Data sharing toolkits for service catalogue (toolkit)	46 - Partner Coordination	
Leveraging provincial data opportunities and understanding what they are (other partners)	47 - New Partner Negotiation	
Data purchasing process/group (data purchasing)	49 - Data Purchasing	
Standardized templated partner and data sharing agreements (agreements)	50 - Creating & Negotiating Data Sharing Agreements	
Contract and agreement management	50 - Creating & Negotiating Data Sharing Agreements	
Data sharing governance		Governance
Partner understanding of data sharing and agreements		Data Literacy

DATA PREPARATION & INTEGRATION

Getting data into the Region's systems and preparing it for analysis.

DEFINITION

The Data Preparation & Integration knowledge area involves the movement of data between various sources and the preparation of data for users to conduct analysis.

	2019	2021	2026
Maturity	2.8	3.0	4.0

2026 Target: Document scripting of data transformation and systems integration.

ANALYSIS

- Focus on processing business data for use within YorkData and on system integration issues regarding the Technology Master Plan.
- Governance is important for this area, and thinking about external data integration will likely be an important step.

SUCCESSES

- Foundational knowledge of data translation (ETL), data preparation and cleansing has increased.
- COVID-19 contact tracing data organized and managed through ETL processes supporting operational needs and planning/reporting needs.
- SSIS is a standard transformation tool for core data and multiple staff have been trained in its use.
- Staff are using consistent methods of loading data from operational systems to data warehouse for reporting.

GOAL

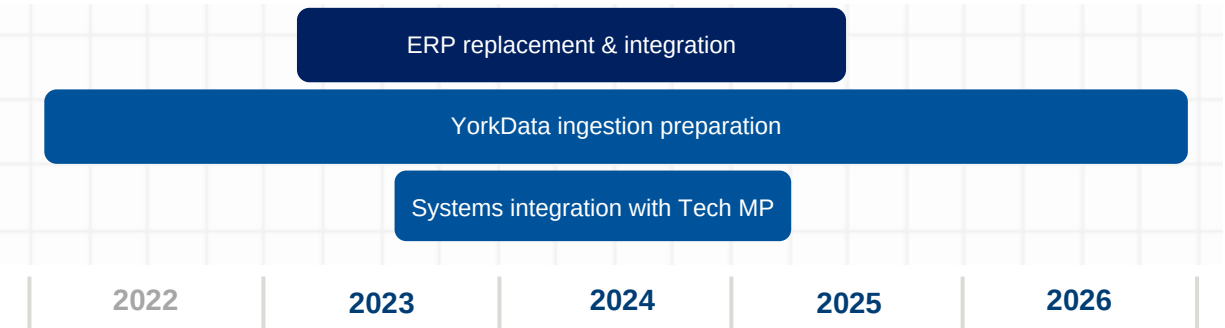
- Consistent, well-documented data transformation scripts feeding data from operational systems to YorkData.
- Client systems integrated with master data repositories.

DATA PREPARATION & INTEGRATION: PROJECTS

Core Projects

PROJECT	MATURITY MEASUREMENT
ANCHOR PROJECT Associated Pillar: Access & Sharing (P1), Actionable Insights (P4) **ERP replacement and integration:** The new Enterprise Resource Planning (ERP) solution for Finance and HR being introduced will require data preparation and integration services, so data isn't lost or changed and can be used within the new solution.	
YorkData ingestion preparation: Additional operational datasets will be made available for analysis and reporting in YorkData. This involves creating ETL scripts to load data from operational systems.	Number of additional datasets added to YorkData each year.
Systems data integration: Combining data from two or more systems in YorkData for analysis, or feeding data from one system to another, for example to feed master data maintained in YorkData to an operational system consuming master data.	Number of datasets combined, and number of systems consuming master data each year.

Timing



Success Measure

- Number of client systems integrated and using master data.

Other Potential Projects

PROJECT	DNA SERVICE	OTHER KNOWLEDGE AREA(S)
Movement of spatial data for tabular use (YorkData processing)	26 – ETL & Data Preparation	
Code repository for reuse across groups to avoid redevelopment (ETL library)	26 – ETL & Data Preparation	
Weather data integration through YorkData (integration from YorkData)	28 - Integrating & Matching to Master & Reference Data	Master & Metadata
Integrating to MDM for client ID, asset ID and employee ID (Master Data Management)	28 - Integrating & Matching to Master & Reference Data	Master & Metadata
Determining how best to improve data feeding from various business systems, potentially through advanced API tool usage (system integration)	29 - System to System Integration	
Integrated case management and link with provincial systems (system integration)	29 - System to System Integration	
Governance and best practices defined for integration and transformation across all toolsets (governance)		Governance
Standards for integration with external sources and leveraging common platforms (governance)		Governance
Reviewing old/legacy integrations and identifying opportunities for upgrade – documentation (governance)		Governance
Continue and expand training in SSIS and SSAS (literacy)		Data Literacy
Training materials for consistent approach to data cleansing (literacy)		Data Literacy

DATA QUALITY

Getting the right data the first time.

DEFINITION

The Data Quality knowledge area applies to the planning, implementation and control of activities that use quality management techniques to assure the data is fit for consumption and meets the needs of data consumers.

	2019	2021	2026
Maturity	1.9	2.5	4.0

2026 Target: Consistent data quality methodology and tools in place and quality targets set and monitored for core datasets.

ANALYSIS

- Data quality will be advanced by implementing data quality tools and getting stewards familiar with using them.

SUCCESSES

- Corporate Data Quality Assessment procedure developed, defining a systematic way to ensure data is fit for purpose.
- 150 Regional staff already have data quality training. Staff are able to talk knowledgably about data quality.
- Water/Wastewater has certified its first dataset as fit for purpose and is working on five more.
- Data quality is being monitored on a few dashboards.

GOAL

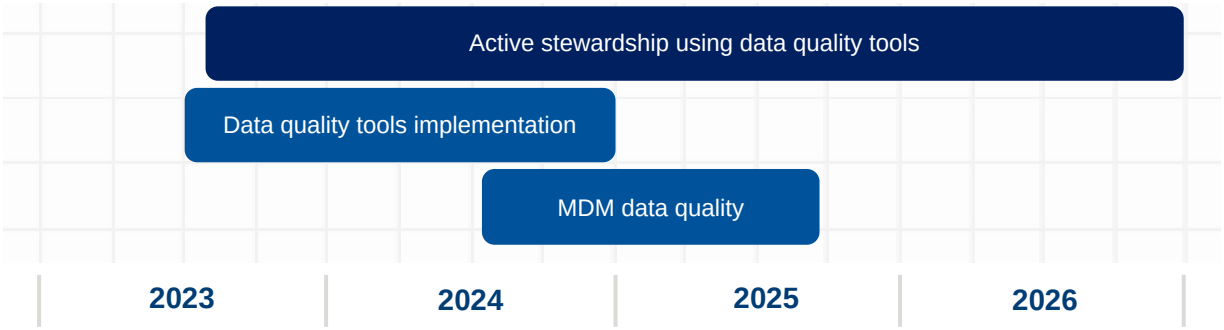
- By 2026 data quality targets and monitoring are widely understood and consistently used across departments, allowing for greater confidence in the Region's data.
- Stewardship of significant datasets is formalized.

DATA QUALITY: PROJECTS

Core Projects

PROJECT	MATURITY MEASUREMENT
ANCHOR PROJECT Associated Pillar: Culture & Talent (P2), Trust & Governance (P3) **Active stewardship using data quality tools:** Along with formalizing stewardship roles (see Data Governance project), we will provide the tools they need with a focus on data quality and downstream user expectations will improve understanding and management of key datasets.	Number of datasets with formal stewardship and number of data stewards trained in the use of the tools.
Data Quality Tools Implementation: Configuring and applying data quality tools against datasets in YorkData and operational datasets will improve trust in data for users. Training staff how to set targets that make data fit for purpose, and monitoring data quality are key activities across all departments.	Data quality tools in place and in use. Number of datasets with data quality management each year.
MDM data quality: Priority data quality support for widely used datasets that are consumed by multiple business processes, (i.e., client ID, employee ID, organizational unit).	

Timing



Success Measure

- Data quality targets are in place and monitored through a tool for the top 10 datasets in each department.

Other Potential Projects

PROJECT	DNA SERVICE	OTHER KNOWLEDGE AREA(S)
Capture profiles of datasets for each department (tools implementation)	23 - Data Profiling	Master & Metadata
Acquire data quality tools (tools implementation)	24 - Data Quality Assessment	Technology
Configure and implement data quality tools (tools implementation)	24 - Data Quality Assessment	Technology
Implement corporate data quality tools against additional data sets (tools implementation)	24 - Data Quality Assessment	
Increase number of stewards able to effectively use data quality tools (data literacy, stewardship)	25 - Data Quality Monitoring	
Stewardship implementation for data quality	25 - Data Quality Monitoring	
Scale and integrate the data quality framework at the data element and dataset level (governance)		Governance
Standardize processes with Data Quality Working Group (standard processes)		Governance
Determine method to measure effectiveness of data quality and improvements (governance, metrics)		Governance
Create training materials for stewards for data quality monitoring		Data Literacy
Establish a Community of Practice for data quality, CQI professionals (data literacy, stewardship)		Data Literacy

SECURITY, ACCESS & PRIVACY

Keeping data safe and secure.

DEFINITION

The Security, Access & Privacy knowledge area applies to the definition, planning, development and execution of security and privacy policies and procedures to ensure proper authentication, authorization, access, monitoring, and auditing of data and information.

	2019	2021	2026
Maturity	2.4	2.5	4.0

2026 Target: Data access and sharing easier through YorkData, and security classification guides decisions for data protection.

ANALYSIS

- This knowledge area overlaps with ITS' and Clerks' areas of responsibility.
- Progress will be made by leveraging things already in place.
- Among the proposed projects, awareness of access and security issues stand out.

SUCCESSES

- Open data supports transparency. More publicly available datasets have been added with our Open Data Policy.
- Information Security Classification Standard identifies sensitive data and defines controls and safeguards for access, integrity, and confidentiality.
- Data and Dashboard Catalogues identify shareable data.
- More staff are aware of Personal Health Information Protection Act (PHIPA) due to work on COVID-19.

GOAL

- Improved access and security provisions for data, based on identity and security classification.
- Improving staff awareness of how to access and securely share data.
- Having an inventory of agreements.
- Knowing what data has been shared with who and why.

SECURITY, ACCESS & PRIVACY: PROJECTS

Core Projects

PROJECT	MATURITY MEASUREMENT
ANCHOR PROJECT Associated Pillar: Access & Sharing (P1), Trust & Governance (P3) **Data Sharing Toolkit:** With a data sharing framework, a toolkit will make it easy for staff to share data internally and externally, providing guidance, agreement templates and tools for sharing data quickly while reducing risk.	*Integrated thinking* through easy-to-access data. Staff use data from other programs to support their analysis.
Applying security classification broadly: Each dataset should have an assigned security classification that will guide how the data is shared and secured. This makes it clear to staff how to handle data.	Percentage of datasets in the data catalogue with an assigned security classification.
Data access management: Catalogue-based direct access to data (especially for Open Data and YorkData), or catalogue-based request for access to data. Reduce the time to use the data directly.	Number of datasets that can be directly accessed and/or requested via the data catalogue.

Timing

Other Potential Projects

PROJECT	DNA SERVICE	OTHER KNOWLEDGE AREA(S)
Increase open data made available (open data)	51 - Open Data Publishing	
Establish “open by greatest extent possible” to increase data access & awareness, minimizing silo effect, reduce duplication (open access default)	51 - Open Data Publishing	
Establish alternatives to FTP for delivering data securely	52 - Data Deliveries to Consultants	Partnerships, Technology
Capture security classification in data catalogue, reduce redundancy for security (security classification)	19 – Classify Data	Metadata
Establish data disposal as a security and privacy concern (with IAM) (disposition)	19 – Classify Data	Content Management
Ensure only those with a defined business need can access related data through Identity Access Management (security)	19 – Classify Data	
Establish API-based security through service layer (ITS), with metadata (security)	19 – Classify Data	
Establish org. unit and Active Directory auditing for security (MDM employee) (security, auditing)	19 – Classify Data	Metadata
Risk mitigation measures and actions (security, risk)		Governance
Data anonymity		Governance
Increase staff understanding around data, access, privacy, and security with data disposal as a security and privacy concern (literacy)		Data Literacy
Have an awareness campaign for understanding where data goes (literacy)		Data Literacy
Improve awareness/enforcement of security standard, training, demonstrations (literacy)		Data Literacy
Annual WHMIS-type training for security, access, and privacy (Digital Academy) (literacy)		Data Literacy

TECHNOLOGY

An environment for data to thrive.

DEFINITION

The Technology knowledge area applies to organizing and managing software designs, technology support and procurement, as well as application inventory, including the provisioning of access to technology.

	2019	2021	2026
Maturity	3.0	3.0	4.0

2026 Target: YorkData provides a central platform for integrated analytics and reporting, with common tools and data access.

ANALYSIS

- This knowledge area overlaps with ITS and should align with the Technology Master Plan.
- YorkData/GIS are key areas of DAVS leadership.
- More platforms may be needed for data sharing.

SUCCESSES

- YorkData established as the corporate platform for analytics and reporting.
- YorkData platform provides stable and controlled data warehouse for analysis and reporting.
- YorkData blueprint provides a path for future development of the platform, enabling integration of data from different sources.
- The Technology Acquisition Policy requires consultation with ITS before technology purchases, ensuring it is manageable, compatible, supportable and securable.
- Web Mapping Strategy (2023 to 2026) completed.

GOAL

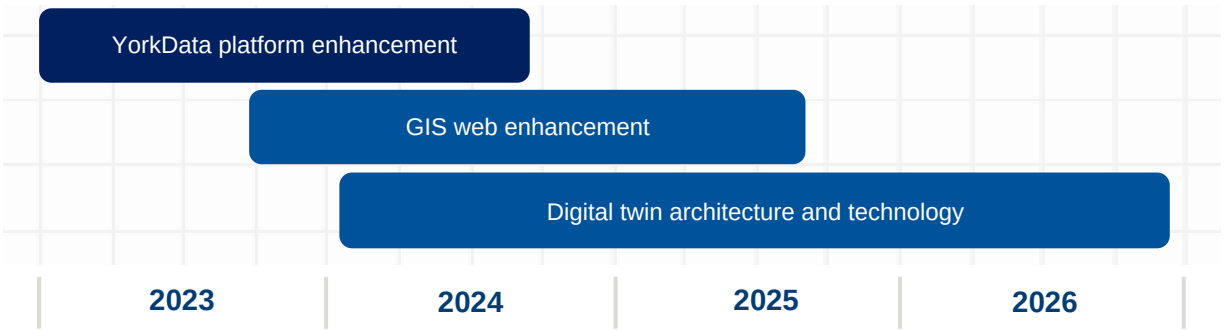
- Put more data from every department in YorkData to make it easy to access through the Data Catalogue, analyze and report on.
- Raise awareness of YorkData, and provide governance to YorkData processes, so that data products are certified and trusted.
- Implement the Data Catalogue and data quality tools.
- Pilot a digital twin model.

TECHNOLOGY: PROJECTS

Core Projects

PROJECT	MATURITY MEASUREMENT
ANCHOR PROJECT Associated Pillar: Access & Sharing (P1) **YorkData platform enhancement:** Upgrading the platform, leveraging cloud-based data processing for large datasets, implementing Data Catalogue and data quality functions (also see Master and Metadata and Data Quality Knowledge Areas). For further details see YorkData Blueprint.	Additional capability and tools are introduced. Curated data can be directly accessed by users.
GIS web enhancement: Keeping the Region's web-mapping capabilities and integrations current by migrating to Drupal and VertiGIS platforms, using microservice architecture, improving usability, and viewing historical data. For details see the GIS web strategy.	GIS web services are integrated with the Region's Drupal platform.
Digital twin architecture and technology: The Region is investing in BIM facility models and updating models and visual representations of physical infrastructure in several areas. Representations of Regional assets, facilities and environmental context make decision-making more accurate. Note: This likely requires acquisition of 3D data which is not budgeted.	Digital twins become useful operationally.

Timing



Success Measures

- Number of staff accessing YorkData environment.
- Number of staff using web-mapping services.
- Number of public and partner sessions using web-mapping services.

Other Potential Projects

PROJECT	DNA SERVICE	OTHER KNOWLEDGE AREA(S)
YorkData Evolution (YorkData)		
MDM technology (CHS and ITS) (MDM)	54 - Solution Architecture	Master & Metadata
Inventories of solutions and MoUs (catalogue)	54 - Solution Architecture	Master & Metadata
Alignment with Technology Master Plan (alignment)	54 - Solution Architecture	
Cloud technologies and architectures for analytics (architecture, technology)	54 - Solution Architecture	Data Architecture
Sensor technologies and smart city solutions that generate data for operations (technology)	55 - Solution Deployment	
Web mapping strategy (GIS) implemented		
ESRI ELA (GIS) renewal (completed in 2023)		
Standardize technology requirements gathering (governance, standards)		Governance
Assessment of best practices for data in the cloud		Governance
Getting common understanding of YorkData for all levels of organization (YorkData, literacy)		Data Literacy
Ensuring tools available are fully leveraged (literacy, usage)		Data Literacy

CONTENT MANAGEMENT

Ensuring integration between data and content.

DEFINITION

The Content Management knowledge area provides consistent approaches to collection, storage and disposal of data, and integration with unstructured forms of information.

	2019	2021	2026
Maturity	–	2.5	4.0

2026 Target: Apply lifecycle management to core datasets, with effective data disposition to ensure appropriate historical records are maintained while managing the overall volume of data effectively.

ANALYSIS

- There is an overlap with IAM.
- Major areas for discovery are the disposition of data and the data lifecycle.

SUCCESSES

- Departments have improved database design, storage, and relationships.
- New positions developed: Data Engineering and Enterprise Data Architect.
- Significant progress in modelling data for data warehouse ingestion.
- Data models and flows for COVID-19 case tracking, financial reporting.
- Information Security Classification established.

GOAL

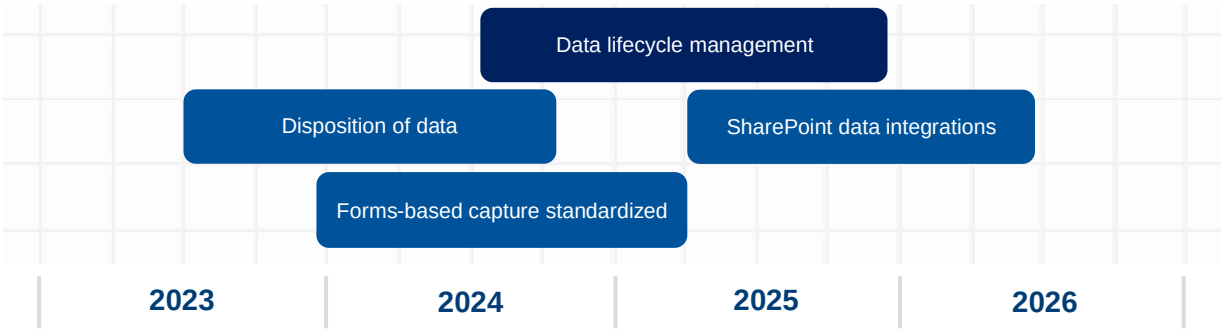
- Improve data lifecycle management, taking formal account of disposition.

CONTENT MANAGEMENT: PROJECTS

Core Projects

PROJECT	MATURITY MEASUREMENT
ANCHOR PROJECT Associated Pillar: Trust & Governance (P3) **Data lifecycle management:** Data management practices have significantly improved over the past four years, but no dataset has full data lifecycle processes applied to it. Using a pilot approach against a candidate dataset will enable us to understand costs and benefits of rigorously managed data in the York Region context.	One dataset with full lifecycle data management applied.
Disposition of data: Applying retention rules intelligently to datasets and fields within datasets to reduce the overall volume of data retained, while maintaining important historical data for long-term trend analysis and archiving.	Number of datasets with active disposition applied each year.
Forms-based capture standardized: Forms-based data capture and workflow that eliminates remaining paper-based solutions – standardization across departments (digital capture standardization).	

Timing



Success Measure:

- Number of managed datasets with a disposition framework.

Other Potential Projects

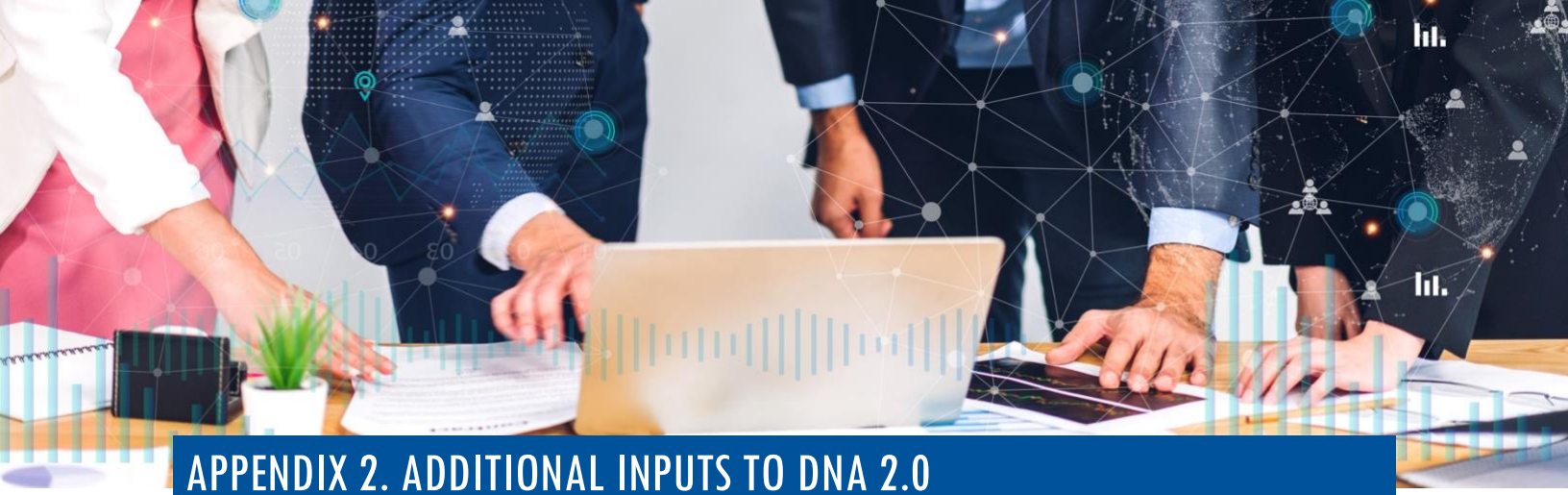
PROJECT	DNA SERVICE	OTHER KNOWLEDGE AREA(S)
User experience (relates to architecture) customer engagement layer (architecture)	17 - Capture	Data Architecture
Alignment with Information Management Master Plan (alignment)	17 - Capture	
Enterprise search	17 - Capture	Data Architecture, Master & Metadata
Archiving dashboards process and technology (work with IAM) (disposition, archiving)	18 - Store & Dispose	
Digital preservation & format conversions (archiving)	18 - Store & Dispose	
Inventories to manage flow, agreements etc. (catalogue)	18 - Store & Dispose	
How do we manage new forms of data capture (e.g., SharePoint)? Governance and decision trees (digital capture governance)		Literacy
Increase awareness of data capture and disposal methods and tools	18 - Store & Dispose	Literacy
Store, dispose, archive. Review policies & enforcement procedures for data retention, determine best practices for disposal (disposition)	18 - Store & Dispose	Governance
Forms management (digital capture standardization)	17 - Capture	
SharePoint, Dataverse as a data capture - how do we manage these? (digital capture governance)		

APPENDIX 1. LEAD AND SUPPORTING DEPARTMENTS FOR DNA 2.0 PROJECTS

Knowledge area, anchor and supporting projects	Lead department/ branch	Supporting department/ branch	Learning department/ branch
Governance			
Data Services Catalogue maturity	DAVS	All	
Stewardship roles defined for all levels	DAVS		
Data asset management	PW	DAVS	All
Data valuation	PW	DAVS	All
Architecture			
YorkData architecture	DAVS, ITS	PW	
Finance Forward/ERP architecture	FIN	ITS, DAVS, CAO	
Integrated architecture board	ITS, DAVS, Clerks		
Master and Metadata management			
Data Catalogue	DAVS, ITS		All
Establish MDM for client and employee	CHS, ITS	DAVS, CAO	All
NG 9-1-1 MDM	ITS, DAVS		Local Municipalities
Insights and Reporting			
Advanced Analytics Use Cases			
Document Archival Content Classification	CS/IAM	DAVS	
Fleet Vehicle Maintenance & Turnover Predictio	PW/TRN Fleet Services	DAVS	
Modernize development charge forecast	FIN/Treasury	DAVS	
Operationalizing Inflow and Infiltration Priority Model	PW/ENV Infrastructure Asset Mgmt	DAVS	

Knowledge area, anchor and supporting projects	Lead department/ branch	Supporting department/ branch	Learning department/ branch
Water & wastewater system resiliency and redundancy analysis	PW/ENV Operations	DAVS	
Solar potential of rooftops	PW/ENV Strategy & Innovation	DAVS	
Talent progression analysis	PEC	DAVS	
Territory and workload optimization automation	CHS/Social Services	DAVS	CHS
Literacy			
Building digital mindset	CAO, DAVS	ITS, IAM	All
Data literacy awareness and assessment	DAVS		All
Develop and deliver specific training for DnA intiatives	DAVS		All
Partnerships			
NG 9-1-1 and data exchange	ITS, DAVS	Police, CHS/ Ambulance	Local Municipalities
YorkTrax planning data exchange	CS/Planning	DAVS	PW
Preparation and Integration			
ERP replacement and integration	FIN	ITS, DAVS, CAO	All
YorkData ingestion preparation	All		
Systems data integration	All		
Quality			
Active stewardship using data quality tools	DAVS	All	
Data quality tools implementation	ITS, DAVS	PW	All
MDM data quality	DAVS		All
Security, Access & Privacy			
Data Sharing Toolkit	DAVS	Clerks	All
Apply security classification broadly	PW	Clerks, DAVS	All
Data access management	DAVS,ITS		All
Technology			
YorkData platform enhancement	ITS	PW	All
GIS web enhancement	DAVS		All
Digital twin architecture and technology	CS, PW	DAVS	All
Content management			
Data lifecycle management	DAVS, IAM		All
Disposition of data	DAVS, IAM		All
Form-based capture standardization	DAVS		All

Notes: *In many cases, we are building capabilities and piloting one department before expanding to others. "All" indicates all departments will be expected to adopt the new practices after they are developed and matured.*

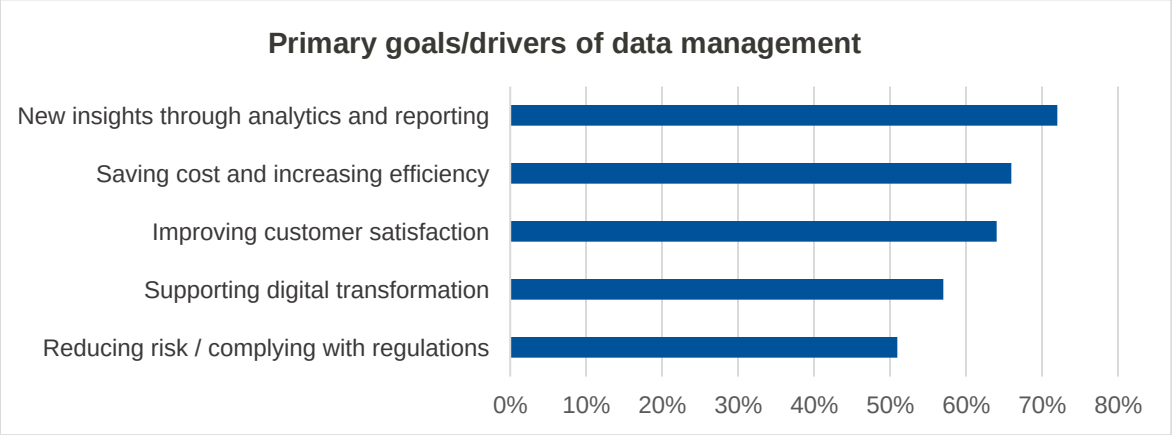


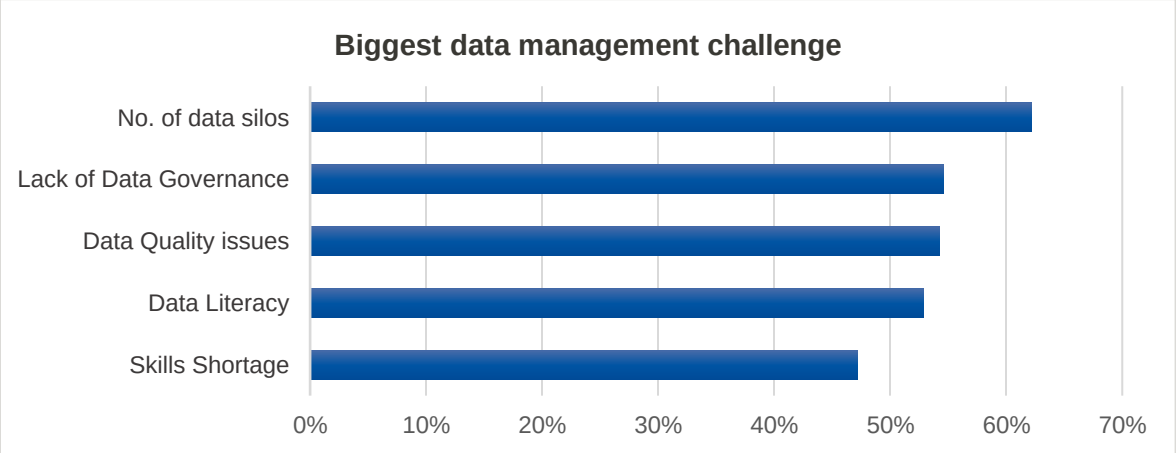
APPENDIX 2. ADDITIONAL INPUTS TO DNA 2.0

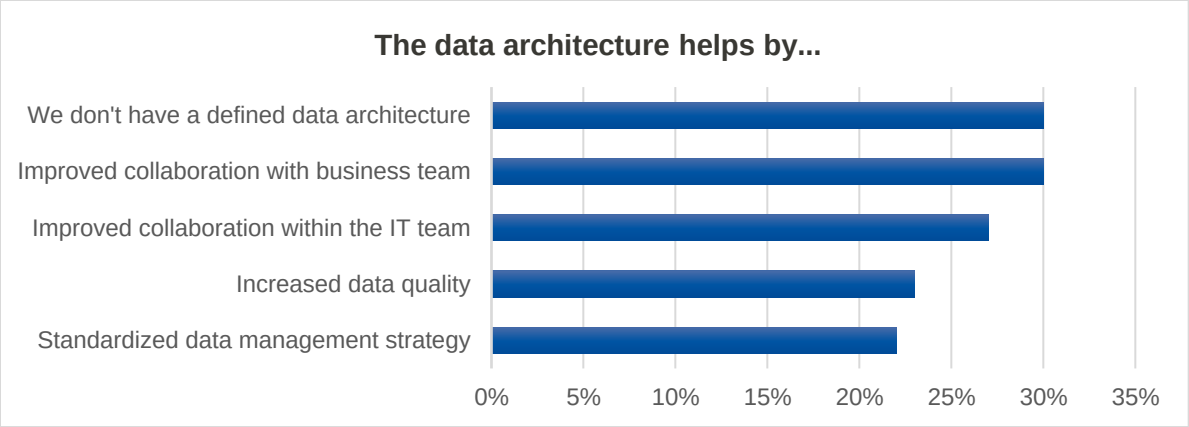
ENVIRONMENTAL SCAN

Additional Insights from the Dataversity Report

Their interviews of the business/government/NGO community produced the following key findings (the x-axis indicates the percentage of respondents agreeing with the statement):







Note: *The data architecture reflects the business' needs to its data and system requirements. It manages the data and its flow throughout the organization.*

WEB MAPPING STRATEGY 2023 TO 2026

Vision: *Putting data to work: at your fingertips.*

Focus Areas and Objectives

Self-Service and Customer Experience
Design modern mapping experiences for customers and staff

Objectives:

- Advance self-serve mapping and analytics for front-line staff
- Deliver a modern and personalized user experience
- Integrate advanced analytics and visualization capabilities
- Expand web-based data collection and editing

Access and Data Sharing
Further data discoverability, access, and sharing for all

Objectives:

- Strengthen external data sharing
- Revitalize trust in web mapping data and systems
- Sustain compliance with provincial accessibility standards
- Increase data and information discoverability

Talent and Communication

Develop customer and staff awareness, understanding, and capabilities

Objectives:

- Introduce new learning and development opportunities
- Increase two-way public communication
- Maximize operational communications

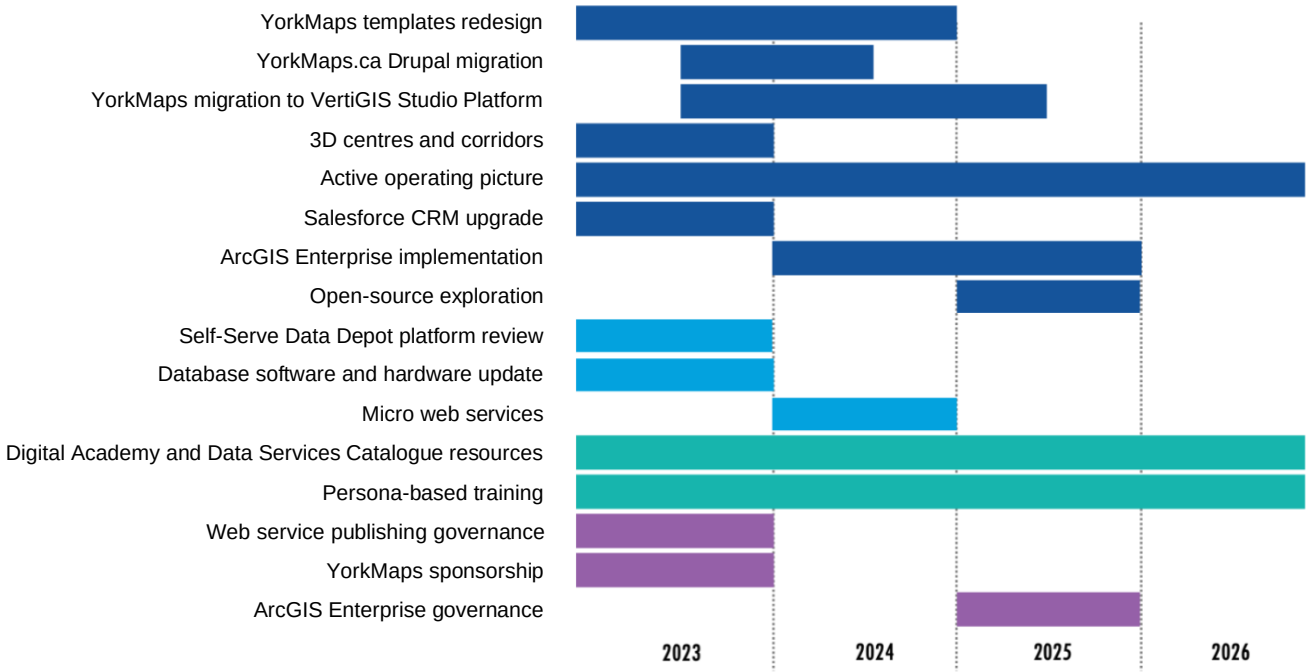
Operations and Sustainability

Streamline service delivery and maintenance processes

Objectives:

- Reinforce a federated service delivery model
- Streamline maintenance processes and introduce product management practices

Implementation Plan for the Focus Area Prioirty Projects



ADVANCED ANALYTICS USE CASES

Dashboards 'R' Us and We Are Putting Data to Work!

> "There is a rise in attention for "GeoAI" which York Region is well-positioned to leverage in, for example, asset management, planning, water/wastewater, and public health.
>
> *PwC Report 2021*

In early 2023, a small team from the DAVS branch held multiple meetings with programs throughout the Region to identify their use of and plans for advanced analytics, in support of their planning, products, services and operations.

Analytics is Happening

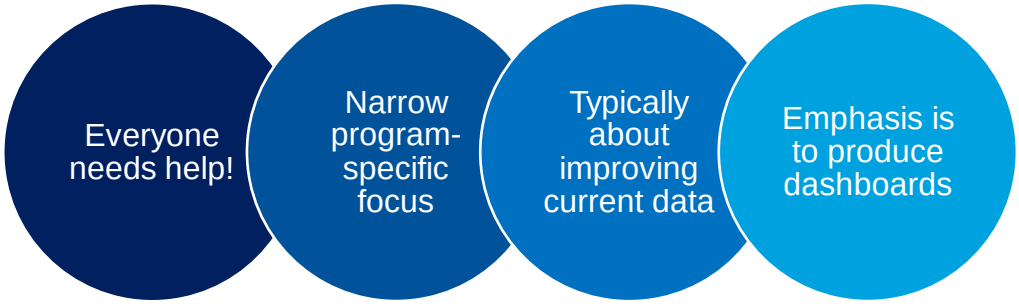
The self-referential dashboard of dashboards above says a lot. We love dashboards, and they are quite prevalent throughout the organization. This project, however, wanted to dig deeper and look at more advanced analytics and the opportunities for that.

With the rapid rise and easy availability of AI, few now need convincing that an advanced analytics revolution is coming. Its impact will be significant.

York Region is getting ready for the next phase of DnA by investigating and enabling advanced analytics (e.g., machine learning, intelligent automation) across the organization with projects

that enhance business value. These will take our analytics beyond dashboards and into new relationships with our data and provide a deeper understanding of what those data tell us.

Our Regional analytics projects and activities currently support policies, programs, and mostly **services**. Most of these are ***reporting*** projects – maps, dashboards or situational awareness. The DAVS review of analytics use within the Region identified these common themes through interviews and discussions.

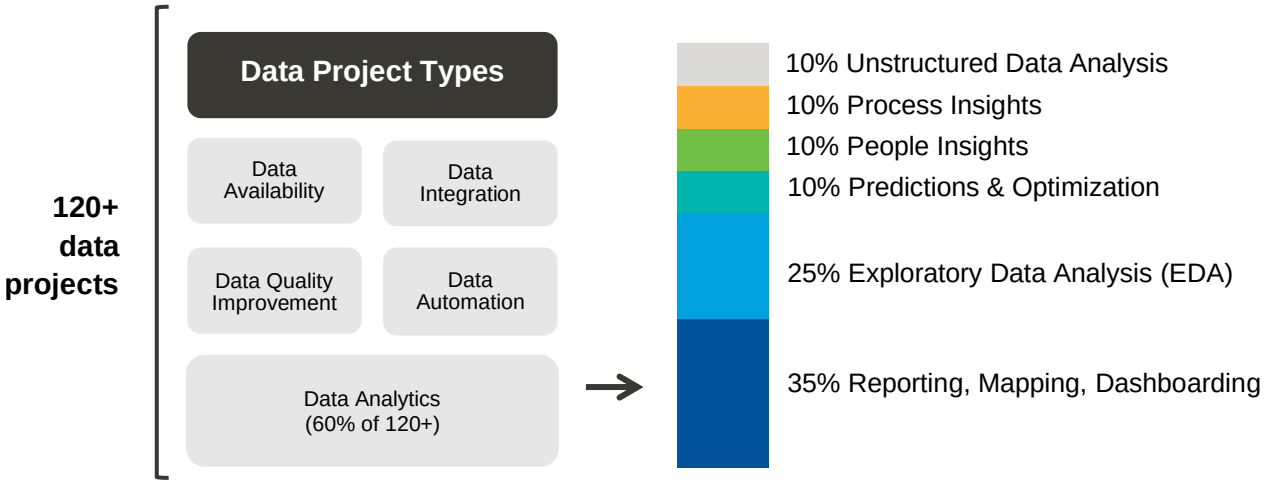


More specifically, we found:

- We are putting data to work!
- Business value is being created
- There is little request for advanced analytics
- We have a reliance on vendors with specialized knowledge and experience with reporting projects in mapping, dashboarding and situational awareness
- Projects tend to use the data at hand

Of the more than 120 data projects identified in the review, most (60%) are data analytics projects and 35% of these are the Reporting, Mapping or Dashboard type. The other types of projects are **Data Availability/Access**, which involve making it easier to get the data you need; **Data Integration** between internal systems and external data; **Data Quality/Product Improvement** which means improving the data and existing dashboards, viewers, functionality; and **Data Automation/RPA** (Robotic Process Automation) e.g., form-filling, data extraction, and completing an application.

This is illustrated in the graphic below.



Data Analytics Project Types

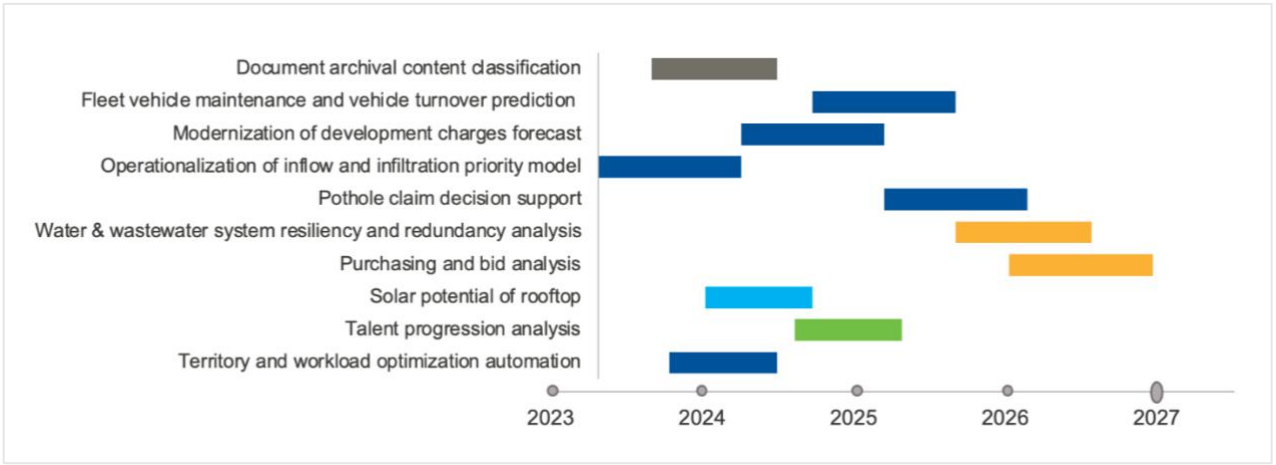
- **Unstructured Data Analysis (10% of the Data Analytics projects):** Analyze text (surveys, contents inside documents, etc.) and images – mostly text. Becoming popularized by online AI applications.
- **Process Insights (10%):** Use the usual length of processes to identify timesaving opportunities.
- **People Insights (10%):** Understand the workforce and our customers, e.g., people on a waiting list for services.
- **Predictions & Optimization (10%):** Forecasts, frequently for asset insights, e.g., vehicle maintenance.
- **Exploratory Data Analysis (EDA) (25%):** Create new information, test hypotheses, delivery is usually storytelling with data, not necessarily a dashboard, e.g., water billing, SCADA alerts.
- **Reporting, Mapping, Dashboarding (35%):** Create new dashboards or enhance existing ones, add more data, improve the data and process pipeline.

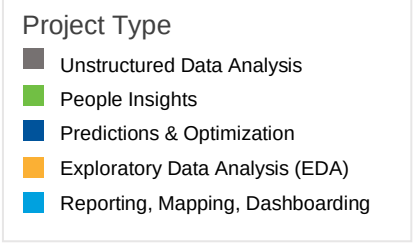
The team also created this status/readiness review for each of these analytic project types:

Analytics Classification	Data Readiness	Effort	Advance the DnA Practice	Impact Potential	Momentum
Reporting, Mapping & Situational Awareness (35%)	🟡	🟡	🟠	🟡	🔵
Exploratory Data Analysis (25%)	🟡	🟠	🟡	🟡	🟡
Predictions & Optimizations (10%)	🟠	🟠	🔵	🟢	🟡
People Insights (10%)	🟠	🟡	🟡	🟢	🟠
Process Insights (10%)	🔴	🔴	🟢	🟢	🔴
Unstructured Data Analysis (10%)	🟠	🟠	🟢	🟡	🟠

Advanced Analytics Projects

Of the several projects identified and noted above in the Data Insights and Reporting knowledge area summary, these 10 are highlighted in the report for their use of more advanced analytics capabilities.





York Region