DATA AND ANALYTICS
PLAYBOOK

2021 MASTER PLAN

York Region

VISION

Strong, caring, safe communities

MISSION

Working together to serve our thriving communities – today and tomorrow

CORPORATE VALUES

Integrity

Commitment

Accountability

Respect

Excellence

BEFORE YOU START

Perhaps you are trying to understand “digital”. Maybe you are sitting on a wealth of data and you’re struggling to put it to work across the entire organization. Or you want to go further and faster with less effort by leveraging the thought leadership of over 100 data professionals and the consultancy of PwC.

The Playbook offers ideas you can use now. It outlines an approach incorporating DAMA that organizes the common elements of data and analytics management to define and deliver core services that virtually any large organization can adapt and adopt. And, although some of what we do is “Yorkified”, the approach below is generic.

If you do intend to develop and implement your own data and analytics management strategy, make sure you can answer “yes” to these:

- Do you have senior management support?
- Are you ready to get at it and stick to it?

If so, the Region is happy to help. We can’t sell this idea to your organization for you, but if your organization is already sold and you have a question or would like to discuss, read on, and let us know.

USE

QUESTIONS? CONNECT WITH US!

This Data and Analytics Master Plan 2019 to 2023 book is intended to be used as a setup and provide context to the main Data and Analytics Playbook.

Connect by phone:
1-877-464-9675
Ext. 7DATA

Connect by email:
data@york.ca

Visit us online:
york.ca/puttingdatatowork

TABLE OF CONTENTS

INTRODUCTION

On behalf of the Regional Municipality of York (York Region) and our Data and Analytics Steering Committee, I'm pleased to introduce you to this Data and Analytics (DnA) Master Plan "Playbook". The Playbook tells the story of how we are establishing a partnered approach to data and analytics across the organization; and how that is improving and enabling the Region's delivery of programs and services to residents.

It's not just an historical accounting. We want this to be USEFUL TO and USED BY others on a similar journey. This should resonate in virtually any large organization. We've done some heavy lifting. Please, help yourself.

For me, this journey continues to be exceptionally rewarding. Every day I get to work with dedicated, talented, and wonderful people – and this truly was and continues to be a team effort. There have been several memorable moments and practical insights as we combined our consultant PwC's ideas with our many experiences to establish a services-based approach to data that brings the whole organization together.

Writing this "playbook" is not just our idea. People and organizations across North America have been asking us "how did you do that?" and have suggested we share what we've accomplished and learned.

We have tried to keep the tone light and the content readable, even engaging. If it sounds like we're boasting, that's not the intent. We do have a lot to be proud of though. We have talented and committed people who have done unique and valuable work, but those accomplishments can only "speak for themselves" if those stories are told.

As with any organization, we are changing. It's not "business as usual". We face external factors (public health, new rules / regulations, next generation 911, affordable housing, climate change) that we must respond to, rising public expectations for personalized services, and increasing fiscal pressures.

In this Playbook, "our" and "we" are three things. We are the Data and Analytics Steering Committee and this Playbook's authors. We are also the York Region. And, after reading this, hopefully "we" includes you, which is our reason to write this.

While the DnA Master Plan itself outlines much of WHAT we are doing with data and analytics, this Playbook adds some of the WHY, WHO and HOW.

While we continue to make strides in data and analytics, we still have inaccurate or incomplete data. There's still duplication. There's still ambiguity. Much of the data the Region collects is *dark data* and can't be used to help us make decisions, create policy, or lead programs. But these are changing.

And that's the story of this Playbook. It is a story of change. It's not perfect. It's not done. But we are far enough along to share with you, so your journey is faster, less risky, and hopefully as rewarding as ours has been.

John

John Houweling Director, Data, Analytics and Visualization Services Branch

The growth and development of the Data and Analytics Master Plan, the milestones achieved, and the many components addressed in this Playbook would not be possible without the continuing direction and unwavering support from Regional Council and the Senior Management Team.

FOREWORD BY PWC

Public sector organizations are at the forefront of sustaining our quality of life. Though often labeled with the reputation of lagging on digital trends, their priority is to serve taxpayers with the best value for their dollars. In trying to do right by citizens, it can be challenging to push the limits of exploration and innovation due to a reduced risk appetite relative to industry organizations. Public sector organizations must make important deliberations before investing.

Decision-making is further complexed due to the highly dynamic stakeholder environments in which public sector organizations operate. Regions and municipalities in particular face significant stakeholder pressures with competing interests. On one end of the spectrum, they are the closest layer of government to the people, running various services we, all deeply rely on but often take for granted. Clean water, safe roads, garbage removal - each of these require multiple decision points daily from our governments and are done nearly seamlessly to the point where we don't think twice when we fill our glasses from the tap. On the other end, regions and municipal-level governments are deeply entangled in coordinating with higher levels of government, maintaining alignment across political agendas and policies. Though left with little recognition, local governments are the unsung heroes of our nation.

Further exasperating the need for quick data-informed decision-making are the various macro trends affecting the public sector, including, but not limited to:

- Pandemic Impact on Ways of Working: Although we're not all physically back to the office, we've adopted new ways of working, including hybrid models. The most critical aspect for employers to consider as we think through the return to the office is safety. Shared and segregated spaces are major drivers in deciding how we return to work, in a safe and responsible manner. Analytics, for example, can help determine the maximum number of employees we can admit to office spaces without risking transmission of disease, through modeling and simulation.

- Employee Wellbeing and Engagement: Working from home comes with its own stresses. Never has the need and desire to multitask been so high with multiple channels of communication and mediums of information literally at our fingertips, always. With so much going on, it's difficult for our workforce to stay engaged and connected to the task or meeting at hand. Using data to understand the workforce sentiment as it relates to this new working environment is crucial in adapting and future-proofing our organizations. Physical connection has now become a mode of reward for some employees. Analytics helps assess the current state and navigate the decision-making process.

- Service Delivery Experience: In the digital age, citizens expect more from our cities. They rely on cities to use data effectively and navigate requests from the community in a seamless manner. Citizens need us to rethink the services we offer and how we offer them. Citizens expect their value drivers to be considered as they interact with municipal services. For example, instead of community members having to schedule their activities around fixed transit schedules, could transit agencies leverage data about how people move around the city to better optimize schedules and routes to meet the changing needs of our communities?

- Transparency on Project Outcomes: As digital transformation initiatives are undertaken by municipalities, an understanding of what the outcome intended is, and what is due to change in service delivery needs to be clear to citizens. Cities are governed by their citizens and therefore need visibility into how dollars are spent to support healthy, thriving, and changing communities. Creating operational transparency is critical in showcasing how dollars are spent and what we've moved the needle on. Measuring outcomes is a key part of tracking our success but ensuring that our outcomes are what the community wants is the very step.

It's clear that, across their roles in the economic, social, health and environmental dimensions of our lives, local governments are already using data to make decisions that impact us daily. Each of these dimensions can be regarded as entire industries in which Regions and municipalities operate, as they are held accountable for delivering products and services across each. This makes the data generated, captured, and managed by local governments to be distinctly diverse, scattered, and difficult to manage. What often happens as a result, is there are multiple "pockets" of analytics and reporting across the organization, with limited coordination across.

What York Region has done here, is create a way forward for other public sector agencies by being a first mover and disruptor in how they have managed to put data to work in an effective and efficient manner. York Region's journey was not so much about initiating the use of data in the organization, but about aligning data and analytics to a common mission and enabling their staff to make better use of it. York Region increased the value of data across their organization with a razor-sharp focus on tying analytics to business needs. In their journey, they exemplified the importance of understanding that the endeavour to becoming a data and analytics leader is not about a single person or a department, but a wave of change across the entire organization.

From when we, PwC Canada, first engaged with York, it was clear that the team had intense passion and excitement for what they could become with the power of data and analytics. Not different from other regions and municipalities, York Region has a high number of employees and contractors, and the analytics team at York was facing multiple competing priorities and business needs from their organization. As visionaries however, it was evident to them that their GIS shop needed to evolve into robust analytics shop to set themselves up for longer term success.

York was aware there was a missing piece to their puzzle, in the coordination and alignment of efforts to drive their vision forward. PwC Canada's role was to channel their energy and align the goals and objectives across the departments to foster the beginnings of a truly data-driven enterprise. This was an outcome of four key activities together:

- Coordination of activities oriented toward enterprise enablement
- Collaboration on foundational elements such as data management and governance
- Development of a three-year D&A Master Plan
- Empowering of diverse teams to deliver on the Master Plan initiatives and roll out functions and services as required

Looking back to two years ago today, York Region has successfully implemented many of the key initiatives in the first two years of their plan, making themselves stand out as leaders as recognized by multiple awards across both the private and public sector. As they reflect on their journey of how they "put data to work", they have developed this playbook as a series of guidelines and lessons learned as other regions, municipalities, and other organizations embark on a similar path ahead. While there's no perfect journey, York's is one that is tested and true, and we're both thrilled and honoured to have been by York's side as they pave the path forward for others.

ACKNOWLEDGEMENTS

Members of the Data and Analytics Steering Committee are dedicated to advancing the practice of data and analytics and work to advance the goals of the entire Region first before any one department. Special thanks to:

- Chin Snelgrove, Susan
- Cummings, Andrew
- Lamb, Jeff
- Lang, Glenn
- Letea, Claudia
- Lucchetta, Kim
- Patel, Uday
- Porretta, Kate
- Purves, Laura
- Rowe, Duncan
- Satterthwaite, Andrew
- Schuller, Kirk
- Sheikh, Ahmad
- Wang, Minnie

eDOCS# 13550246

PREFACE

It is helpful to first know something about the Regional Municipality of York; how data drives us; how having senior management support has been key; and our notable GIS legacy.

ABOUT YORK REGION

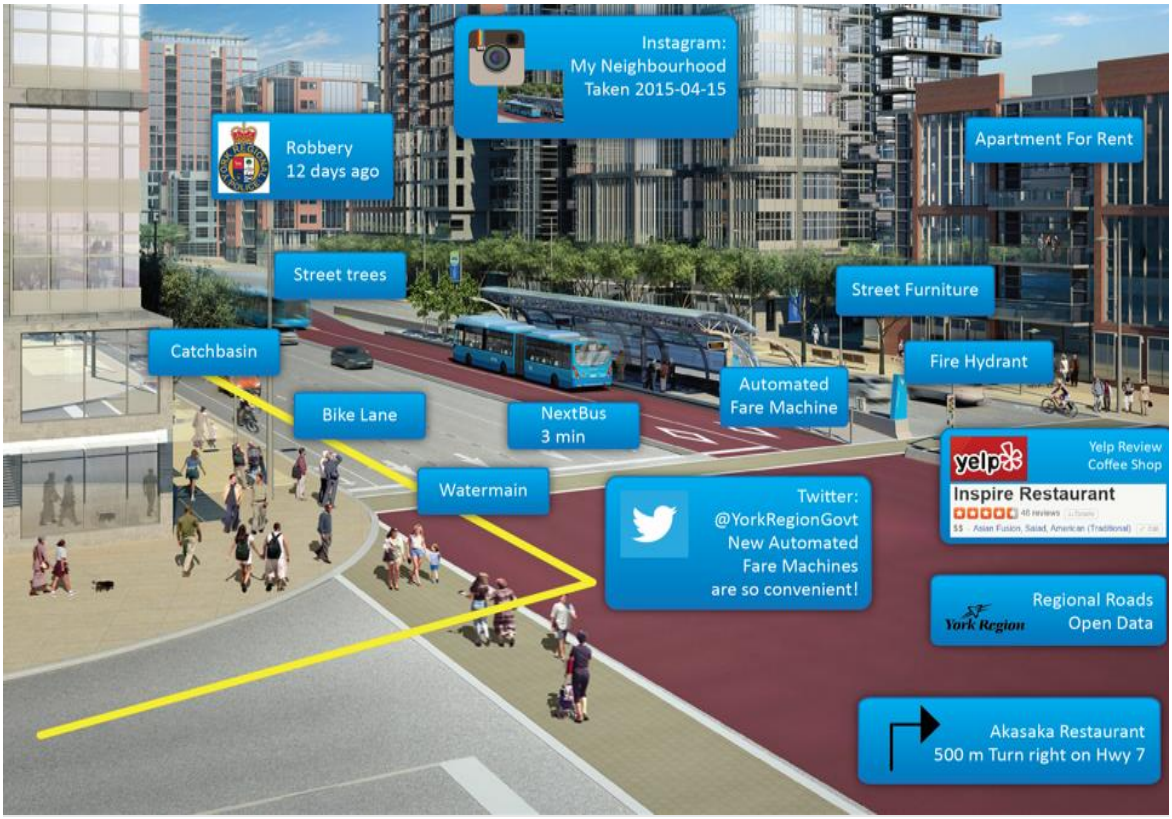
York Region's 1.2 million residents live in nine local cities and towns, speak over 120 different languages, and identify with more than 230 distinct ethnic origins. With more than 54,000 businesses and 650,000 jobs, the Region is the second largest business centre in the Province of Ontario, Canada.

York Region provides a broad selection of services and resources to its residents and businesses, in support of its vision of "strong, caring, safe communities."

In York Region's two-tier municipal government structure, the regional municipality is responsible for broad common services such as emergency response, police, waste management, public health, social assistance, transit and more; and the local municipalities (Georgina, East Gwillimbury, Stouffville, Markham, Richmond Hill, Vaughan, King, Aurora, Newmarket) provide services like development, fire, planning, zoning, recreation, cultural programs, and many others. In addition, there are several shared responsibilities and services, such as roads operations, water and wastewater services, and land development approvals. More information about the Region's key service areas is available at york.ca/regionalservices.

IT'S ALL ABOUT THE DATA

Our residents need and expect *coordinated and integrated* services. That takes data.



THERE IS A LOT OF DATA

At any given intersection, data connects to us through road sensors, traffic cameras, in-vehicle GPS, and mobile applications that track where you are, what you want, and what you might want. SCADA sensors produce billions of records per year; Bluetooth sensors collect 91 GB per year. The Region stores over 140,000 GB of data growing at 30% annually, and our 14 business lines use hundreds of different applications that each create and use data.

Data also comes from local municipal partners, the provincial ministries, federal departments, regional police, conservation authorities, and school boards as well as from commercial data vendors, NGOs, and the private sector.

It's a cornucopia of data types, sources, and uses. We are working to unlock and then share this trusted data among our partners and with the public both for their needs and to help us generate insight to support more efficient and effective program and service delivery.

Residents expect us to have data under control. They expect their personal data is protected, the data used to plan and deliver programs is accurate and complete, and that new policies and laws are based on supporting data. Residents don't "see" the data environment at the intersection described above, but they see the results and they expect those to *work*.

DATA IS A CORPORATE ASSET

Just like a road, bridge or building is an asset, so too is the data that represents it. Just like that asset has a defined acquisition, construction, maintenance, and replacement lifecycle, so too does its data. The organization has long understood that its data is an asset. We just needed to figure out how to elevate this understanding to ensure it's truly "corporate", because data collected and managed by one team can be invaluable to others, including partners. We formally declared data to be a corporate asset in our Information Management Policy.

WE HAVE SEVERAL SOURCES OF DATA

We generate most of our data through thousands of business processes. Much of that data supports multiple activities. When we put a pipe in the ground, we record the location, the material, the diameter, ownership, the date, and so on. Like so much of our data, that data is not just important to the Region, it's important to our local municipalities for their water and wastewater maintenance and planning. It's important to the utilities and to programs like "Call before you dig". It's important to the province's Ministry of Environment for their inflow and infiltration monitoring.

Some data comes from private sources such as Uber, Airbnb and Strava and from other public sector organizations such as Stats Canada.

For over 20 years, we've been exchanging and sharing data with our local municipalities, school boards and conservation authorities through the YorkInfo Partnership. (If you haven't seen the website, it's worth a look!)

We also acquire or buy data from companies. For example, we bought data from Environics Analytics to help us better understand our customers including their values, behaviors and what matters to them; and we regularly buy orthophotography for the Region (and share that data and the cost of the purchase with our YorkInfo Partnership members).

WE NEED TO IMPROVE HOW WE LEVERAGE AND USE ALL THIS DATA

Our data is typically created or bought to solve point solutions or address unique departmental needs. It does that, but it can do much more. It needs to. We are asked to do much more too.

Unless there's privacy concerns, department data needs to be corporate data, so all areas of the Region can use it. That way costs are shared, duplication is avoided, trust in the data rises, and our programs, services, and decision-making all benefit.

As this happens and our data and digital maturity grow, departmental programs will increasingly consider the broader context when they set out to collect and use data.

Tools like AI and machine learning will also help us use and leverage our data by automating processes and getting at deeper answers. These technologies are already available, but the data must be ready first before they can produce anything worthwhile. Our Data and Analytics (DnA) Master Plan is putting in place the services to support that way of thinking and being.

OUR GEOGRAPHIC LEGACY

Regional CAO, Bruce MacGregor:

"Most municipal data is connected to geography, so it was a natural progression for our GIS group to take on a corporate data governance roll beyond just spatial data. Data drives business intelligence and informed decision-making. Analytics and visualization help us ask and answer questions, model and predict outcomes, and tell our story to council and residents. The DAVS Branch is helping establish that culture of collaboration within the Region and amongst our partners."

Everything happens somewhere. Most data in the Region can be tied to a location.

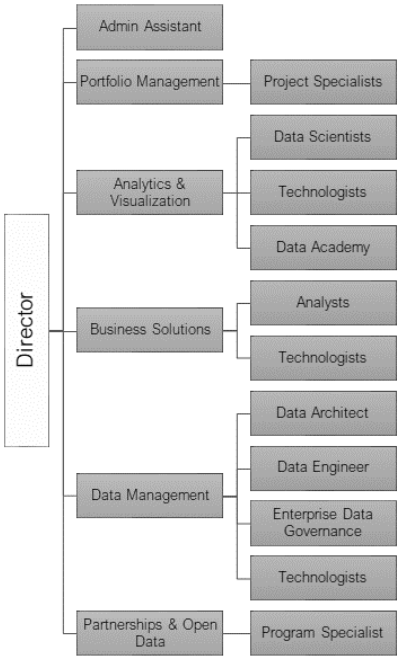
DATA, ANALYTICS AND VISUALIZATION SERVICES (DAVS) BRANCH

York Region was an early adopter of GIS to support regional planning and development. The GIS Branch worked with geography. They produced maps. Maps are **data** (place names, features, and conditions on different integrated data layers) that show (**visualize**) something (**analysis**).

About five years ago, the GIS Branch was renamed to Data Analytics and Visualization Services (DAVS) Branch, in part to recognize the broad and strategic role in establishing a data-informed culture within the Region. The change also helped recognize the work already being done in areas like data partnerships and data management and recognized the branch was much more than a "mapping team." GIS people are good at data collection, maintenance, analysis, and visualization. It is only logical to get broader value by applying these skills to spatial and non-spatial (business) data.

They matured to the point that in 2015 URISA International recognized York Region as having the world's *best municipal enterprise GIS*. And, in 2020, York Region received the *Esri President's Award* from Jack Dangermond, Esri's founder / President – an award that considers their entire worldwide GIS community – over 350,000 organizations, not just municipal. This was in recognition for our leadership particularly associated with data governance and partnership.

In outlining his decision, Jack stated: "York Region's work represents a pattern that's worth repeating across Canada and around the world. Their innovations exemplify how geospatial data can be shared and integrated and help improve communities and serve as important milestones for GIS users globally."



MISSION ACCOMPLISHED WITH SPATIAL DATA

Unlike most of the tens of thousands of data sets in use at York Region, the management and use of spatial data ***are*** coordinated across the Region. All departments and their staff interact with, contribute to, and use the over 1100 spatial data layers in our Region's spatial data warehouse. It may have taken 20 years to do(!), but this trusted, corporate spatial data resource has also given us a big head-start re. the work underway through the DnA Master Plan with corporate data management.

Note: many of these data layers and associated web map services and analytics are public facing at YorkMaps. The spatial data warehouse is outlined in more detail in the "Notable Corporate Solutions" section below.

OUR KEYS TO SUCCESS

There are many reasons, but mostly we succeed because our quiet, consistent, and persistent management team focuses on our people and on data. The DnA Master Plan and its outcomes reflect this. Our focus on staff and "social grease" gave everyone the comfort to dive in, go through the process, and create this plan. Our focus on data gave us the literacy and background to know what questions to ask and where to look for issues and opportunities.

Much of this Playbook and its implementation however should be relevant regardless of your history. Much of what we have done, you can do.

(The DAVS Branch team pre-pandemic. Looking forward to a new group photo!)

THE DAVS BRANCH "SUCCESS PLAYBOOK"

In response to receiving the Esri President's Award in 2020, we wanted to identify the keys to our success. DAVS staff were surveyed, and each person was asked to list their *top three reasons* for the branch's success. We compiled the responses into a "Success Playbook" with a detailed rationale for each of their top 10 responses. That playbook and the responses are summarized below:

Success Factor: Culture (the top response by far!)

Both DAVS and the Region are often described as progressive and "ahead of the curve." DAVS has an environment where opinions and ideas are valued, and everyone feels free to provide their own perspective. Staff members have the trust and respect of their peers and the support of their management.

For example, the **Data Heroes** initiative celebrates unsung data stewards throughout the Region with an article about their accomplishments, and an accompanying poster which is posted throughout the regional office.

Success Factor: Team

Staff told the survey that they are part of a great team, and that teamwork is valued, encouraged, and supported. DAVS staff have a diversity in background, culture, interests, and age, and our roughly 50/50 split of men and women mean there's a variety of voices and perspectives. Getting the right people is thoughtful and deliberate.

Success Factor: Vision and plan

The branch has a vision, a multi-year strategic plan, and annual project charters that everyone helps create. Plans provide an opportunity to assess the environment, find opportunities and determine direction. They align with the Region's vision and strategy, and they ensure Branch activities address the key needs of the Region's Departments.

By involving all staff, the plans reflect a broad range of views and helps build the collaborative culture.

Success Factor: Collaboration

Undoubtedly "collaboration" was on everyone's mind when they took the survey because Esri President Jack Dangermond had identified it as the key reason why the Region won the President's award. Alex Miller, Esri Canada's President said: "I think it's a reflection that they are ahead of the rest of the world, ahead of the rest of the country in this level of collaboration – which is not easy to do."

There are several tangible examples, but the **YorkInfo Partnership** is most notable with its 25-year history of the Region's municipalities, conservation authorities and school boards working together to get the most from their collective investments in data, analytics, and GIS technology.

Success Factor: Agility

Staff talk about how DAVS is "agile", flexible, able to face change and leverage opportunities. Even the best planning can't foresee all the priority future needs.

The COVID-19 response is a good example because when COVID-19 struck, it was essential to report both internally and externally on the spread and scope of the disease within the Region. The Region borrowed many staff from DAVS for the team that rapidly stitched together a backend and dashboards which kept improving and adjusting through a series of quick deliverables – giving the Region one of the most comprehensive and accurate COVID-19 information systems in the province.

Success Factor: Explore and innovate

Innovation is an encouraged, iterative, and usually collective process. The branch leadership team stay up on effective management concepts and what others do to be successful, bringing these into the team conversation. Much of the solutions they produce – the Open Data site, YorkInfo Partnership, All Pipes, the Data Co-op – are unique.

Success Factor: Opportunities to grow and learn

This success factor is closely aligned with one of the pillars of the DnA Master Plan. Learning opportunities are both formal and informal and are available to staff across the Region and often to partners as well – through training programs, webinars, and collaborative initiatives. Communities of practice are being established in which subject matter experts from across the programs and departments interact, share ideas, and experience, and provide expert assistance to staff requesting help. More formally, a significant emphasis is being placed on staff

advancement through skills assessment and training pathways – particularly through the Region's Digital Academy.

Success Factor: Council and senior management support

Staff identified "senior management support" because of the many ways it has been shown over the years – such as through the corporation's focus on digital literacy (technology, information, and data); its support of the branch's name change from GIS to DAVS signifying the broader and more corporate role; and establishing the branch's home within Corporate Services. Another example is the Region's approach to Open Data, which led to us receiving the Canadian Open Data Summit Innovation Award in 2018.

Success Factor: A network of experts

DAVS has established a cadre of experts often through standing agreements whose skills are either not available within the Branch or sometimes needed to supplement during peak times who also provide thought leadership and can quickly be brought on board for a project or assignment.

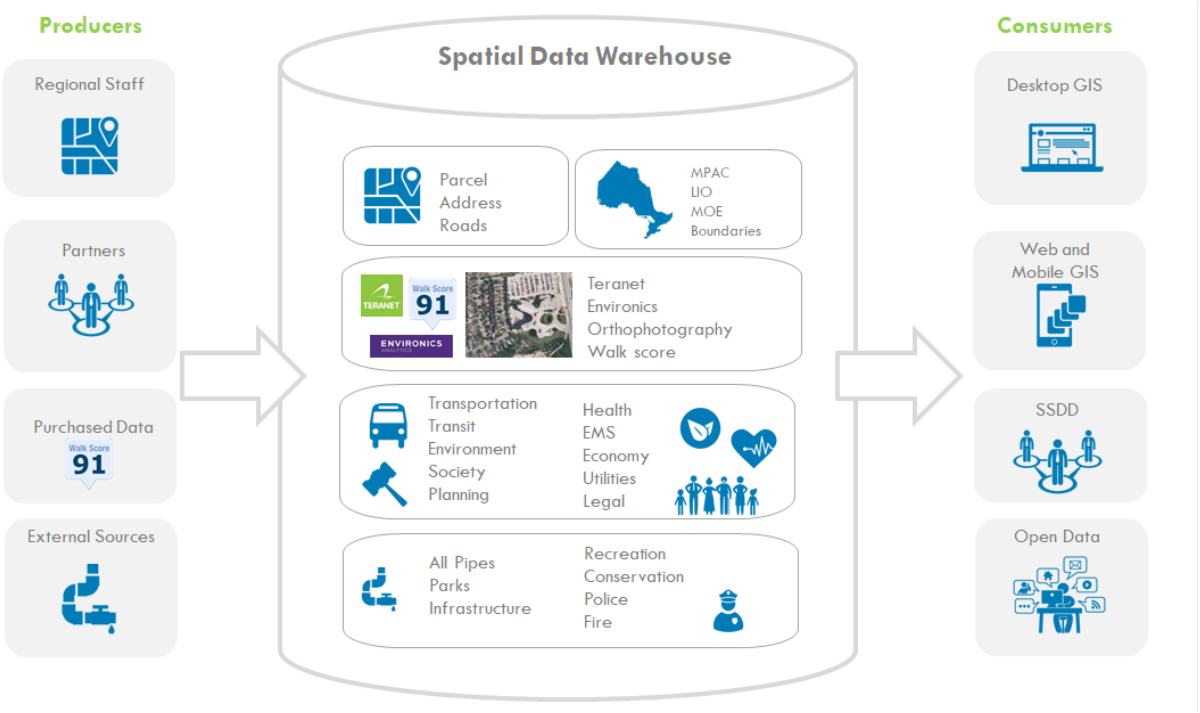
Success Factor: Data governance

When the Region identified data as a corporate asset, the CAO's policy pronouncement meant that data needs to be managed with appropriate governance like any other valued asset. Data governance took on increased importance within DAVS and it is a significant aspect of this plan and the maturity of DnA.

NOTABLE CORPORATE SOLUTIONS

The following are several of the corporate business applications, partnerships and approaches that reflect our aspiration of "***Together, putting data to work***". These were in place before we tackled the Data and Analytics Master Plan.

SPATIAL DATA WAREHOUSE



The spatial data warehouse provided somewhat of a blueprint and "proof" for the DnA Master Plan that a partnered approach to data is effective and was possible within the Region. The spatial data warehouse is a central, easily accessible store of over 1100 spatial data sets. Multiple users contribute to the data through their business systems or direct data input. Other contributions come from partners, data purchases and other external sources.

The warehouse supports multiple consumers / users of the data such as desktop GIS, web and mobile GIS, and various business applications while many of the map layers are some of the more popular downloads on the Region's Open Data site.

YORKINFO PARTNERSHIP

The quest to improve the use of spatial data and analytics (GIS) to deliver better services, reduce costs and improve their residents' quality of life is as true now as it was in 1995 when the YorkInfo Partnership with York Region, the nine local municipalities, two conservation authorities and two school boards was created. The Partnership drives innovation throughout the Regional Municipality of York by enabling its partners to build capacity, put in place shared data standards and policies for key business processes, and establish a culture of data openness and sharing. As a result, the Region's residents get programs and services that are increasingly more coordinated, effective, and efficient. The partnership is growing its impact even further by incorporating non-spatial data and purpose-built apps and it is doing so through sharing, learning, and building opportunities.

Sharing

We serve the same resident. Although each partner's focus will differ, everyone works together to share risk, reduce costs, and drive efficiencies. By collaborating and sharing data, apps, and best practices, partners have solved a variety of challenges, such as:

- Developing an "All Pipes" application to integrate water and wastewater data into a common model for reporting and analysis; and "All Construction" to share planned municipal road work information to enable coordination; and several other "All" systems on their way
- Coordinating GIS support for emergency management activities
- Deploying a Self-Serve Data Depot that gives partners and consultants live access to data
- Connecting each other's Open Data sites giving residents of York Region one-window to everyone's data
- Defining a common data model for parks and trails
- Negotiating better data pricing. For example, we pooled our resources to get the latest aerial imagery coverage and LiDAR data coverage for the Region. Similarly, we bought historical imagery back to 1954 so we can now see the changes across the Region over the past 60+ years
- Negotiating bulk discounts on software and technology, saving partners up to 80% and making software affordable that otherwise wouldn't be.

Learning

Learning together builds trust and understanding. Members attend information workshops, industry events and (before the pandemic) in-class training. By collaborating and sharing knowledge and best practices, partners can build similar solutions in parallel resulting in systems that can interact with each other, common data models, and training on standard technology platforms. Since 2005, more than 500 partner staff have participated in over 100 free courses saving well over $200,000 in training costs.

Building

Partners pool resources to deliver projects of shared interest. Projects are chosen for their impact on service delivery and operations. The Partnership incubates new ideas and creates solutions from this while building a culture of collaboration. Recent examples include:

Data Co-op: The Data Co-op (outlined below in detail) provides an intuitive way for the partners to not only share their data, but applications and tools as well. The Co-op helps reduce duplication of effort, encourages reporting from a "single source of the truth", and facilitates the creation and adoption of common data models for data associated with services that each municipality provides.

Common LiDAR Products: The partnership bought LiDAR coverage of the Region. LiDAR data's very high accuracy and sample density makes it ideal for applications like floodplain delineation, forest canopy analysis, and solar potential. The partners are working to identify new uses for the data and once defined, use cases will be developed and data products created and shared.

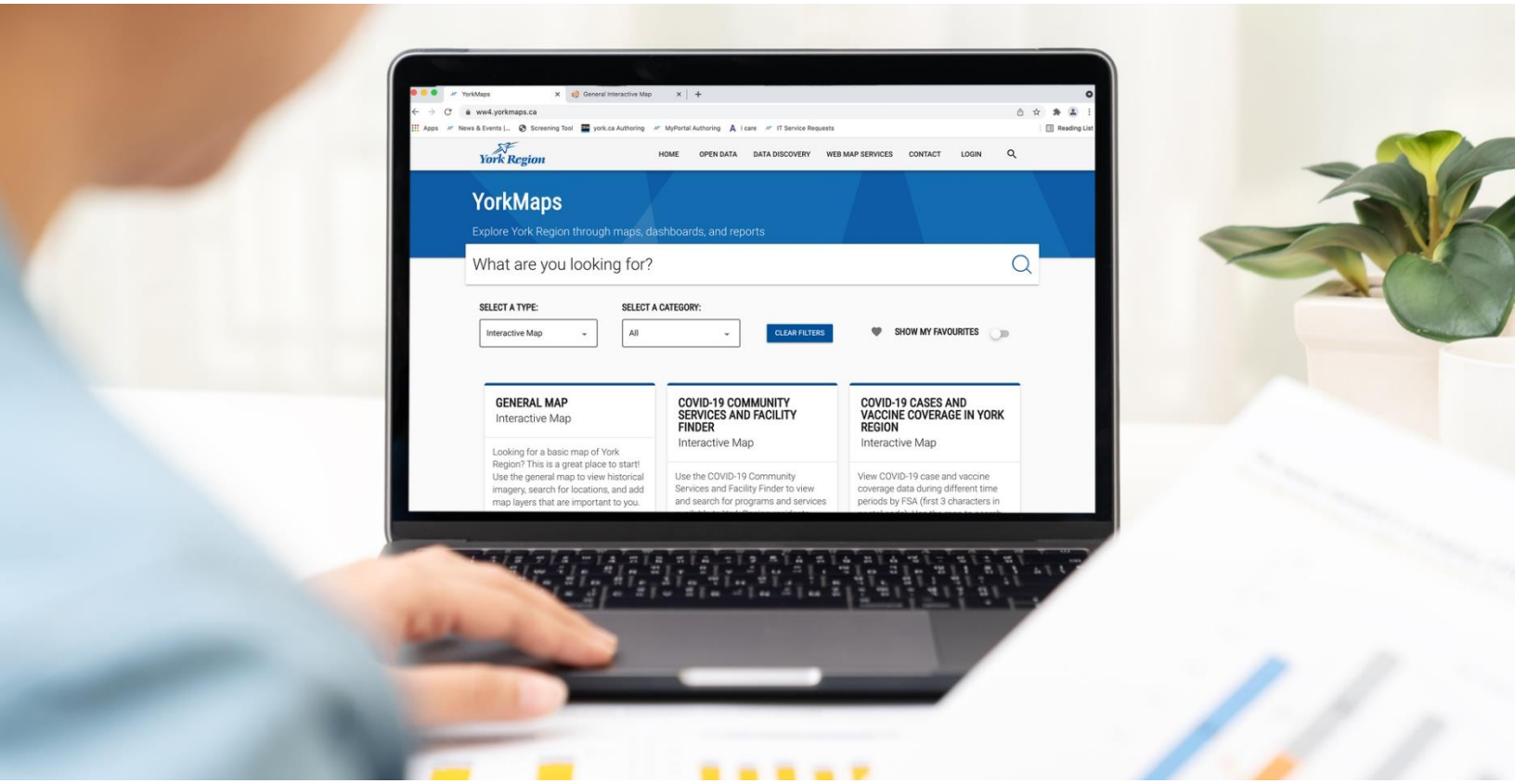
Connecting Open Data Portals: Each municipality has an open data portal, and this project is integrating these so that a resident can access data from any through any open data site.

Enhancing the Digital Plan Upload Portal: With the Digital Plan Upload Portal, developers can upload their digital drawings for site plans, condo plans, subdivision plans and architectural drawings. Once submitted, these CAD files are automatically translated to a GIS-ready format. The Digital Plan Upload portal is expanding to accept as-built engineering drawings as well, and to then document and send the files to the partner's environment.

YORKINFO PARTNERSHIP STRUCTURE

The YorkInfo Partnership is coordinated through member's participation in committees and task forces:

- The Chair of the YorkInfo Partnership Executive Board annually reports on the work plan's progress to the Municipal CAOs.
- The Executive Board (Directors and CIOs from all partner organizations) meets annually. They confirm needs, set priorities, commit resources, and review the program and progress
- The YorkInfo Partnership Coordinating Committee meets five times a year to review project status, discuss data / technology purchases, and share knowledge toward partner program building
- Staff-driven task forces undertake / implement all major projects and purchases



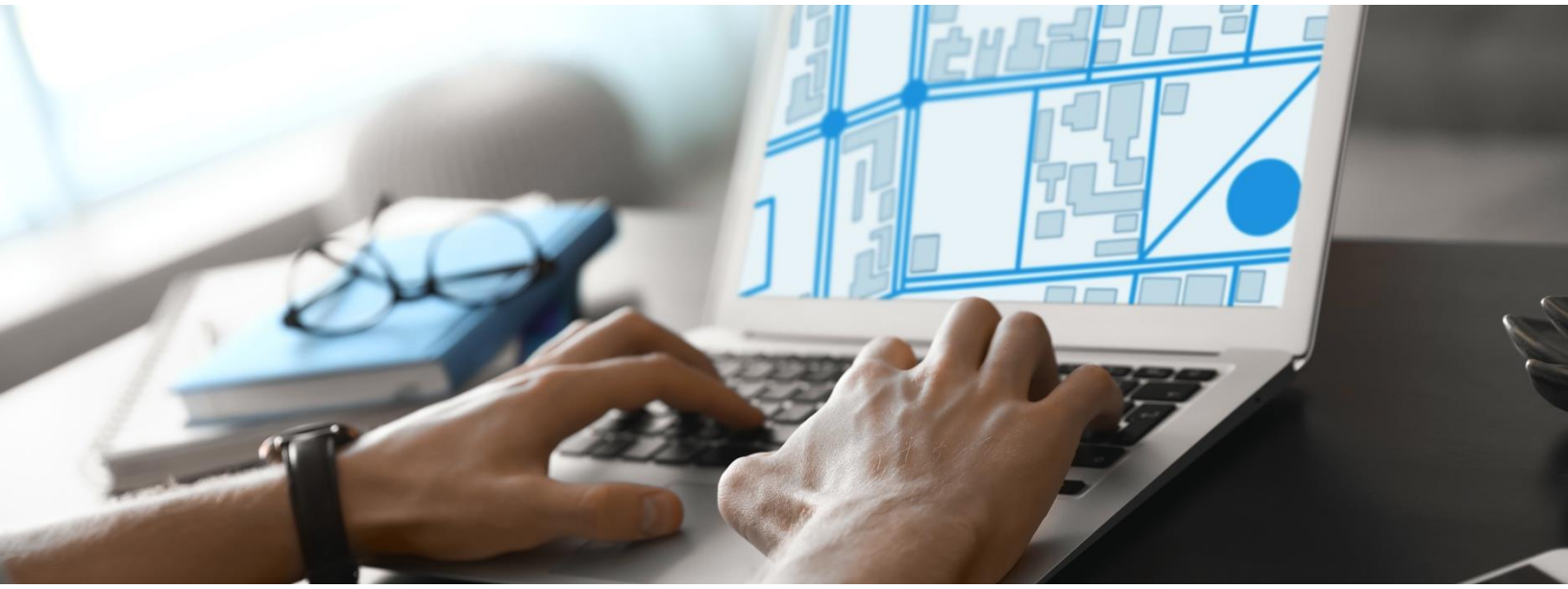
YORKMAPS

YorkMaps is a lot more than maps! It's an externally facing data and information service that provides a large variety of interactive maps, PDF maps, dashboards, and reports. Its content is easily searchable and organized into common business areas for easy reference.

Connected to the spatial data warehouse, the information service always provides the latest data available from hundreds of data sources. Information sources, maps, dashboards can be "favourited" making them easy to find again. YorkMaps also provides a web maps service so that the interactive maps can be easily embedded in any other third-party's web content pages.

DIGITAL ACADEMY

Outlined in greater detail in Chapter 4, the Digital Academy has long served the GIS and corporate software training needs of both regional staff and our partners (formerly as the Data Academy). The Digital Academy helps staff and partners use data and technology more effectively. It provides a variety of services including core software training, custom applications training, helpdesk assistance and curriculum / course development – delivered through a variety of mechanisms including in-class instruction, recorded webinars, eLearning courses, links to external training resources, help videos and customized workshops and courses.

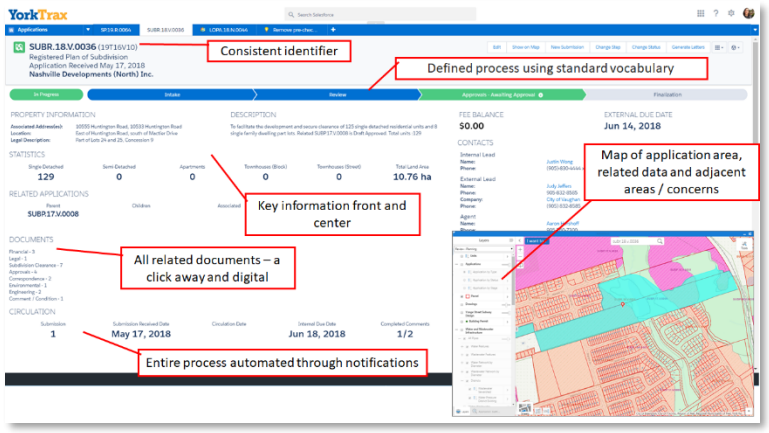


YORKTRAX

York Region's development application process ensures that Provincial planning regulations and the Region's interests are protected. The Region handles hundreds of applications a year. At every stage of the process, staff need access to trustworthy information about the proposed development, the property in question, the locally available and planned infrastructure, and what else is nearby. The process produces and consumes data, comments, documents, maps, spreadsheets and more. Reviews must meet legislated timeframes.

Prior to YorkTrax, internal processes were varied, siloed and not easy to coordinate. The information available did not support a consistent message or forecasting for budgeting, growth, and servicing demand. It was difficult to coordinate all the reviews and comments with so many involved from throughout the Region. YorkTrax changed this.

YorkTrax is a browser-based application developed by the Region and used by the York Region staff across multiple departments who are involved in the development application review process. It has replaced all other application review business systems in every department along with their associated data and document repositories.



Users are connected and aware of each other's comments and insights and can "chat" online should any questions arise. Everyone knows what stage the application's review / approval is in, what it is for, and through the mapping window get an immediate impression of where it is and what's nearby.

Note re COVID-19: because YorkTrax is online, when the pandemic hit there was very little interruption in the Region's ability to continue the plan review and approval process.

OPEN DATA AND PLATFORM

Having a data-informed culture requires that we share reliable data collaboratively across the organization and with our external partners and stakeholders. It's becoming increasingly crucial to successful business operations.

Much of our data can be made available to the public – and the Region's new Information Security Classification Standard is helping us determine which data should be "unrestricted" and can be made accessible.

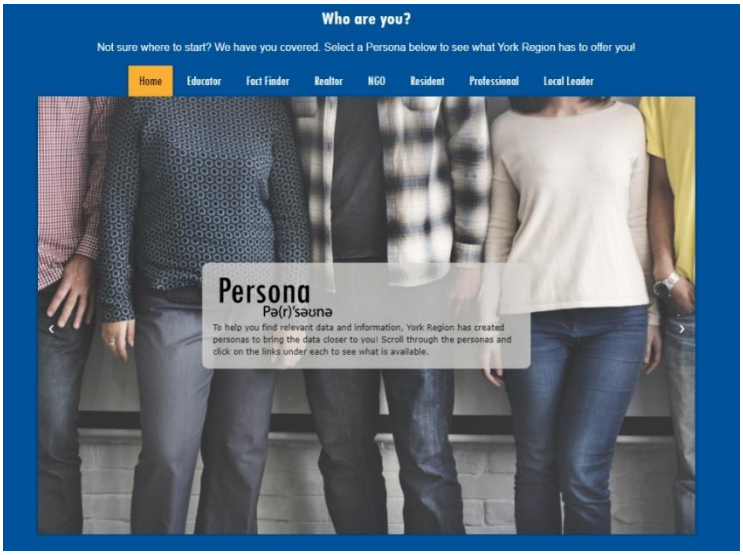
Those "Open Data" are publicly available through the Region's website at York.ca. The data sets are presented in an easy-to-access, easy-to-use way. There is an ever-increasing amount of data and information resources available through the site, including about 180 spatial data layers from our spatial data warehouse.

Tailoring to the Customer: If the site only lets customers search and access its content, it is hard to identify the customer and why they are accessing the data. Measures like "# of hits" is not a valid metric of their experience. We want to understand who uses the Open Data site and how.

Open Data means doing more than a web site!

By using psychographic data (from Environics Analytics) about York Region residents and through a series of facilitated exercises internally and with our partners, we grouped our probable customers and the data / content that we had to help them interact with the Region.

We established seven personas associated with people who customize the site's content (data, apps, events, stories, insights) for their various initiatives or learning outcomes. Now as they use the Open Data site, they first self-identify as one of these personas: Educator/Student, Resident, Professional, Fact Finder, Local Leader, Realtor, and Non-Government Organization. Then, by clicking on that persona, they receive a curated list of data and content options for them. We track usage of these and have found that "professional" is the highest-used persona so far.



Other than the Region's COVID-19 reference web site which has had millions of hits, residents don't generally think to use York.ca to interact with data despite the strides made through our Open Data application. We need to do more – and that means **putting data where people's eyes are**. People generally don't use Open Data programs, online GIS applications or visit their municipal website proactively. Instead, they are on the Internet using popular data-intensive applications. That is where they should and will encounter York data. For example:

- Yelp publishes regional health inspection data associated with restaurants
- Waze publishes real-time regional roads data for its routing service
- Google maps publishes regional bus routes
- FindHelp / 211 publishes municipal programs and services information

So, Open Data also means things like:

- Open APIs for apps
- Data partnerships with industry and local governments
- A "connect don't collect" paradigm

By making it easier to incorporate York Region data in online applications, we're adding value to the data and improving our ability to serve our residents.

DATA CO-OP

York Region's Data Co-op is an online "utility" that gives each partner in the YorkInfo Partnership the technology and business infrastructure for sharing data and related digital assets and tools. This lets them leverage each other's resources, accomplishments, and insights so that they can work more efficiently, as well as coordinate common business activities and services among the municipalities.

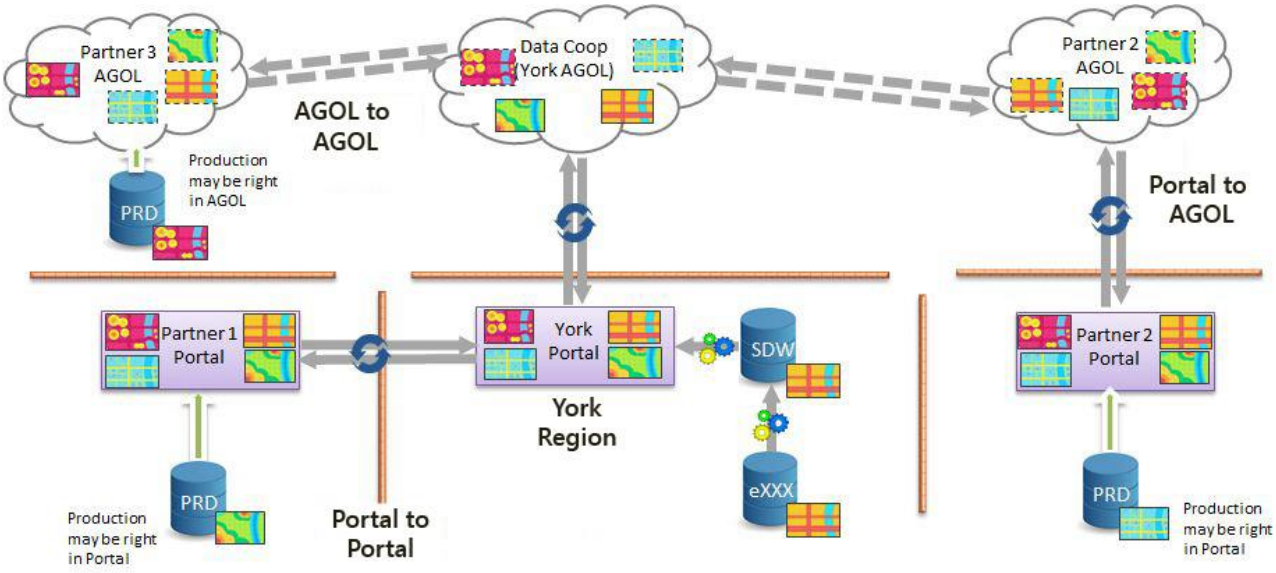
The infrastructure the Data Co-op provides enables collaboration among the partners' web GIS implementations. As a result, business applications that support common business areas can be quickly created and implemented. So, even though a partner doesn't have the internal capacity to develop the application themselves, the partnership has done so for them.

The Data Co-op is designed to be the *single source of truth*, enabling partners to connect to each other's data, leverage each other's apps, and grow skills and knowledge by sharing workflows, scripts, and other tools.

HOW SHARING WORKS IN THE DATA CO-OP

Partners publish their digital assets by registering them within the Co-op. The asset is then available for others to find and use. Copies of the assets in the cloud or on a partners' server remain linked to the "owner's" copy so that the assets always reflect the most current version everywhere, and owners / users aren't dealing with multiple versions on different servers. It's a *federated* solution, which means, for example, a search for "street tree data" will return information about all sources of these data, regardless of where it's being stored. The system knows what's where and presents all search results in a single on-screen report.

The architecture diagram below illustrates the different “scenarios” that partners might publish and share data within the Data Co-op: i) Portal and Portal, ii) ArcGIS Online (AGOL) and AGOL, and iii) AGOL and Portal. (Note: AGOL and Portal are Esri technologies)



Assets such as interactive maps, dashboards, and information products, along with development tools, APIs, and operational business apps go well beyond raw data and provide immediate insight and added value for users. Many are now shareable and can be used to meet an immediate business need.

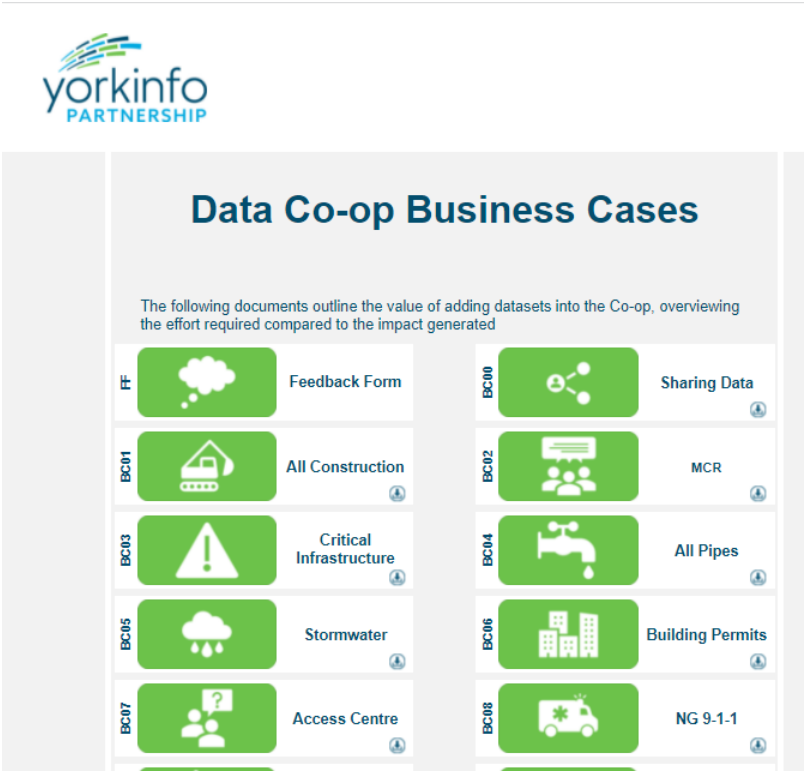
1. “SHOPPING” FOR A DIGITAL ASSET

The Data Co-op is both a “virtual distribution centre” containing digital assets from partners; as well as a “virtual marketplace” enabling others to search for and acquire / use these digital assets.

Using this distribution centre / marketplace analogy, the digital assets represent and reflect different business areas and services associated with the municipality. Each of these business areas, in effect, are like a marketplace store or shelf within the stores. So, digital assets associated with specific common business needs and services – such as property services, infrastructure, environment, health, and so on – are presented together. Because it is a federated solution, the shelves will have assets based on their function and use rather than their owner/origin, as you’d see in a supermarket.

2. SUPPORTING COLLABORATION

One project supported by the Data Co-op is "**All Construction**" led by partnership team members from Aurora, Stouffville, Vaughan, King, and the Region. The project enables the sharing of construction data among the local municipalities and the Region and enhances the coordination of their construction projects, saving all the partners time and resources, while limiting traffic disruptions. All Construction was done without consultants, without buying new software, and without significant change to anyone's business processes.



The Data Co-op team have identified over 50 business cases / opportunities like this one for integrated solutions supporting multiple municipal business areas, like emergency management, social services, water-wastewater infrastructure, and roads. Some of the business cases have been detailed and posted online here (https://yorkinfopartnership.com/business-cases/) on the YorkInfo Partnership web site.

SHOUT OUT TO ESRI

Both Esri's ArcGIS Online (AGOL) and Portal are fundamental technologies of the Data Co-op and make it possible because:

a) They are inexpensive and easy to deploy. Partners don't need a full ArcGIS Server solution to be a node within the Co-op

b) Solutions are easy to develop

c) They support a federated architecture – i.e., a one-window view of everyone's assets as if they were stored together

"The AGOL development environment is so straightforward that we can be working things out on a whiteboard in the morning and then looking at a prototype online by that afternoon." **Brendan Coles**, GIS Project Specialist, Regional Municipality of York.

DATA CO-OP BENEFITS

Shared Services - Services the Region and local municipalities share like planning, solid waste management, roads, and bylaw enforcement are easier to manage with easy to access and trustworthy data.

Business Efficiencies - Collaborative applications made possible through the Co-op enable often significant business process and service level improvements.

Leverages Partnerships - Along with sharing data, tools and applications, the Data Co-op gives partners an easy way to chart their contribution and involvement and helps them identify areas of strengths and potential need.

Improved Response - For example, one of the top calls to the Region's Access York are about services that aren't a regional responsibility like streetlights or tree damage. Since each call costs about $2 / minute, answering those calls improves customer service and saves money.

Coordinate Activities - For example, sharing emergency management data throughout the Region gives all EMS managers a common operating picture.

Plan Regionally - Region-wide topics like climate change policy, employment, housing, and more benefit from shared data.

Implement Locally - For example, each local municipality has different zoning categories and terminology. The Data Co-op users can see these differences on a map so areas near municipal borders can be treated more consistently.

Integrate Systems - For example, each municipality deals with building permit applications which may have a regional interest. The Data Co-op enabled a dashboard interface to be developed that shows the status and types of these from each partner.

THE FUTURE FOR THE DATA CO-OP

As the Data Co-op matures, we expect to see more digital assets added, more collaborative business applications that leverage the Co-op's infrastructure developed, and potentially more partners, such as municipal service providers, utilities, other levels of government, municipal consultants, and private sector partners, and even the public.

We also expect this idea and architecture to be replicated and enhanced by other jurisdictions. Technically, it is relatively straightforward; the most "difficult" part of doing so is the partnership and the "social grease" that enables it to be established and digital assets shared.

SUPPORTING RESOURCES / DOCUMENTS

The Playbook references many of the following information sources from York Region and elsewhere that may be of interest:

Links to relevant online resources		
Canadian Data Strategy	York Region	Data and Analytics Startup Kit
Ontario Data Strategy	YorkInfo Partnership	Data Co-op Business Cases
York Region DnA Master Plan	Promotional Videos	YorkMaps
Analytics Playbook	COVID-19 Dashboard	Open Data

AWARDS / RECOGNITION

The Regional Municipality of York was the recipient of the 2020 President's Award from Esri, the global leader in location intelligence. The President's Award is the highest honour given by Esri, recognizing one organization annually for making a positive impact by using data-informed decision-making. York Region is honoured to be the first Canadian organization to receive this recognition. The award recognizes York Region's commitment to continuous improvement and using trusted data to inform decisions. It is the result of a 25-year focus on working collaboratively with partners and using data to solve problems and make a difference within our communities. Recipients of this award are personally chosen by Esri's Founder and President, Jack Dangermond.

Esri Inc 2020 - President's Award

Esri Inc 2014 - Special Achievement in GIS

Esri Canada 2021 - Award of Excellence

Esri Canada - Innovation in the Field of GIS

Canadian Open Data Summit 2018 - Open Data Innovation Award

Public Sector Digest 2019 - Geospatial Maturity Index 3rd place in North America

Public Sector Digest - Open Cities Index #8 in Canada

GTEC 2016 - Distinction Awards Municipal (Excellence in Service Delivery)

URISA Ontario 2019 - Best Public Sector GIS

URISA Ontario 2013 - Innovation in GIS

URISA Ontario 2013 - Best Web GIS

URISA International 2015 - Exemplary Systems in Government (ESIG), Enterprise Systems (Award Video)

Municipal Information Systems Association (MISA) 2020 - Excellence in Municipal Systems Award

Municipal Information Systems Association (MISA) 2016 - Excellence in Municipal Systems Award

Municipal Information Systems Association (MISA) 2016 - People's Choice Award

Association of Municipalities of Ontario (AMO) 2020 - PJ Marshall Award

CHAPTER 1: OUR NEED FOR A DATA AND ANALYTICS MASTER PLAN

This chapter outlines why we created a Data and Analytics Master Plan; how being a large, *federated* organization can make it difficult on an organization's ability to manage data corporately; and the how the PwC consultancy laid the groundwork for meeting that challenge and creating a *partnered* environment.

"FIGURE OUT FEDERATED!"

Prior to the DnA Master Plan and the creation of the Digital Leadership Team, it was becoming clear for reasons detailed below that we needed to rationalize and focus the delivery of data services within the organization. It led to this Plan and the work that identified 58 data services, produced the Data Services Catalogue of who delivers what, and defined a truly *partnered* approach to data services within the corporation.

It was York Region's CAO, Bruce MacGregor who put it clearly at the time: "Figure out federated!"

OUR FEDERATED STRUCTURE

Business areas / departments within large organizations (both public and private) often don't operate in a partnership with *each other*. They stay in their own lanes; they have funding for their operations, and they deliver products and services to meet corporate objectives unique to their department. For example, a municipal roads department has the mandate and funding to build and maintain roads. In doing so they don't necessarily need to consider that other departments might be interested in or benefit from the data they create. Nor might they know about or understand the potential value of data from other departments.

York Region has a *federated* structure like this. Your organization may as well. We have three main operational departments: Community and Health Services (CHS), Environmental Services (ENV), Transportation (TRN) along with corporate management services: Finance (which includes IT), Legal and Court Services, Corporate Services (which includes DAVS and Information Access Management). The operational departments have the lion's share of the budget and deliver most of our public-facing services. Across the board, they all do a great job, and in doing so have created their own systems, invested in digital talent and capability to meet their needs, and managed their program data to support their service-delivery.

The ideas and mechanisms underpinning what it means to treat "data as a corporate resource" haven't been around very long. Each departments' investments in data and analytics were producing the results they needed. None therefore had any real reason to seek or lead a corporate approach – it wasn't their job. The creation of the Region's Digital Leadership Team (DLT) made this possible, and now that we're implementing a corporate approach through DLT and the DnA Steering Committee, the opportunities, and benefits of doing so have crystallized and are apparent throughout the organization.

Without needing to change our structure or significantly re-align budget allocations, the Region and its various departments and groups can take advantage of the benefits associated with becoming an increasingly "digital" organization and implementing the DnA Strategic Plan.

HOW A FEDERATED ORGANIZATION CAN BENEFIT FROM A CORPORATE APPROACH

There are thousands of systems across the Region (we counted them!), each producing and consuming data. Even though the systems support a business need, there are also similarities, overlaps, and opportunities for integration and rationalization with the technology, data and even staff. For instance, there are multiple asset management systems, each with different technology but each providing that core service to its department.

Each business area was doing well with their systems. Their data gave them the results they needed. There was little need or thought for a corporate approach. Without clarity in how and why they should change, there was no reason for them to think it would do anything more than add extra time and effort.

Unique solutions produce silos. When data are in a silo they typically aren't being shared, they aren't easily accessible outside that silo, and as a result they are often hidden from others and therefore duplicated when needed for something else.

When data isn't available, senior management can't easily consider the implications across all lines of business, and no one – management, staff, partners – can trust what they see because the available data:

- May have quality issues (incomplete, inaccurate, not current)
- May have no master record "single source of truth"
- May be duplicated, which adds costs in data collection, maintenance, or even purchase
- Can't easily be linked to / integrated with other data
- May be used in ways that don't tell the true / full story

ARE MIDDLE MANAGERS TOO BUSY DELIVERING TO DEAL WITH DATA?

As outlined in this article in Harvard Business Review, middle management are very busy. Front line staff typically know when the data is broken, whereas senior staff want good data. Middle managers, though, despite all the work they do to ensure the delivery of their program/service, may not know how to address the problem of bad data. Or they may be too focused on the work at hand. Or they may be busy running their program that don't see the benefit from data and analytics. Middle managers assign the resources, create work plans, and get the work done. But if they aren't lining up, the data confidence gap grows up and down the organization.

For those who did not understand the changes we were introducing, it meant taking the time to meet with them, listen to them, and inform them on the value of *putting data to work*.

An organization that isn't confident in its data will also become less effective as people come and go, systems get replaced, data is moved, and business processes change. Data can't be taken for granted. It needs organizational commitment and active management to ensure it's valued, accessible, and trustworthy. What was needed was a plan and support.

HOW THE PLAN IS LED

YORK REGION IS "DIGITAL"

With the Region's vision of "strong, caring, safe communities", we need to meet the challenges of rapid change, engage our residents, and respond with confidence.

Being "Digital" means reimagining service delivery using new approaches, skillsets, technologies, and data.

Digital-induced change has a personal impact. For instance, almost overnight the pandemic transformed us into a more virtual society. It accelerated a process already underway.

That's why our digital transformation puts people first. We're focusing on what people need from us and how we can meet those needs using new technologies and data.

Our Region's digital focus and the Digital Plan to deliver it come from the highest levels of the organization.

OUR DIGITAL VISION: Together, building the foundation for digital success

DIGITAL LEADERSHIP TEAM

The Digital Leadership Team (DLT) was created to be the catalyst to ignite "digital" across the organization. The members represent each department and the three digital domains: data, information, and technology. The Chair of DLT reports directly to the Region's CAO on corporate digital priorities. The CAO approves the DLT membership.

By bringing together digital and business expertise, DLT can break down silos, advance organization-wide thinking, and align, prioritize, and ensure delivery of priority digital (data, information, and technology) projects. The vision shows that being committed to digital means being: people centered; agile; digitally equipped; and reflecting "one organization" with our priorities and for our customers.

The Digital Plan marks the start of an effort to change organizational culture – how we work together, align, collaborate, and use data to inform our actions and decisions. It is a journey that has no end date and represents an effort to continuously innovate and improve the way we work and serve customers.

To get there, we will:

- Set priorities and focus resources through the Digital Plan
- Identify priority digital projects , including deliverables, timing, and accountability
- Use digital standards to set expectations about how we work
- Prepare for the future by developing digital knowledge and skills through the Digital Academy

The Data and Analytics (DnA) Master Plan is part of DLT's work plan. This makes DLT accountable for the DnA Master Plan and creates a vested interest in its success at a senior level across all departments. DLT is leading and is responsible for ensuring the Master Plan is delivered and within its four-year timeframe.

DLT is also ensuring the activities of the DnA Master Plan are included in departmental work plans and individual performance plans. Of note, with their recommendation, the Region recently adopted the Canadian government's Digital Standards.

THE DNA STEERING COMMITTEE

Originally formed to lead the consultancy, the DnA Steering Committee was re-jigged with new people and terms of reference to lead the the DnA Master Plan's four-year implementation. The committee reports to the Digital Leadership Team which ensures the DnA Master Plan deliverables are part of the performance plan and are delivered.

The Steering Committee members are responsible for the plan's various deliverables. The committee is chaired by the Director of DAVS Branch, and committee members are data Subject Matter Experts from across the Region.

The DnA Steering Committee has become a community of like-minded individuals, like a partnership. A bond has grown because through sharing and commiserating the people around the table understand each other and what they are trying to do. In a typical cross-organizational committee, members might think they are there to represent their Departmental interests. This one is different.

THE DNA STEERING COMMITTEE PRINCIPLES

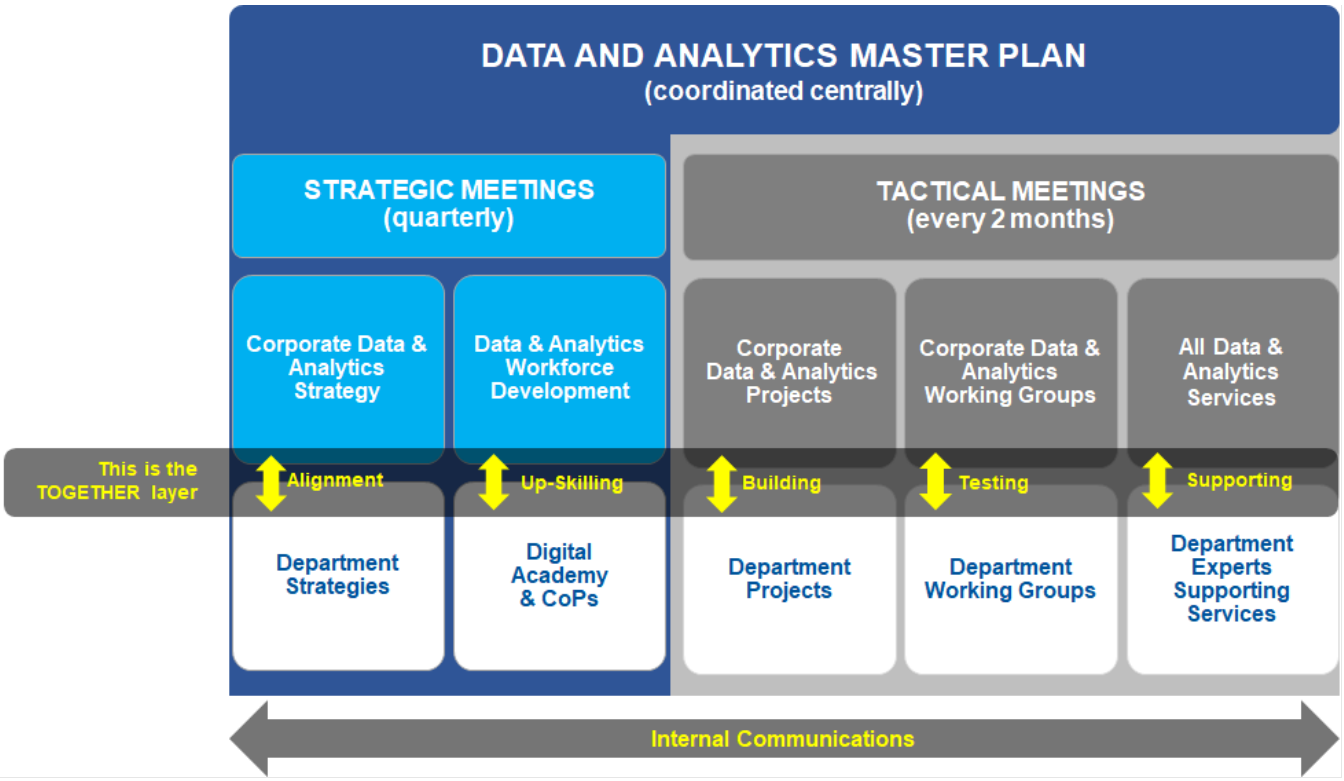
Working in this way, the DnA Steering Committee plays a key a role in creating a more data-informed culture and in bringing people together. We're seeing a growing camaraderie and breaking of silos as results are achieved, data are shared, and as people throughout the organization work together toward common goals and outcomes.

HOW WE'RE IMPLEMENTING THE PLAN

We had been asked to "Figure out federated!" That means figuring out a way to get people working together across business lines and departments with data and analytics. The organization's federated structure doesn't depend on staff from different departments working together. The DnA Master Plan has given us the road map to do that through its partnered approach to data. That's one of the key reasons we're able to write a Playbook. The concepts here should apply everywhere there is a federated organizational delivery model: Communications, Human Resources, Property Services, Information Technology....

Senior leadership, middle management and frontline staff use data. Although the temptation might be to manage data and analytics from a central group, it won't work. Much of it needs to be distributed. Essential to our approach was this recognition and realization there are services which are better provided **corporately** and there are services better delivered **departmentally**.

York Region's organizational structure won't be changing because of this. It doesn't need to. We figured out how to work together and leverage the abilities and knowledge of those throughout the organization despite the federated structure that made it difficult in the past. We were given a unique opportunity to take on the challenge of working in a highly decentralized organization and apply corporate governance that doesn't slow anyone down.



The DnA Master Plan's implementation is coordinated centrally though the DnA Steering Committee as shown in the diagram above. There are both **strategic** and **tactical** sides to DnA implementation.

The **strategic** side has two broad components: the **corporate strategy** and the **professional development** of staff.

The strategy team meets quarterly and is composed of 15 managers and directors. The committee ensures:

a) branch and departmental plans align with the corporate strategy

b) up-skilling / training opportunities are put in place as required through the Digital Academy or through communities of practice (CoPs)

The **tactical** side is where the DnA Master Plan is implemented through numerous corporate and departmental projects, corporate and departmental working groups, and corporate and departmental services. There's a lot going on, but at least now there's a way to coordinate, stay aware and benefit from all this activity!

The projects and services are those identified in the DnA Strategic Plan or departmental plans and resourced through the appropriate work plans.

The "Together" layer represents our aspiration: "**Together, putting data to work**." This is the "social grease" layer, the relationships and partnerships component, and the mechanism that is breaking down the walls within a federated organization in which people from different departments with completely different business purposes (seniors care, water pipes, plan reviews, traffic management…) meet to find common ground and purpose.

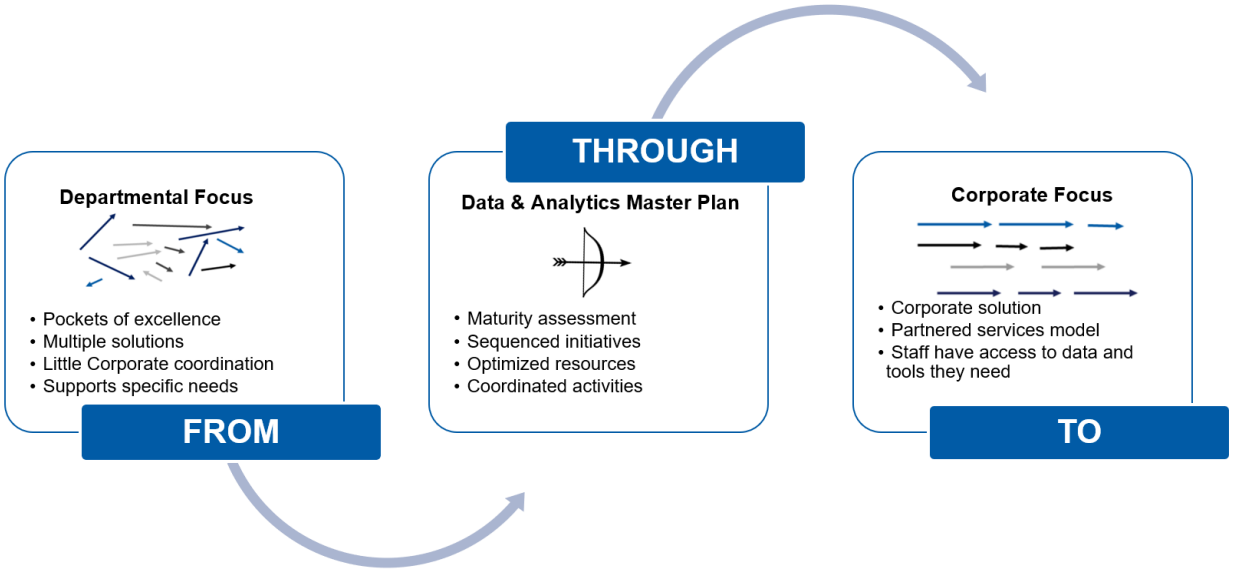
Notably, this is what the YorkInfo Partnership has been able to do for over twenty years with staff from different organizations, so there was some familiarity with how this should work and an expectation that it could.

Finally, there's an important Internal Communications component (shown across the bottom of the diagram) that represents how communications gets looped in through the internal newsletter DATATALK and by other means.

THE CASE FOR A MASTER PLAN

Data is a corporate asset, but prior to the DnA Master Plan we lacked a corporate governance or management structure to support it. With tens of thousands of data sets distributed across departments and on multiple technology platforms, much of the data could only easily be used for the sole purpose it was collected. When these programs operate in isolation and their systems can't integrate, or their data is hidden to others, the result can be expensive and time-wasting data duplication and poor data quality. It doesn't mean program staff and management are doing a poor job or making poor decisions, but it does mean their jobs and decisions can be made faster, better, and more responsive to change and opportunities if they are able to find and access data and collaborate across branches and departments.

Ultimately, our aspiration of "Together, putting data to work" looks like the graphic below, in which we needed to go from a departmental approach through the DnA Master Plan to a corporate approach:



Many of us inherently understood the importance of treating data corporately, and there had been various attempts to make it happen. Our culture allows us to "fail fast" and take those lessons learned to apply them in new attempts. It seemed though that our branch or department-driven attempts were never going to work and always left digital angst and a trust deficit.

One important moment came in March 2018 when the data and analytics specialists across the Region came together in a workshop to discuss their work on business intelligence. We discussed how the Region had made strides over the last five years with investments in data and analytics. There are pockets of excellence within most departments with the three big operational departments building solutions to meet their business needs.

The workshop showed with more clarity what many of us already knew, that in the absence of a corporate approach, each department had their own approach, were developing their own

solutions, and had varying levels of expertise. Data standards weren't established, there was no clarity in master data management (MDM), and there was duplication and overlap in the technologies being used.

It also became clear that each group had a lot to offer. There were business areas in the departments who had significant expertise that were not being leveraged. Important opportunities were being missed. For instance, emergency services (EMS) need address data. If you don't know where you are, they can't find you. Several groups create and manage addresses (internally plus organizations like local municipalities, Bell, OPP, Ministry of Health). We need a single source of truth.

There was a general acknowledgement that despite everyone being in different business areas we could do a lot better by leveraging the talent and expertise from across all departments to build a data and analytics foundation for the broader needs of the Region.

Taking this horizontal approach would require senior management direction and leadership, so it was brought to the Digital Leadership Team (DLT). We used the "Strategic Influencing 4-box Model" to frame the discussion. That model asks these four questions:

1. What is the case for change?
2. What are the benefits?
3. What concerns may exist?
4. What is good about the current model that we will preserve?

Approaching it this way enabled everyone to see that change was needed because:

a) Our success managing and using spatial data corporately plus our current fiscal, environmental, and societal pressures made the case for change

b) There would be significant benefits resulting because there are so many business areas that affect each other, and there was currently no easy way to work across the silos

c) The only way it could be achieved was with senior management support

d) This wasn't a big centralization exercise but would leave departments with autonomy over their priorities and business needs.

DLT created the DNA Steering Committee with managers from the key data programs across the Region.

With the creation of the DNA Steering Committee and its membership of managers from key data programs across the Region, one of the first things we acknowledged was the planning work that had already been done or was underway within many of the Region's departments and business areas. ENV, for example, had begun work on an extensive data management strategy. Community and Health Services (CHS) was another.

We worked together to hire a consultant and create a Data "Master Plan" which could assess our maturity to help guide where effort would be best directed and be a foundation for those other plans (and not oversee them). In other words, significant work was already done, and the Data Master Plan would support this, enabling all our plans to align over time.

THE PLANNING PROCESS

THE PWC CONSULTANCY

Data-related subject matter experts throughout the organization worked together to develop and administer an RFP for the creation of a Data and Analytics (DnA) Master Plan which, after a competitive bid process, was awarded to PwC.

PwC were directed to:

- Provide a **plan** that builds a corporate solution and leverages existing work plans
- Ensure the solution would work within our federated environment but have a **partnered** / **coordinated delivery model** with clear responsibilities and accountabilities
- Leverage **existing work and staff** to limit the need for any additional resources
- Get to **understand us as an organization**, since a key pillar of their approach is based on culture

In developing the plan, PwC visited all departments and offices in person to see what they produce and discuss their plans for moving forward. This helped ensure the plan had broad input and engagement which would later help with staff buy-in into its implementation. By the numbers, the consultancy lasted five months, had 33 workshops with 117 staff and included seven surveys for input from the departments and units throughout the Region.

Measuring Maturity: The concept of corporate functional maturity was important in their assessment, and it remains a big part of our implementation and in our KPIs. PwC used a Maturity Model to rank all the knowledge areas and to understand the organization.

Environmental Scan: The research was supported by a scan of what other governments were doing. Two were getting ready to publish and launch corporate data strategies: Federal government in January 2019, and the Ontario government in the Fall 2019.

What is the DnA Master Plan?

A cross-departmental, collaborative roadmap to using data effectively

A multi-year, strategic approach for data governance

A plan for increasing training opportunities and strengthening a data-informed culture

Part of the Region's commitment to the modernization and continuous improvement of its programs and services

It showed they were also working to recognize data as a corporate asset that needs to be actively managed: just like people, capital, and facilities.

Their plans recognize that all staff need to understand how to use data. They are standardizing data management practices and building internal and external relationships. Of course, not everyone needs to be a data scientist, but staff who know their data and know the problem may not have the skills / tools to analyze it. Like York Region, the Federal Government created a

Digital Academy with a curriculum and the resources to help staff modernize their operations and deliver digital services.

PwC provided staff with surveys asking them where they saw their organization's capability in DnA and where it should be in four years. The surveys found that data management functionality exists within isolated pockets; and staff agreed we needed the functionality to exist across the organization and be connected, accepted, and adopted.

PwC identified a strong DnA foundation requires focus in five areas:

1. **Data-informed culture**. Organizational culture that supports data informed activities and outcomes
2. **Governance**. Horizontal governance, with clear accountability established and adopted
3. **Capability and literacy**. Staff at all levels able to read, understand, create, and communicate data
4. **Access to trusted data**. Access to the right data to support decision-making
5. **Tools for self-serve data & analytics**. Staff can self-serve with DnA tools

These five became the ***pillars*** of our current plan.

There was a gap between where we were and where we should be. Closing that gap formed the basis of the plan's two main components:

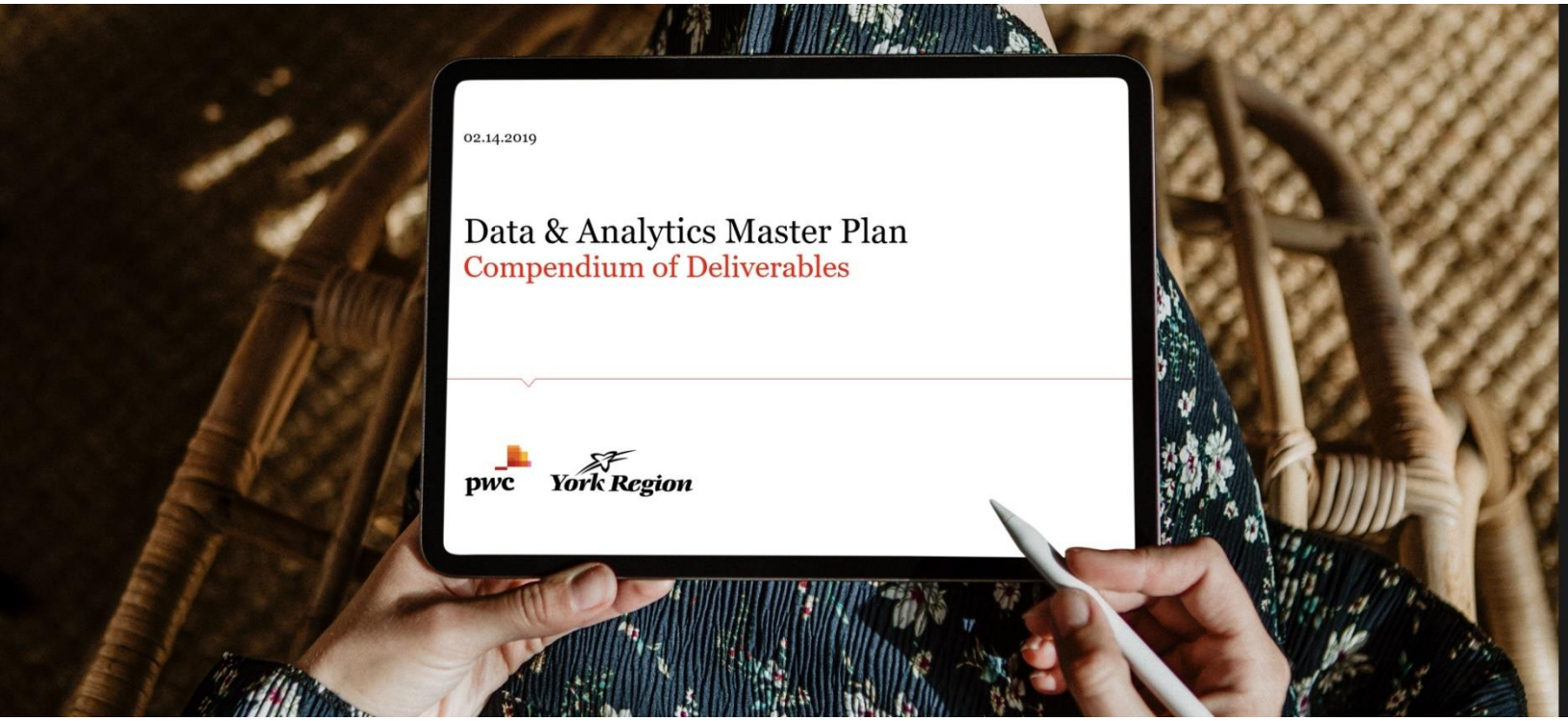
1. Build the DnA foundation through projects
2. Mature the DnA foundation through partnered services

A mature DnA foundation will support virtually everyone. A community member will be able to access regional data to support a personal or business decision. Frontline staff will use self-service analytics tools to inform decisions and find operational efficiencies. A manager will generate reports that give a clear, consistent answer, help inform policy, look for program and service effectiveness. External partners will get help for their programs and services, build trust, and see a bigger picture through integrated and shared data.

To build the DnA foundation, PwC looked at what each department was implementing and what they planned to do. They identified 80 projects and selected 40 with the highest impact. They took these projects, aligned, and sequenced them, and in certain instances broadened them to take a corporate perspective.

PwC identified numerous services that an end-user might need, and they suggested whether a service would be best delivered corporately or delivered by the departments. These have now been rationalized by the DNA Steering Committee to the 58 services outlined below. Most, 36 of them are being delivered corporately while 22 are being delivered by the departments.

PwC's plan showed that by leveraging existing work and resources, we would reduce duplication of effort, cost, and risk, improve program and service delivery, and be able to put the DnA foundation in place in four years without the need for any significant new resources.



RECEIVING THE REPORT

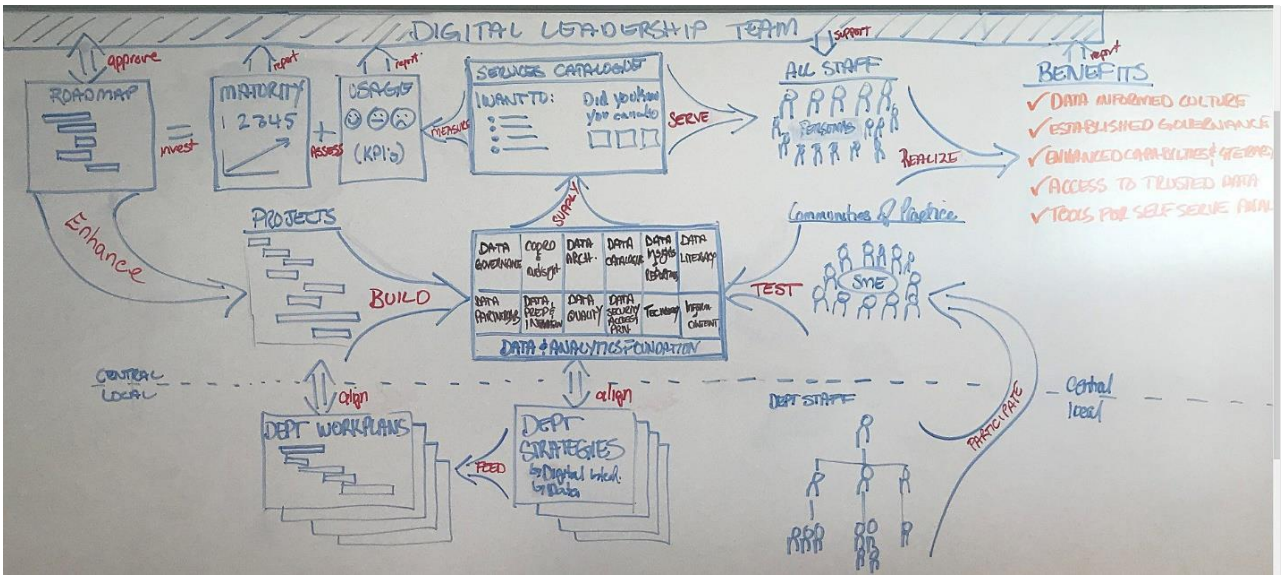
When PwC presented their report, the DnA Steering Committee understood that it would be better received if it was aligned with the DLT direction and “Yorkified” to bring it into our culture and environment. Not doing so would risk it sitting on a shelf. Some things needed to be worked out without the consultant in the room to ensure the ownership of the final product was with the Region corporately, particularly since this DnA Master Plan which touches all staff and business areas. PwC’s report gave us everything we needed to get there, we just needed to further engage, add the “social grease”, and bring it home.

One thing we did was engage our corporate communications. They helped change the language, create messages, personas, and establish a communications plan with tactics to help it land in the organization. Within those discussions, we agreed on these four key components:

1. **Pillars** – the 5 areas we will mature over time
2. **Knowledge areas** - 11 areas with projects and associated services
3. **Services** – the 58 base elements of a mature data and analytics practice
4. **Projects** – rejigged the project plan to align to more of the foundation building work

"YORKIFYING" THE PWC REPORT

For several months after the PwC Report dropped, the project manager's 10-foot white board was the project's canvas. Often dozens of sticky notes were on it, on the wall, and on the window beside it as colleagues would drop in, exchange ideas, and debate a box or relationship or function. (Yes, this was pre-pandemic!) Eventually, this work led to the process structure below which illustrates how the data and analytics work would take place in the Region and could be described in the Data and Analytics (DnA) Master Plan.



This diagram helped make the entire plan click in the early days as we rationalized and ground-truthed the projects and services and "Yorkified" the PwC report. The top line looks at the services. What do our customers want? They want to make smart business decisions based on data. To do that they need to be able to access, understand and work with data.

To do THAT, they will need help through data services (using the Data Services Catalogue) to find the answers or access a data expert.

For us to deliver those services, we need to:

- (1st column) Work with the data to centralize it in a platform (D8aLinx) so that it's easy to find and access; and organize that data through standard corporate systems
- (2nd column) Support the departments to enable them to create data strategies that are aligned with the DnA Master Plan
- (3rd column) Build data talent and capacity and assign experts from across the Region to those services

From this work, the final 11 knowledge areas and 58 services began to take shape.

THE PROCESS SUMMARY

So, that was our journey! It was a year's worth of work that identified the problem, got everyone aligned, set up and worked through a consultancy, landed the report, and started the process to "Yorkify" it. This didn't happen in secret. Everyone knew. And social grease was going to become even more vital to ensure a corporate response in a DnA Master Plan. Let's look at how we finalized it to fit the Region and how we enabled the Region to work with it.

CHAPTER 2: THE DATA AND ANALYTICS MASTER PLAN COMPONENTS

This chapter lays out and defines the main components of the DnA Master Plan and gets into the processes and thinking behind these ideas and the decisions. There's a brief outline about how we used DAMA to guide the definition of our knowledge areas, as well as the importance of reflecting on the Region's business areas' other data plans and leveraging the talent and capability of staff.

THE DNA

The **Data and Analytics (DnA) Master Plan** is our guide to establishing and using data and analytics more effectively and strategically at York Region.

The plan describes a multi-year strategic approach for data and analytics governance.

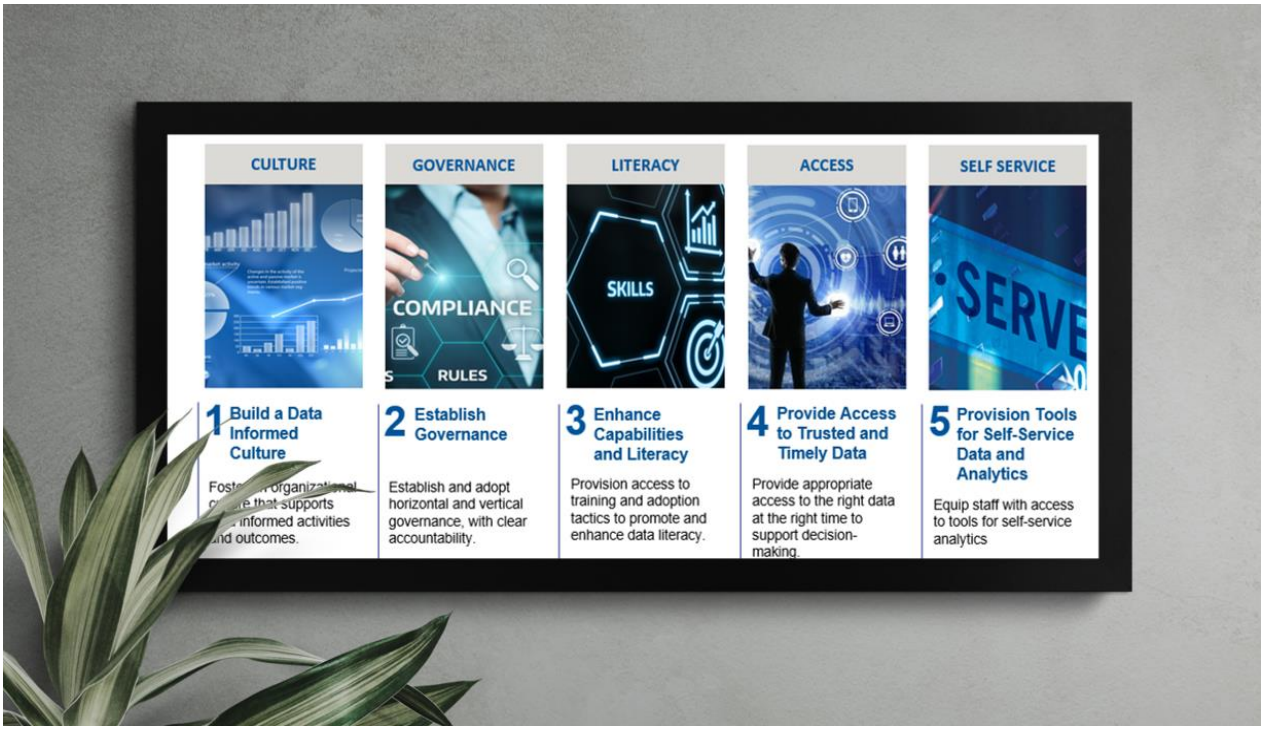
- 5 **pillars** establish the goals and describe the data and analytics foundation
- 11 **knowledge areas** enable that foundation
- 58 **data and analytics services** are delivered corporately or departmentally and establish and maintain the knowledge areas across the Region

While York Region is intent on “putting data to work” to support program and service delivery, our lack of data and analytics rigour and the very nature of our federated organization hampers us in getting the full value from our data assets.

Getting reliable, trusted data to those who need it when they need it requires a data and analytics foundation. Along with the data and the technology to deliver it, the foundation also needs a comprehensive governance structure, targeted training opportunities, and a data-informed culture. The DnA Master Plan is the guide.

We began using “DnA” as a short form, but it quickly became part of our lexicon. After all, DnA is bringing “life” to the organization!

THE PILLARS



Underpinning the foundation are the five pillars – tried, true and tested! These remained largely unchanged from the PwC Report (which refers to them as Goals).

The pillars support our **aspiration**:

Together, putting data to work.

Pillar 1. Build a Data-Informed **Culture**

Data supports decision-making throughout the Region. We are cultivating a culture across the organization that supports data-informed activities and outcomes. Being “data-informed” means using data to support decisions. Having a data-informed culture will enable us to unlock the value in our data, make better decisions, design better programs, and deliver more effective services.

Much of what we have already done points to progress with this pillar. By truly listening, engaging, risk taking, being open, giving others credit, providing clarity, and working to get everyone on the same page we’re building a healthy culture and realizing our aspiration “Together, putting data to work.”

Pillar 2. Establish **Governance**

Data is a corporate asset. As noted above, the Region’s federated structure can make it inherently difficult to manage data horizontally across departments. Governance will help create a more partnered approach by aligning data and analytics services and activities. This means

identifying key processes and procedures and defining staff roles and responsibilities across the organization.

Our DnA planning process showed us there's significant opportunity for improved coordination among the 400 or so staff delivering data-related services within their departments. Without changing the staffing model, the governance activities will add rules of engagement so employees can more easily work together with data. Governance is not about oversight or control of others' actions. Rather, it enables, guides, and empowers employees to work with data effectively.

Pillar 3. Enhance Capabilities and **Literacy**

We're putting in place the services and supports needed by employees to continually enhance their ability to read, find, use, analyze and champion data more effectively.

The Region's **Digital Academy** already has many targeted learning and development opportunities including in-class training, workshops, webinars, helpful guides, and podcasts on a variety of topics, and many more will be established.

Of note, many Digital Academy programs are available for free to members of the YorkInfo Partnership.

Digital literacy: *skills and knowledge to keep up with changing technology, using it to communicate information effectively*

Data literacy: *competencies involved in caring for, understanding, analyzing, and using data*

Pillar 4. Provide **Access** to Trusted and Timely Data

Data underpins everything we do. Providing access to trusted and timely data will mean dealing with data sets distributed across multiple technology platforms at York Region, eliminating the silos between departments and even between programs within departments; and making it easy for staff to find what's there.

Data must be accessed from a "single source of truth" for it to be trusted, complete, and providing the highest value. Data quality initiatives are underway, such as correcting errors or inconsistencies in high priority departmental data; transferring data to a central data marketplace (D8aLinx); and developing departmental data strategies to put in place good data-related governance including how data is collected, reported, stored, and so on. The Master Plan's successful implementation relies on this often-undervalued work, so each department is involved. After all, data underpins everything we do.

Pillar 5. Provide Tools for **Self Service** Data and Analytics

Self-serve data and analytics tools and resources will give staff additional information and capability to support their business decisions. Our staff have a wide range of skills and expertise related to data, analytics, and visualization and everyone can benefit by using data and analytics more effectively. The self-serve tools will make it possible for some, and easier to do for others.

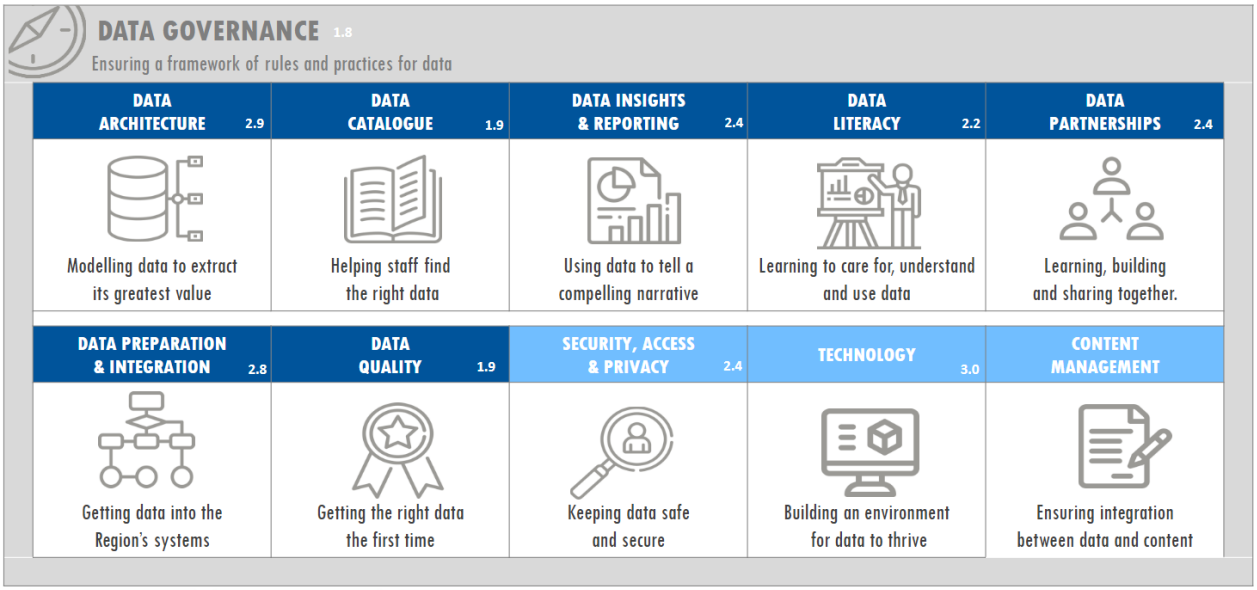
As the plan was developed, more than 50 resources were identified that would improve the self-serve options available to staff and decrease their need for expert support. These topics range from data architecture to insights and reporting to guidelines on securing data.

THE KNOWLEDGE AREAS

The DnA Master Plan's five pillars (Culture, Governance, Literacy, Access, and Self-Service) are reflected across all the knowledge areas. Not only that, but we are also enhancing Culture, Governance, Literacy, Access, and Self-Service in each one. The seven in dark blue are related to data, the three in light blue are related to IT or information access, and the grey one below (Data Governance) underpins them all.

The PwC consultancy report identified 22 programs areas. One of the program areas identified, GIS, was shown to be the most mature and was already dispersed throughout the organization. As you'll see in the Services section, the DnA Master Plan now puts the GIS functions within several *services*, and those services are being delivered departmentally.

We arrived at these 11 knowledge areas through multiple facilitated meetings and workshops, and by using DAMA's "DMBOK" (Data Management Book of Knowledge) and referencing its knowledge areas and analytics areas (see the section below about DAMA for more about this).



MATURITY LEVELS - DEFINITION

During the PwC-led planning process, a maturity level score was calculated for each of their 22 program areas (from maturity level of 1 to level 5) both at the departmental level and centrally. These scores were established through a series of self-assessment surveys completed by over 100 staff. When we combined the programs to these 11 knowledge areas, we brought the numbers forward and combined them to give a Regional score for each knowledge area.

The Maturity Levels that PwC uses are:

1. **Non-existent**. The functionality does not exist within the organization.
2. **Reactive**. Basic functionality does exist within isolated pockets of the organization.
3. **Proactive**. Most of the functionalities exist with consistency.
4. **Committed**. Most of the functionalities do exist within the organization and are well connected, accepted, and adopted.
5. **Leader**. Most or all the functionalities do exist within the organization and have been adopted and scaled across.

The original scores for each of the knowledge areas is shown in the descriptions above.

Knowledge Area	Description
Data Governance *Establishing a framework of rules and practices for data* 2019 assessed maturity level: 1.8	This 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 data and analytics at York Region. This knowledge area advises and supports data and analytic program areas, throughout the Region, in the implementation of data and analytic initiatives, and delivery of data and analytic services and activities
Data Architecture *Modelling data to extract its greatest value* 2019 assessed maturity level: 2.9	This knowledge area leverages a set of technologies to connect disparate applications and data sources to answer a business question.
Master and Metadata Management *Helping staff find the right data* 2019 assessed maturity level: 1.9	This knowledge area provides organization to collections of data to make it intelligible, searchable, accessible, and useful for users. Master data enables a whole-of-enterprise view of critical datasets shared across multiple business functions.

Knowledge Area	Description
Data Insights and Reporting *Using data to tell a compelling narrative* 2019 assessed maturity level: 2.4	This 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 to increase their desire to use data to make decisions.
Data Literacy *Learning to care for, understand and use data* 2019 assessed maturity level: 2.2	This knowledge area strengthens capacity in our workforce to care for, understand, and use data.
Data Partnerships *Learning, building, and sharing together* 2019 assessed maturity level: 2.4	This knowledge area provides the fostering of data and analytics-oriented partnerships, internally and externally, with the goal of increasing access to data, acquiring new data and sharing knowledge.
Data Preparation and Integration *Getting data into the Region's systems* 2019 assessed maturity level: 2.8	This knowledge area involves the movement of data between various sources and preparing data for users to conduct analysis.
Data Quality *Getting the right data, the first time* 2019 assessed maturity level: 1.9	This knowledge area applies to the planning, implementation and control of activities that apply quality management techniques to data to assure it is fit for consumption and meets the needs of data consumers.
Security, access, and privacy *Keeping data safe and secure* 2019 assessed maturity level: 2.4	This knowledge area applies to the definition, planning, development and execution of security & privacy policies and procedures to ensure proper authentication, authorization, access, monitoring, and auditing of data/information.

Knowledge Area	Description
Technology *Building an environment for data to thrive* 2019 assessed maturity level: 3.0	This knowledge area applies to the organizing and managing software designs, technology support and procurement, as well as application inventory, including the provisioning to the access of technology.
Content Management *Ensuring integration between data and content* 2019 assessed maturity level: not assessed	This knowledge area provides consistent approaches to collection, storage and disposal of data, and integration with unstructured forms of information.

ALIGNING KNOWLEDGE AREAS WITH DAMA

DAMA International is a not-for-profit, vendor-independent, global association of technical and business professionals dedicated to advancing the concepts and practices of information and data management. Data professionals around the world recognize them and their DMBOK (Data Management Book of Knowledge) as a touchstone guide to international data management standards and practices. This is similar to the Project Management Institute with its PMBOK (Project Management Book of Knowledge) for project management professionals.

The DMBOK organizes data management by knowledge areas surrounding a central Data Governance area. Each knowledge area has identified both training and best practices for data management professionals.

To incorporate DMBOK concepts into the Region's DnA Strategy, it needed to be "Yorkified." We updated the names of some knowledge areas, incorporated analytics and related areas like AI (artificial intelligence), and then determined *primary* knowledge areas (the dark blue ones in the DnA Master Plan Knowledge Area diagram above) and *secondary* knowledge areas (the light blue ones).

By doing this, we were then able to organize our 58 services and put each one into the knowledge area it fit best. DAMA doesn't reference services in this way. As a result, it can encourage the creation of data management groups within an organization that are not necessarily aligned centrally (the DnA Steering Committee in our case), something that we needed to avoid.

At first the project team was hesitant about using the DMBOK. The thinking was that it was too detailed; and the DMBOK's approach would not communicate the DnA Master Plan idea well within the Region. The way we'd approached the plan, the DMBOK didn't quite fit the services, it

didn't address analytics, and it didn't take spatial data, machine learning, or AI into account. Despite this, several data professionals throughout the Region pushed back hard.

The decision: **we'd incorporate DAMA and build out from there**. York Region has used the DAMA framework with its knowledge areas and evolved it to incorporate new areas like analytics, AI, and aspects of governance. Our DnA Strategic Plan is DAMA-compliant and more.

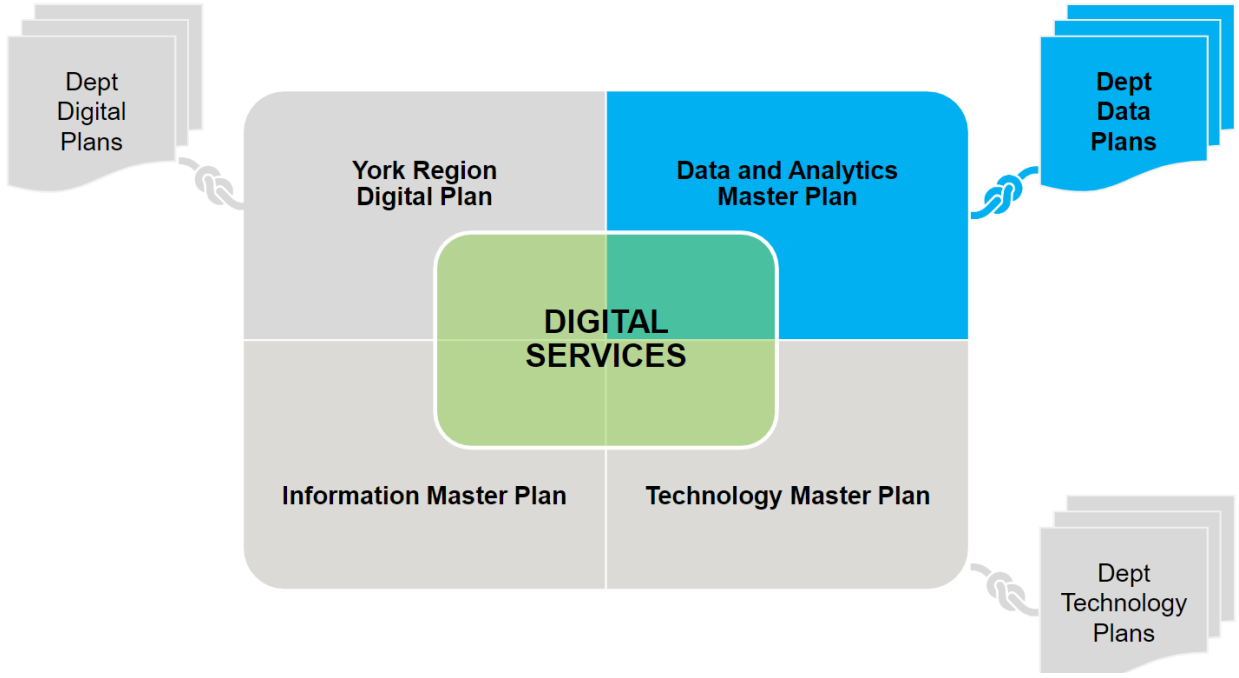
The Knowledge Area concept has worked well. In fact, the knowledge area diagram has helped show how the other "digital" areas - Technology, and Information Management - can go through a similar exercise to define knowledge areas and then services.

DIGITAL SERVICES APPROACH

A one-stop Digital Services Catalogue will include all the services associated with the DnA, Information, Technology and Digital Plans. Knowing what services are offered and who/how they are delivered will reduce duplication, increase efficiency, and improve service delivery.

The graphic reflects the corporate Digital Plan along with the three master plans and their services (e.g., the DnA Master Plan identified 58 services). The Region's departments are or will also be creating plans to address departmental digital needs. They will each incorporate the corporate services from the parent plans - some of which they'll deliver within their department as well.

The DnA Master Plan was the first corporate digital plan to explicitly identify *services* along with their service interaction diagrams with their associated workflow, roles, and responsibilities (who does what, how). The other plans will do the same. In this way, corporate digital services will be the mechanism by which the digital plans become grounded within our federated environment and help us define and understand how we will work together in this new digital world.



THE DNA SERVICES

The entire organization gets involved and the DnA plan gets “real” through the definition and ultimately the delivery of the data and analytics services.

It is largely through these services that our *federated* organization achieves a *partnered* approach.

Much of the rest of the playbook deals with the services and how they were defined, who should deliver them, and why these lead to a partnered organization and will enable us to achieve our aspiration of “Together, putting data to work.” The chart below lists them based on their related knowledge area.

The DnA Master Plan includes **58** services within the 11 knowledge areas. The rigorous process we took to get to these 58 services has left us quite confident in these services. Even so changes may be needed at some point, and we’ve planned an annual review to discuss.

02 - DATA ARCHITECTURE	03 - MASTER AND METADATA MANAGEMENT	04 - INSIGHTS AND REPORTING		05 - DATA LITERACY	06 - DATA PARTNERSHIP	07 - PREPARATION \INTEGRATION	08 - DATA QUALITY	09 - SECURITY, ACCESS AND PRIVACY	10 - TECHNOLOGY	11 - CONTENT MANAGEMENT
	Classify 19	Report Generation with Data 31	Geo-demo graphics 37							
Data Modelling 12	Metadata Collection 20	Dashboard Generation & Maintenance 32	Descriptive & Diagnostic Statistical Analysis 38			ETL & Data Preparation 26				
Data Flows 13	Metadata Publishing Catalogue 21a	Analytics Consulting 33	Exploratory Data Analysis 39	Training Awareness 43	Partner Coordination 46	Cleansing 27			Requirements Gathering 53	
Data Asset Management 14	Metadata Publishing Dictionary 21b	Scenario-Based Analysis 34	Artificial Intelligence & Machine Learning 40	Skills Assessment 44	New Partner Negotiation 47	Integrating & Matching to Master & Reference Data 28	Profiling 23		Solution Architecture 54	
Tactics for Integration 15	Metadata Publishing Glossary 21c	Analytics Needs Development 35	Data Visualization 41	Learning & Development 45	Data Purchasing 49	System to System Integration 29	Assessment 24	Open Data Publishing 51	Solution Deployment 55	Capture 17
Data Migration Planning 16	Master & Reference 22	Location Analysis 36	Storytelling with Data 42	Communities of Practice Coordination 48	Creating & Negotiating Data Sharing Agreements 50	Integration to Portal 30	Monitoring 25	Data Deliveries to Consultants 52	Maintaining Sharing Platform 56	Store and Dispose 18
Strategic Objectives 01	Monitoring Readiness Progress 02	Issue Resolution 03	Best Practices 04	Enterprise Policies and Standards 05	Local Procedures 06	Stewardship 07	Data Audit 08	Data Valuation 09	Promoting Data Culture 10	Communications 11

GETTING TO 58 SERVICES

Deciding and defining the “universe” of data and analytics services has been an exciting and complex job. Our starting point was the PwC consultancy report which listed numerous services in what were 22 program areas (which became the 11 knowledge areas outlined above).

A group of managers reduced their original list of services to 78. These then went to the staff throughout the Region through workshops. That process was guided by a DAVS manager who held four sessions for each of the 11 knowledge areas (44 meetings) involving more than 100 staff. They described the services they provided, and we whittled them, organized, and combined

them to reach the 58. Throughout this journey the work was validated, debated, discussed, argued, and defended by managers, program managers, and staff.

It took about a year. Hard work by many.

The work not only paid off by producing a plan we could build from, but it also had another positive and unsurprising outcome. Because this process put people with similar interests and abilities from throughout the organization together – many who had never met or worked together – they got to know and understand each other while building trust and new relationships.

This was “social grease” at work and from these many discussions, meetings, and joint decisions several communities of practice have arisen and become formalized, which will continue to lead innovation and provide support.

SERVICE DESCRIPTIONS

The following is how the **Data Services Catalogue** describes each of the services for staff:

Service Name and Number	Description
01 - Strategic Objectives	We are #puttingdatatowork in York Region. Learn how the Data and Analytics Master Plan is helping to move the Region forward.
02 - Monitoring Readiness and Progress	Learn how the Data and Analytics Steering Committee tracks maturity across all data service catalogue offerings.
03 - Issue Resolution	Get help with mediating conflict between two groups working with the same data, but with different end goals.
04 - Best Practices	Don’t waste time reinventing the wheel. Learn to leverage tried-and-true methods and techniques and reap the benefits of our collective knowledge, skills, and experiences.
05 - Enterprise Policies and Standards	Many policies and standards apply to all data across the corporation. We made them easy to find and follow.
06 - Local Procedures	Learn how to create and follow specific data rules to keep your business area or department aligned.
07 - Stewardship	We know people need data to do their jobs, but data also needs people to manage it. Learn how data stewardship can help sustain your data operations.
08 - Data Audit (Standards Compliance)	Audits are sometimes necessary to ensure best practices and data standards are being followed. If an audit is required for your data, let us know and we can help.

Service Name and Number	Description
09 - Data Valuation	Get help quantifying the value of your data. Data is a corporate asset and has a tangible value.
10 - Promoting Data Culture	Have a great message to share? Learn how you can contribute to building a data informed culture at York Region.
11 - Communication of DnA Program	Wondering how we are building a data culture? Understand the overall strategic view of the DnA Master Plan, with insights into current projects.
12 - Data Modelling	My data is in a spreadsheet. I need a database to optimize relationships. What do I do?
13 - Data Flows	Get help tracing the life cycle of your data, from collection to reporting, and everything in between.
14 - Data Asset Management	Are you using the correct data in your business processes? We can help you identify the data you need.
15 - Tactics for Integration	Data makes systems communicate. Learn how to integrate regional data assets into your system.
16 - Data Migration Planning	Is your data moving to a new system? As systems are retired, data must pack its boxes and moved over to new systems, while keeping its integrity.
17 – Capture	Need help creating or collecting new data? We support a variety of solutions to get you started.
18 - Store and Dispose	Whether your data needs a home to be safe and secure or if it needs a proper "burial" as it nears end-of-life, we have cradle-to-grave solutions we can discuss.
19 – Classify	Categorize your data by value and risk, so it gets the attention it deserves.
20 - Metadata Collection	Need help creating or collecting information to describe your data? We are here to help you.
21a - Metadata Publishing / Catalogue	Is your data ready to be found? Publish your metadata so other users can find it in the Data Catalogue.
21b - Metadata Publishing / Data Dictionary	
21c - Metadata Publishing / Glossary	

Service Name and Number	Description
22 - Master & Reference Data Management	Ready for your data to be York Region's official data source? Get help integrating your data into systems region-wide.
23 - Data Profiling	Want to know your data better? Data profiling gives you statistical insights about your data and is a great first step to #puttingdatatowork.
24 - Data Quality Assessment	Once your data has been profiled, it's time to assess whether the data meets your business needs and if any improvements are required.
25 - Data Quality Monitoring	You've spent countless hours cleaning your data. We're here to help you implement tools to keep it clean.
26 – ETL and Data Preparation	Manual data processing is a relic of the past. Let us show you how to leverage powerful tools to automate your entire data flow.
27 - Cleansing	It's time for a data cleaning. We have tools, templates, and methods for improving your data.
28 - Integrating and Matching to Master and Reference Data	Make sure the data you're using lines up with the authoritative data sources available region wide.
29 - System to System Integration	Do you need help seeing data from another business system in your business system? Trusted data can feed many systems at the same time.
30 - Integration to Portal	Do you have data or visualizations that you need to show online? We can help.
31 - Report Generation with Data Toolkit	Are you building a report and want to make your data sing? We have a finely tuned instrument for you.
32 - Dashboard Generation and Maintenance Toolkit	Are you building a dashboard and want to make your data dance? We can help.
33 - Analytics Consulting	Not sure where to start? That's OK. Press 0 for help. We are here to be your trusted partner in your data and analytics journey.
34 - Scenario-Based Analysis	Have "What-If" scenarios you need to evaluate? Let us help you plan your analysis so you can make informed decisions.
35 - Analytics Needs Development	Ready to supercharge your analytics work? Let us help you bring in machine learning, artificial intelligence and more.

Service Name and Number	Description
36 - Location Analytics	Simply put, location analytics help solve location problems. Need help finding optimal locations for a new service or hotspots to identify geographic patterns? We're here for you.
37 – Geodemographics	Using demographics data in your project? We're here to help analyze population characteristics.
38 - Descriptive and Diagnostic Statistical Analysis	Need to understand what happened and why? We're here to help you analyze your data to find answers to those burning business questions.
39 - Exploratory Data Analysis	Learn how to find trends and hidden patterns in business data to gain insights! We can help turn you into a data explorer.
40 - Artificial Intelligence and Machine Learning	Curious to see if there are opportunities to automate repetitive tasks using AI and ML in your project? We're here to help you get started.
41 - Data Visualization	Ready to present your data findings? A picture tells a thousand words, and a great interactive visualization tells even more.
42 - Storytelling with Data Toolkit	Ready to create a persuasive story based on your data? We have all the tools you need to get started.
43 - Awareness	Learning to "speak data" is essential to navigating our increasingly digital environment. Harness the Digital Academy to understand how data literacy can help you and your team.
44 - Skills Assessment	Are you ready to have your data skills assessed? It's helpful to assess your current state of literacy so we can tailor a learning plan for you.
45 - Learning and Development	Ready to go back to school? We have training opportunities for all staff to improve data management, analytics, and literacy skills.
46 - Partner Coordination	Wondering which data partnerships exist and who to contact? Many mutually beneficial partnerships exist between the Region and various stakeholders.
47 - New Partner Negotiation	Interested in formalizing a data partnership with a new stakeholder? We have processes in place to speed up the negotiation and relationship building.
48 - Communities of Practice Coordination	Looking to find like-minded people across the Region to learn and share best practices in a social setting?

Service Name and Number	Description
49 - Data Purchasing	Before you buy that data, be sure we don't already have it. On the flip side, can you share purchased data to save others from buying it?
50 - Creating and Negotiating Data Sharing Agreements	Have you thought through the legal implications of sharing your data? We can help with your legal agreements to ensure access and usage requirements are clearly captured.
51 - Open Data Publishing	Can your data make a difference in the wider community? Learn how to share it openly so everyone benefits.
52 - Data Deliveries to Consultants	Have a project with external consultants that need our data? We have processes and technology in place, so your consultant gets the data they need for the project.
53 - Requirements Gathering	Building tools and systems means understanding the system and business requirements. We have many techniques to help you engage all aspects of your business.
54 - Solution Architecture	Need systems thinking to help you identify design options for a new solution? We take a holistic approach to designing solutions that will meet all your requirements.
55 - Solution Deployment	Need help implementing your data tool? Our experts can help with everything from installation, to testing, to troubleshooting.
56 - Maintaining Data Sharing Platform	The Region operates many platforms for sharing data. Learn more about them here.

Note: there is no service #57 or #58 since #21 is three services 21a, 21b, 21c (hence the total of 58 services)

ALIGNING DEPARTMENTAL PLANS

Each department at York Region (Community and Health Services (CHS), Environmental Services (ENV), Transportation (TRN) along with a few corporate services) has or is developing their own Departmental Data Action Plan. The goal is to help these align with the DnA Master Plan, so that their data activities and outcomes reflect the corporate objectives. ENV has already done this and CHS has worked to align theirs after the DnA Master Plan was published.

The Region's DnA Master Plan was developed with the involvement and buy-in from all departments. The departmental plans will therefore be able to reference and leverage the five pillars, eleven knowledge areas, and the 58 services.

Departmental data action plans complement the Region's DnA Master Plan by focusing on data activities that affect the department's acquisition, storage, management, sharing and use of data. They help establish data that can be used throughout the organization.

Creating a departmental data action plan typically includes:

- Making an inventory of the datasets used by each business unit in the department
- Identifying and documenting critical datasets and determine if any data can be retired
- Establishing data quality targets for high priority datasets (~ 10 datasets)
- Identifying the potential for Master Data Management for any of these datasets, and working with other dept's to implement
- Ensuring these priority datasets are shared with staff for their reporting and analytics
- Building stewardship structures to ensure that data quality is maintained

The Departmental Data Action Plan Template below was created by one of the DAVS managers to help departments create the plan so that they are better able to implement the data services for which they are accountable.

GUIDING QUESTIONS

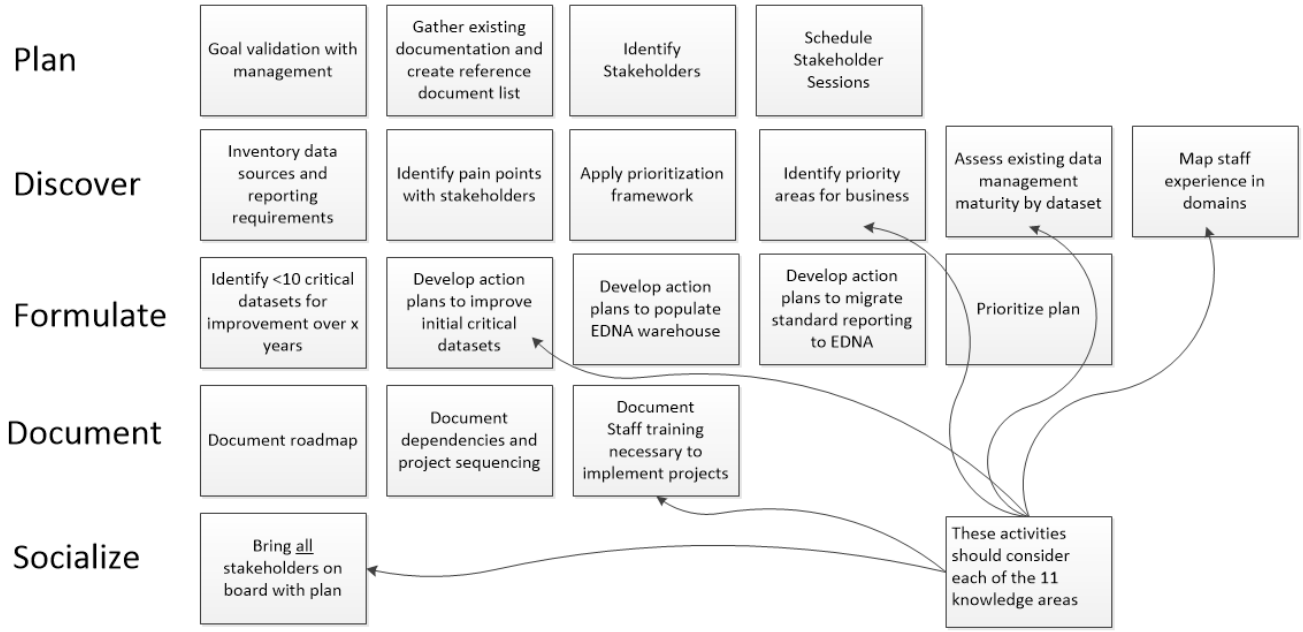
In working through the development of the plan, the following questions that emerge from the eleven knowledge areas (adapted from Gregory Nelson's paper) should be reviewed in each of the Plan, Discover, Formulate Document and Socialize phases.

Knowledge Area	Question
Data Architecture	What data is managed? What data is out of scope? What data is needed operationally? What data is needed to run the business and strategize? When is it needed? Where do you need real-time data? How should data be shared between different silos?
Master and Metadata Management	Where are your databases of record? Who decides what new data is brought into the department? What metadata should be captured and managed? Who should capture and maintain metadata? What tools and systems generate metadata? Who is responsible for raising awareness of metadata? How can you best exploit metadata once you have it? What tools expose metadata for business use?
Data Insights and Reporting	What data do you need where and when? How should you facilitate data exploration? How will you develop, deploy, and manage analytic results?
Data Literacy	What skills should staff have to manage data? Does management have enough training to be able to ask the right questions?
Data Partnerships	How will you foster collaboration on data throughout the organization and with other organizations?
Data Preparation and Integration	What data transfers are necessary and how frequently? How do you integrate data silos?

Knowledge Area	Question
Data Quality	How frequently does data need to be updated? What level of data quality is practical? How will you measure data quality? What is the cost of cleaning data? Who is responsible for data quality?
Security Access and Privacy	How would you access, share, and manage data? Will you have self-service access to data or develop a provisioning team? Who can access data and what level of detail do they see? Who decides who gets access to data? Who is responsible for managing data security? How often will you audit your security and privacy controls?
Technology	What applications are most appropriate for data capture, storage, distribution, and reporting?
Content Management	How long should you keep data? What are the data archiving requirements? How will you address regulatory issues?
Data Governance	Who will determine the requirements for data availability? How do we measure success of our data action plan? How will leadership learn about what's going on with data? Who is responsible for data stewardship? How much is our data worth?

THE DEPARTMENTAL DATA ACTION PLAN TEMPLATE

The following template provides a standard approach to developing a Departmental Data Action Plan that helps guide its development to align with the Data and Analytics Master Plan.



Planning for a data action plan

Goal validation with management – ensure that departmental directors and managers understand the need for better data management, as their staff will be engaged in the development of the action plan, and its subsequent implementation.

Gather existing documentation and create reference document list – this activity will start with the planning phase and continue throughout as people re-discover documentation. It saves time later. The documentation list is an output of the action plan and will assist implementation efforts.

Identify stakeholders – determine who you need to engage with, recognizing that early engagement leads to better ownership of the action plan by staff. Stakeholders include people in other departments and organizations who use the data (e.g., Finance, Office of the CAO, …), as well as people in other departments that can identify joint Master Data Management opportunities.

Schedule stakeholder sessions – decide how you want to engage stakeholders and put a hold on their time, so they are available when you need them.

Discovering the issues and problems that need to be addressed

Inventory data sources and reporting requirements – get as good an understanding of the department's datasets as possible. The York Region data catalogue is a good place to start, but it will likely need updating. Other resources include critical business information registry lists

maintained by Risk. Large systems often have several different datasets addressing different business issues in them.

List standard reports to get a sense of how the data is used and help understand the pain points. Pay attention to report types that are common to other departments to guide Master Data Management opportunities. This activity may take a while. Use the inventory to update the York Region data catalogue.

Identify pain points with stakeholders – explore the use value of different data sets and any frustrations around data quality with stakeholders, including those external to the department.

Apply prioritization framework – ENV has worked on a data classification tool that asks a series of yes/no questions to classify data as high/medium/low in five areas (criticality, sensitivity, value, access, and compliance). Get data subject matter experts or data stewards to answer the questions with the tool. It will take about 15 minutes of their time. The tool provides recommendations as to how the data should be managed. For a downloadable version of this go to york.ca/puttingdatatowork.

Identify priority areas for business – use the results from the classification tool and the pain point consultation to identify which datasets are the most important from a business perspective for the department. These are the datasets that will be addressed by the action plan. Also identify potential Master Data Management opportunities.

Assess existing data maturity by dataset – compare what staff are currently doing in terms of the managing priority data with the recommendations from the tool for each of the knowledge areas. The gap reflects where maturity needs to increase.

Map staff experience in the domains – determine whether staff working on the priority datasets need additional training in each knowledge area to be able to close the maturity gap for their specific datasets.

Formulate the action plan to address the problems for priority datasets

Identify fewer than 10 critical datasets for improvement – With management stakeholders, determine which datasets should be addressed first. Keep the number small because you will not have the resources to be able to address many at a time. Other datasets will get attention later.

Develop detailed project plans to improve critical datasets – for each dataset (and its associated reports) decide what must be done to close the maturity gap between current and recommended data management practices relative to each of the eleven knowledge areas. Determine the level of effort needed to close each gap.

Develop project plans to populate the Region's data warehouse (D8aLinx) – high priority operational data can be used more consistently if it is available to users through a standardized warehouse.

Prioritize plan – again with management stakeholders, determine which action plans should be implemented first, based on the effort and benefit. With stakeholders from other departments set priorities for potential Master Data Management projects.

Document the strategy so that efforts are coordinated

Document the roadmap – Write out what datasets the action plan will address, and what actions will be taken to close the maturity gaps as a series of projects.

Document the dependencies and project sequencing – take account of dependencies between actions in projects and resource availability to sequence projects on a timeline.

Document the staff training necessary to implement projects – identify how any required staff training will be achieved and incorporate this into the dependencies and timeline analysis.

Socialize the action plan with stakeholders to manage expectations

Bring stakeholders on board with the plan – Identify a champion to review the plan with stakeholders before its completion. Identify the activities they need to do, and the benefits they can expect from participating. Make clear what success will look and feel like as the action plan is implemented.

FOUNDATION BUILDING PROJECTS

DEFINING THE PROJECTS

The DnA Master Plan identified over 40 projects.

PwC's expertise and understanding of what a strong DnA foundation is based on the five pillars was invaluable during the project definition process. PwC looked at 80 existing departmental projects and their implementation stage and what they planned to implement over the next four years.

With this overview, they aligned and sequenced projects and in certain instances broadened it to take a corporate perspective. From these, high impact projects were chosen (many detailed below), and 11 new projects identified to fill in some gaps – most of which were assigned to DAVS.

Implementing these will create and mature the DnA foundation. By working together, they are enabling us to quickly (four years) implement the foundation for the entire organization.

Even more, by leveraging existing work and resources we did not need to go back to the organization with a big ask for money and new staff. Aligning existing projects to take an enterprise approach reduces the cost, risk, and duplication of effort.

2021 PROJECT WORK PLAN

Our current (2021) Project Work Plan listing looks like this:

Project	Work Description
Foundation Building Projects	
Microsoft Power BI Pro	Pilot and present findings in a business case for deployment to the corporation. Buy subscriptions and test features of the cloud version.
Microsoft Power BI Governance	Cleanup existing environment and support corporate rollout. Deploy governance over Power BI Pro Online/OnPrem.
Cloud Data Services	Pilot Data Cloud Services like Big Data as a Service and Cloud Storage to support departmental use cases.
Voyager Evaluation	A pilot to see if Voyager can be an enterprise search tool on D8aLinx without needing to buy new technology to do the same thing. Present findings in a business case for deployment to the corporation.
MS SQL Server Database provisioning and Masking Tools for non-production data	Implement MS SQL Server Database provisioning and Masking Tools to enable data masking and security when working with non-production databases. Can take a copy of production data and test application development on it while keeping privacy.

Project	Work Description
Enterprise Data Catalogue Tools	Acquire and pilot Enterprise Data Catalogue tools and present findings in a business case for deployment to the corporation. Further deploy Microsoft tools within D8aLinx to track lineage, create a glossary and catalogue.
Strategic Projects	
Enterprise Data Strategy Template	Develop a template to use to align departmental data plans to the Master Plan. As branches in departments create their own data strategy this project will provide a template that can be used to align their strategy with the Master Plan.
Data Strategy Implementation - ENV	Each department is at various stages of developing / deploying their data strategy. This work will support the alignment of the ENV strategy with the Master Plan.
Data Action Plan Implementation - TRN	Each department is at various stages of developing / deploying their data strategy. This work will support the alignment of TRNs Action Plan for Data with the Master Plan.
Data Strategy Implementation – Corporate Management	Each department is at various stages of developing / deploying their data strategy. This will support corporate management groups (Finance, Property Services, others) to adopt a data strategy and align with the Master Plan.
Data Strategy Implementation - CHS	Each department is at various stages of developing / deploying their data strategy. This work will support the development of a data strategy within Community and Health Services that aligns with the Master Plan.
Data Risk Assessment toolkit	Corporate risk assessment processes do not currently cover data assessments. This project will work with legal and risk to develop a Data Risk Assessment toolkit that enables a review of data risk.
Foundation Testing Projects	
Data Publishing Standards and Procedures	DAVS to develop enterprise data standards and procedures that are aligned to the Master Plan and allow for data to be put into the departmental and corporate bucket of D8aLinx.
Data Architecture Guidelines for Publishing Data	DAVS to develop data architecture guidelines that align with the Master Plan and support departmental data going into the corporate bucket of D8aLinx.

Project	Work Description
Metadata Guidelines and Publishing Mechanisms	DAVS to develop technical metadata guidelines that align with the Master Plan and support departmental data going into the corporate bucket of D8aLinx.
Master Data Management	Defining and documenting York Region's approach to master data management for publishing data in D8aLinx.
Metadata Management	Defining and documenting York Region's approach to metadata management for published data in D8aLinx.
Enterprise Data Dictionary and Glossary	Defining and documenting York Region's approach to data dictionary and glossary for published data in D8aLinx.
Data Quality Framework	Define, develop, and implement a Data Quality Framework for published data in D8aLinx.
Content Projects	
Corporate Management Data	Add Corporate Management operational data to departmental buckets of D8aLinx applying recommendations of outcomes of foundational projects.
Transportation Data	Populate D8aLinx with operational data from Transportation department.
Environmental Services Data	Populate D8aLinx with operational data from Environmental Services department.
Community and Health Services Data	Populate D8aLinx with operational data from Community and Health Services department.
Sharing Projects	
Data Sharing	Communicate and expand data sharing between departments by applying recommendations of outcomes from foundational projects. Define use cases to share data in D8aLinx.
Service Enhancement Projects	
Report Toolkit	Develop and deploy a guideline and toolkit for how to develop effective data informed products.
Dashboard Toolkit	Develop and deploy a guideline and toolkit for how to develop effective dashboards.
Data Sharing and Purchasing Directive	Develop a Data Sharing and Purchasing Directive to help centralize coordination and purchase of data

Project	Work Description
Corporate Data Catalogue	Enhance / maintain the Corporate Data Catalogue which provides users with information about the data we hold
Data Valuation	Develop a data valuation methodology for the Region
Privacy Policy	Review and update privacy policy to ensure integrity and data ethics. Update and communicate data policies to staff
Open Data Strategy and Policy	Create new action plan and approve policy
Foundation Supporting Projects	
KPI Framework	Develop and test a framework for measuring the effectiveness of data and analytics services.
Align DnA Plans	Socialize DnA alignment with existing DnA-related groups and their plans.
New DnA Groups	Create new DnA groups, where needed, to have full DnA coverage.
External Data Sharing Partnerships	Develop new data sharing partnerships with industry and academia through the YorkInfo Partnership.
DnA Communications in MyPortal	Launch and populate the MyPortal home page with DnA communications.
DnA Master Plan Communications Plan	Create and execute the tasks outlined in the DnA Master Plan Communications Plan.
Analytics Gallery	Launch corporate visual analytics gallery providing staff with one location for the display and explanation of analytics available.
Digital Academy	Enhance the Digital Academy with more content.
Digital Literacy	Design a digital literacy framework for assessing the digital literacy of staff.
Review Data Job Families	Conduct a review, consolidation, and alignment of existing data jobs.
Corporate Data Policies Changes	Inform the organization of updates to corporate data policies.

IMPACT INITIATIVES

The following projects are some recent DnA projects worth highlighting:

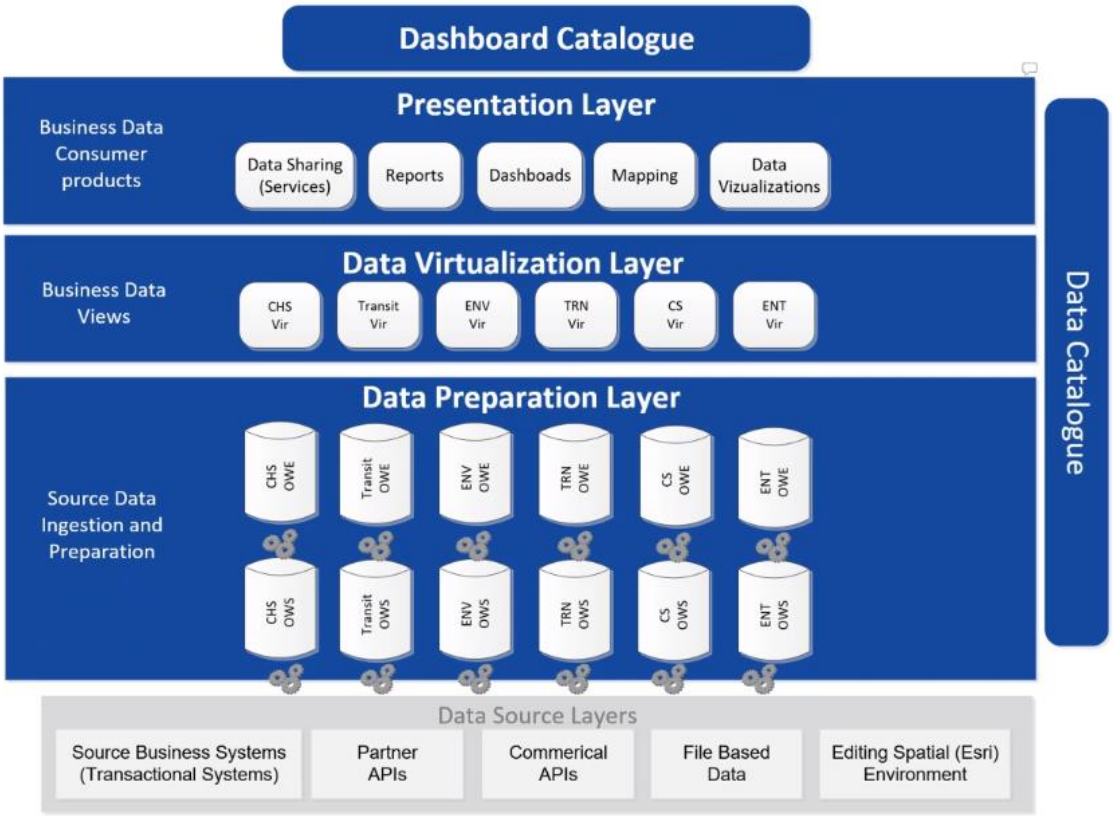
D8ALINX PLATFORM

Our data and analytics platform – D8aLinx – is the central data store where data from across the organization is accessible.

The Region's departments store their data in a variety of systems. D8aLinx is bringing it together and making it shareable and searchable across all departments and in some cases by the public through the Region's Open Data initiative.

Before data is added to D8aLinx it is checked for quality and accuracy. Data experts across the Region have formed the D8aLinx (Data Without Borders) Working Group and are establishing a standard approach for access and security and to ensure the data are accurate, timely and complete, so that anyone using data from D8aLinx can trust it.

Current workplan goal: finalize governance, standards and procedures and scale it up to be available for all to access the virtualization layer through visualization tools. Once governance is finalized get full participation from all departments to add their data.

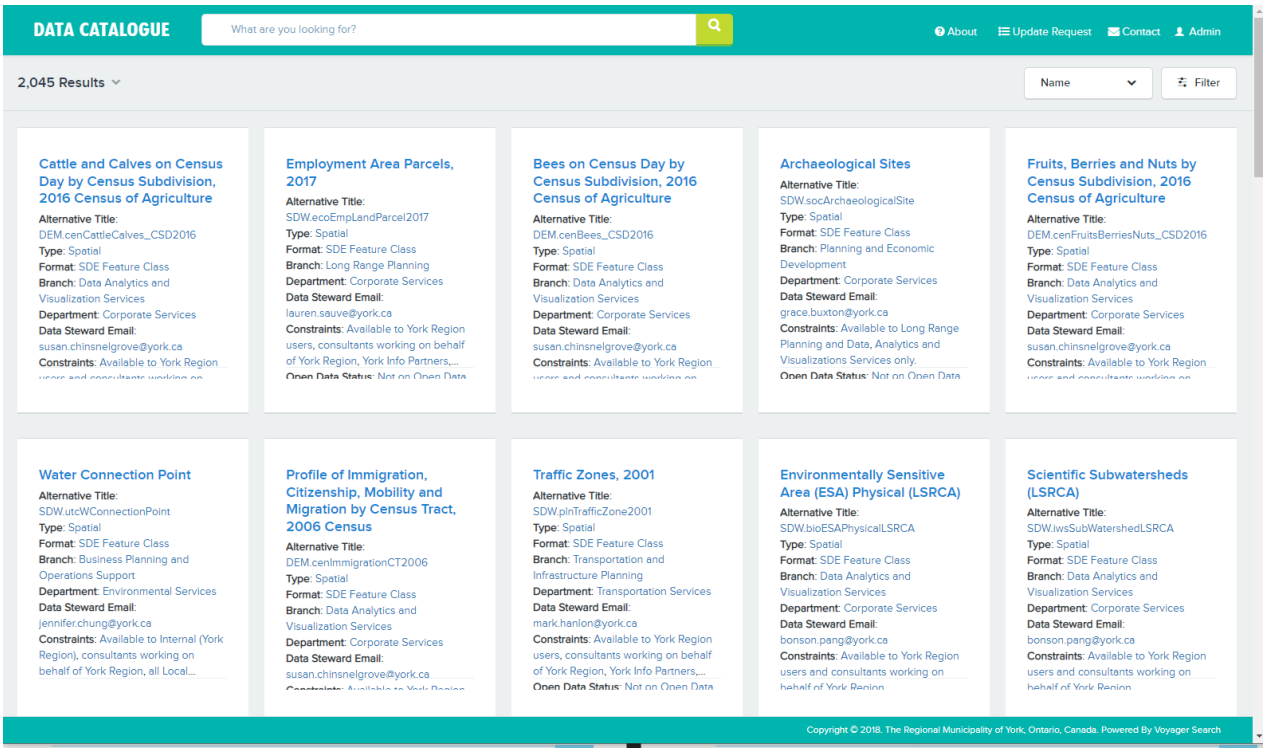


ENTERPRISE DATA CATALOGUE

Finding data should be easy. The Data Catalogue, available on MyPortal (the Intranet for Regional staff), is the Region's data "Google". Staff discover how and where to get data, along with its metadata, access rights and any rules that govern the data set.

As a result of the DnA Master Plan implementation, the Data Catalogue has expanded and the amount of data available continues to increase. Staff are increasingly learning that the Data Catalogue should be the first place to look for data. Plus, there's a support email to use if they can't find something.

Current workplan goals: Shore up the existing governance, processes and communications while considering evaluation of vendor technologies to support the catalogue beyond current capabilities. Build business case for acquisition and seek approval to proceed with procurement of a new solution.



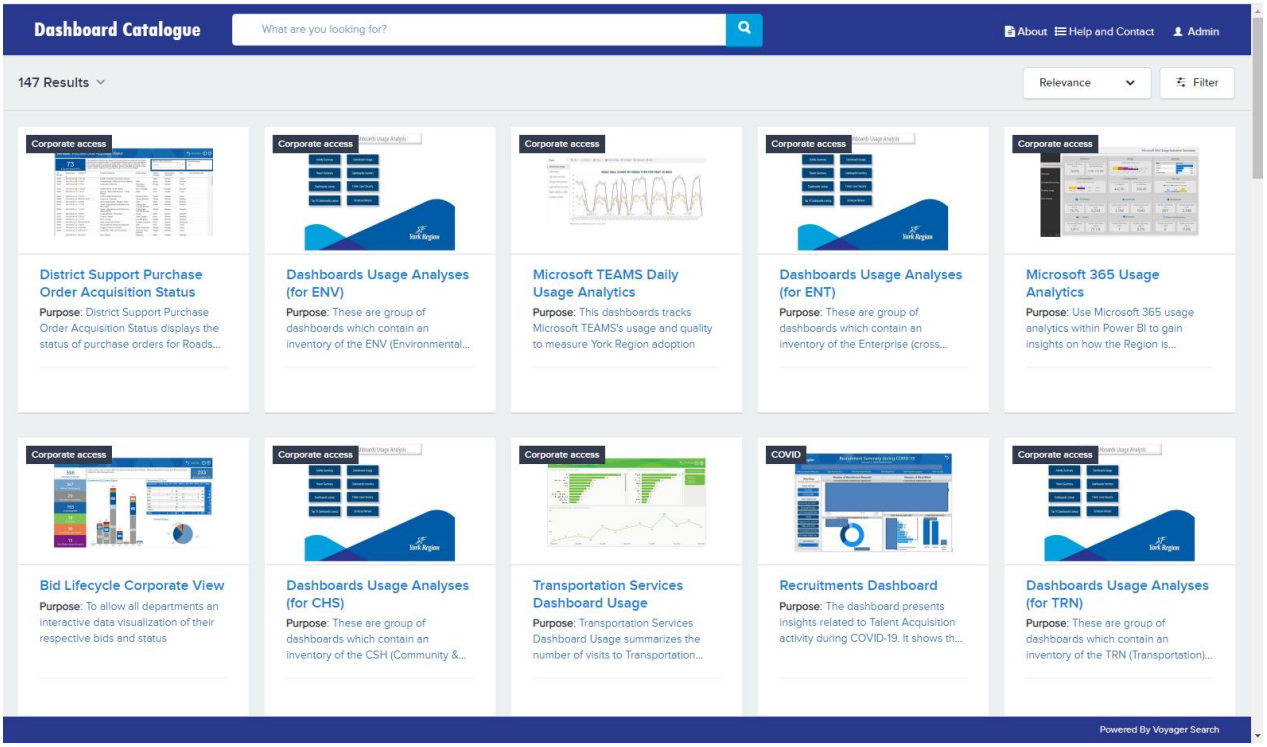
DASHBOARD CATALOGUE

Our work on the COVID-19 ignited demand for dashboard expertise and the idea to understand what we have in the Region. Developed in partnership with employees from across the organization, the Dashboard Catalogue is a one-stop-shop for quick and easy access to many of the Region's dashboards.

Data-driven dashboards give managers insight into their business in real time and a quick assessment of effectiveness and potential issues.

As we created an inventory of the all the dashboards in the Region, we found some duplication across business units and a variety of technologies being used. This led to the creation and application of brand and technology standards.

Staff now have a one-window onto all the Region's dashboards, which will help in the further development of new dashboards and therefore business effectiveness.



DATA SERVICES CATALOGUE

The Data Services Catalogue has resources that provide the Region's staff with help in understanding, using, and delivering all 58 data and analytics services. To do this, each service in the catalogue has a self-serve toolkit and/or an online form / "service ticket" that goes directly to the Region's expert assigned to support that service. So, for example, if an employee is trying to create a dashboard, they may need help with storytelling and metadata management services. That person can go to the catalogue and browse a set of instructions, videos, templates, best practices to do it themselves.

No matter what department the requestor works in, their request will go to the right team and data expert, regardless of where they work. It's ONE CLICK TO CONTACT! With the Data Services Catalogue and each of the self-serve toolkits, staff can get and use the services they need themselves. It helps them do their job more effectively and increases their digital literacy.

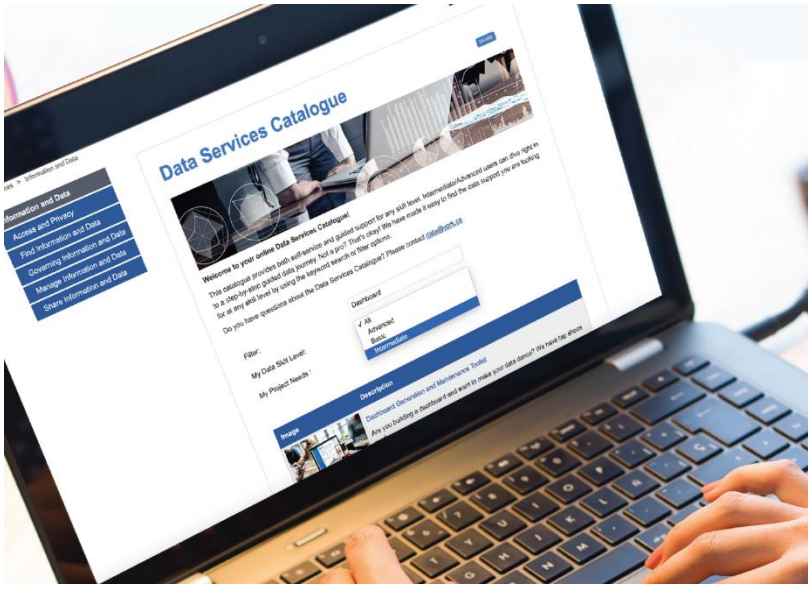
There are a few services that don't need or have a self-serve toolkit or request form because they are more "back-end" and not something an employee would request. For those services, the catalogue provides both a description of the service and a contact should the employee want more info.

The Data Services Catalogue has a management component that tracks the requests in a queue and has a dashboard to track metrics associated with the services and requests. By tracking service tickets we're also able to ensure they are followed-up and looked after.

The metrics help us assess which services are being referenced the most so more investment in their toolkits can be made; and conversely, if there are toolkits not being used these may be turned off. We also seek feedback from staff about their experience and how we can improve. The usage data is ready for use in PowerBI dashboards for reporting as well.

ONE CLICK TO CONTACT

By enabling staff to self-serve, the Data Services Catalogue also reduces the number of small requests and questions that the experts would otherwise handle, freeing them up for more involved requests. And by directing employees right to an expert removes administration and gets them support quickly.



The catalogue increases data literacy and improves self-reliance by making staff more comfortable with data, helping promote a data-informed culture.

ANALYTICS GALLERY

The Region's new Analytics Gallery provides inspiration to anyone wanting to bring their data to life. With examples and links to dashboards and infographics and analytics throughout the Region, it helps users better understand how best to present their own stories and messages with their data by showing what's possible.

With a support team just an email away, the gallery is an ongoing showcase of what's possible with data and analytics. Plus, it's a great way to learn about the Region's various programs!

GETTING STARTED WITH ANALYTICS PROJECTS

The diagram below is based on insights from the Public Sector Service Delivery Council's (PSSDC) Analytics Playbook which government organizations can use as a guide to developing their analytics journey. Their Playbook is the result of extensive consultations with leading public sector organizations implementing analytics.

Don't wait get started. Start small – build momentum. We found analytics projects like these are changing the culture and are a big component of building a data informed organization.

MASTER DATA MANAGEMENT

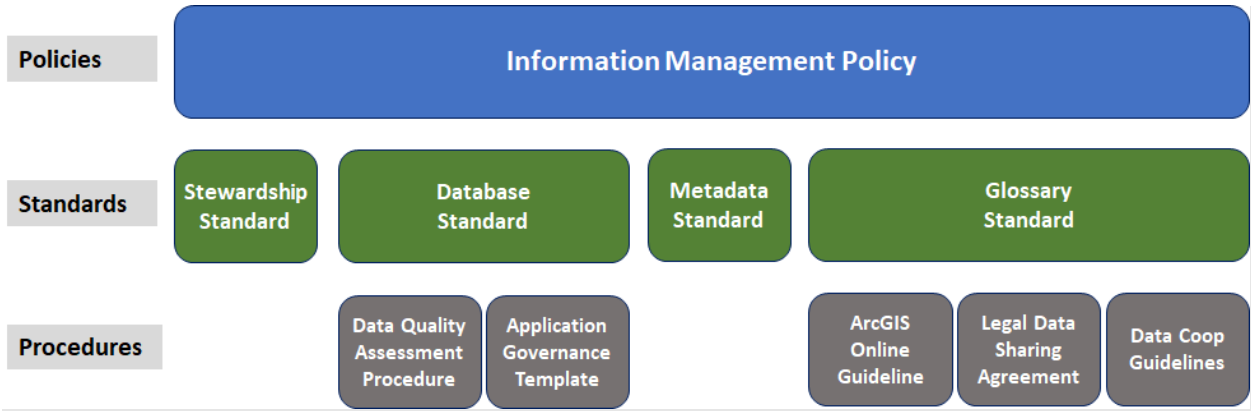
The DnA Master Plan has made it possible for us to look at data integration work like Master Data Management (MDM) in which a commonly used data element can be established corporately within an enterprise-wide “system of record” and then used in multiple business applications. MDM helps solve issues like data duplication, lack of standardization, process disharmony, and the difficulty of integrating similar data from disparate sources by establishing a single source of truth for that data element. Example MDM data elements are address, customer, staff, and asset.

For example, there are multiple systems that record a customer’s contact info. As a result, a customer may have to input their contact info each time they deal with a different area of the Region. With MDM, the system will already know their contact info, enabling them to interact with the Region more efficiently and with fewer data input errors.

Our current workplan has a project to bring together a common unified approach to MDM across the organization, establish a list of candidate data, review and provide recommendations on a path forward.

INFORMATION GOVERNANCE FRAMEWORK

As with data, the accuracy, quality, and integrity of information must be trusted. The diagram illustrates how corporately we are framing the governance of information. Given available resources and time, the plan is to deliver the elements in the green layer – which have a direct impact on enabling information to be more trusted.



INFORMATION SECURITY CLASSIFICATION

DLT recently endorsed the Region's Information Security Classification Standard. Classifying information according to its sensitivity is important because of the regulatory requirements and privacy legislation that we must follow when managing our information and data.

The Standard sets out four levels of information sensitivity (public, low, medium, high) and recommends security controls and safeguards required for each level so that all information and data can be classified. The default level is "low" which means the information is available to all staff. Classifying information at a different level requires justification.

Why classify? Information security classification provides staff with confidence in sharing information that is not sensitive. It supports a key principle of our Information Management Policy that information is open and accessible and is made available to the greatest extent possible except those with privacy, security, or confidentiality concerns.

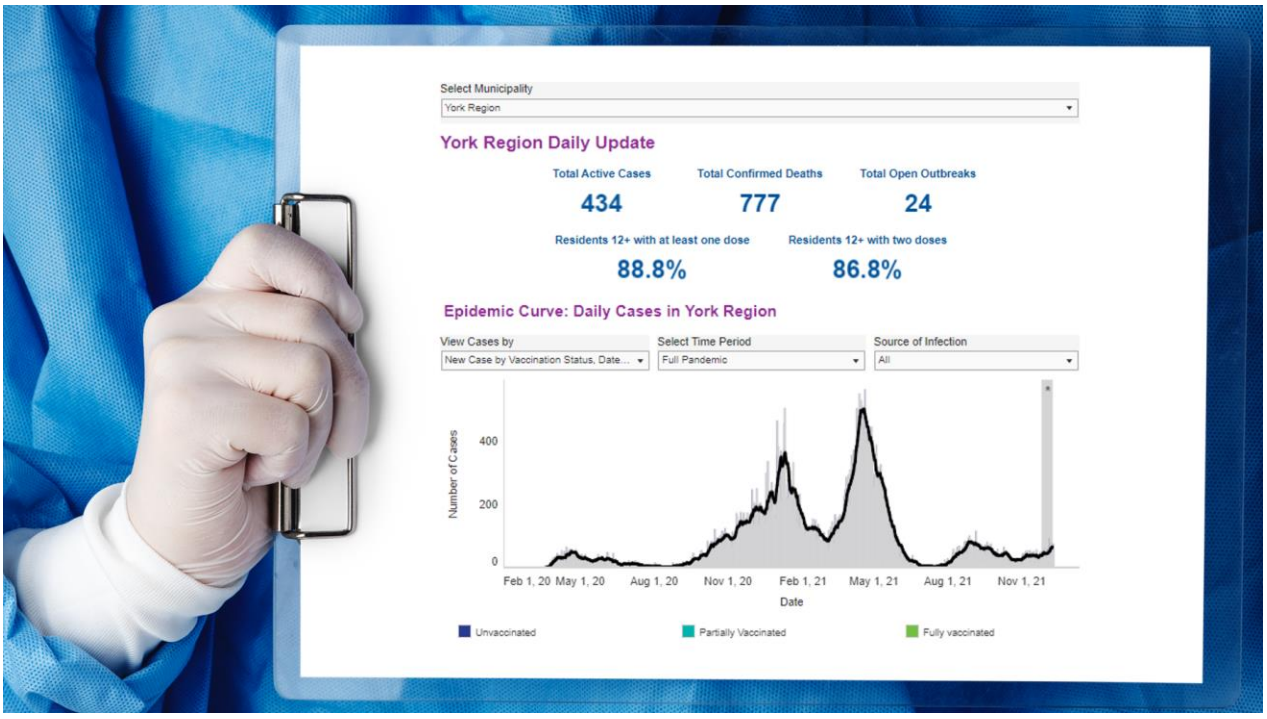
An important first step is to know your information and understand the legislative, regulatory, or contractual obligations that apply to it. Then start classifying!

COVID-19 RESPONSE

Part of the reason the Region set about to put the DnA foundation in place was to mitigate disruptive changes that might happen. While the pandemic wasn't specifically identified, there is no better example. That said, the foundation we already had in place helped the Region to be prepared. While other jurisdictions initially struggled to manage their COVID-19 data, we were quickly able to deploy solutions.

The Region's public health staff, bolstered by staff redeployed from DAVS Branch, helped establish an effective COVID-19 web site and online dashboard which quickly became the go-to site for the public and media looking for COVID data and insight. It remains the highest used area of the Region's website with over ***three million hits*** on COVID-19 dashboards and more than 2,400 hits on four interactive web mapping viewers (as of October 2021).

Many new information products and systems also resulted from the Region's "Healthy Data, Healthy Response" (HDHR) project. HDHR was set up to remove duplicate data entry and transition those public health staff involved from having to use multiple disconnected spreadsheets containing contact tracing data into integrated databases that synchronized with Provincial databases and that automated internal and external reporting. Automated queries from these databases now feed the COVID-19 dashboards.



The HDHR project team rapidly launched several new internal or externally facing applications and dashboards that integrate with the public health and social services data sets along with the Region's spatial data warehouse.

These include:

A map-based, vaccine reporting system that enables public health staff to set up new vaccination clinics, track vaccine rollout, track dosage and vaccine count information, and much more…

An adverse events database and dashboard tracker, enabling public health staff to quickly catch any issues with the vaccine rollout…

The Region's COVID-19 response also included:

- A tool for the emergency operations team to access places where several people live (such as a long-term care facility) to help with the supply of equipment and the planning of health professionals
- A public survey and tracking dashboard to determine the economic and the business impact residents and business owners faced. Data from the survey was used in the recovery efforts and can support future programs and services for the business community
- Realtime mapping of confirmed COVID-19 cases to support public health and municipal planning and program delivery in:
  - Understanding areas with increased burden of illness
  - Monitoring rates of change of cases
  - Relating case rates to hospital catchment areas and supporting the development of provincial COVID strategies
- The development of mapping insights about case counts to help public health understand the effectiveness of self-isolation education and to monitor secondary transmission within families and households
- The development of a tool for public health staff with data about manufacturing facilities to help with the development of mitigation and response plans
- Map-based analysis showing where best to open childcare resources for essential workers

Business (Almost) as Usual

Another key sign of the maturity of data and analytics in York Region considering COVID-19 was our ability to continue to conduct the government's business despite working from home. Several corporate applications - like YorkTrax - were already accessible online so regional development planning and approvals wasn't affected.

LEVERAGING DNA EXPERTISE

Data is everyone's job. It underpins everything we do from policy development to program delivery. If we have trusted and accessible data, we'll have better outcomes.

The DnA Master Plan will transform the culture of the Region to be data-informed, allowing us to unlock the value in our data, enabling employees to make better decisions, design better programs and deliver more effective services. Creating a data-informed culture is one of the plan's Pillars.

To have a truly data-informed culture, reliable data must be shared collaboratively across the organization. This means data stewardship - creating, maintaining, and managing data - is key, and all staff have a role to play. Even though all staff are involved, there are three types of staff who are going to be particularly important in building up our new culture: Data Stewards, Data Heroes, and the subject matter experts within the Communities of Practice.

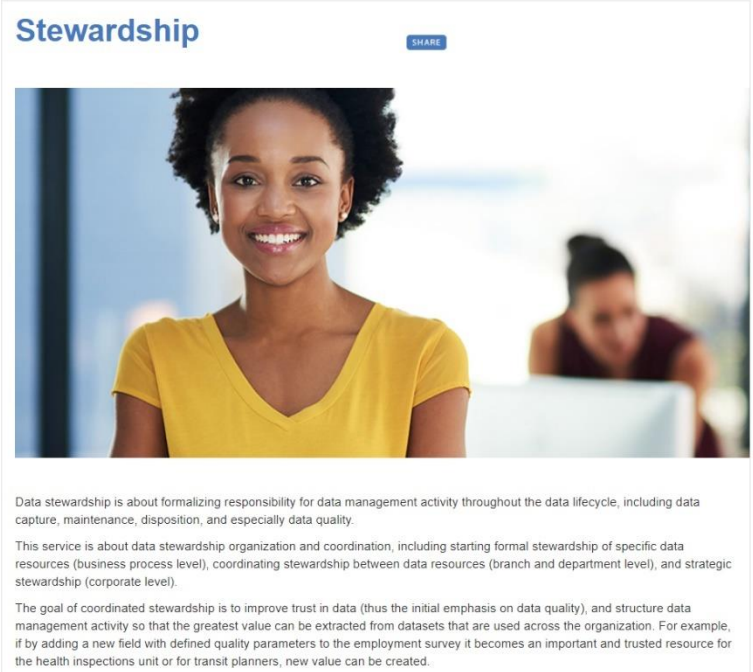
DATA STEWARDS

Much of the success of the DnA Master Plan rests with data stewards. They are key to prioritizing and cleaning the organization's data, while enhancing the Region's data literacy.

Data stewardship is a role not a position. Staff with data stewardship responsibility monitor and ensure the quality of a given data set. A steward has authority to make corrections to improve the data set's quality and ensure any issues or errors are caught as quickly as possible. This also means collaborating with other staff to manage any subsequent impact of their changes.

Data stewards consult with users to better understand how they use the data and its intended purpose. This includes supporting the metadata so users can understand the data and use it appropriately.

There are already several employees who informally fulfill the data steward role. The data steward role is being formalized and guidelines and parameters are being established to help those data stewards be more effective.



DATA HEROES

A few years ago, DAVS began recognizing “unsung” data stewards throughout the Region with a program called “Data Heroes.” They are staff who go beyond their stewardship role, creating new approaches, capabilities, educating their peers, and enabling and empowering staff to share and work with data successfully so we can transform program and service delivery. Regional program managers nominate them, and then an article is written and a poster produced. The article is published in the popular online staff newsletter “YorkBeat” and more recently in the new DnA-specific “DATATALK” newsletter, and the poster (there are now several!) is displayed in hallways and meeting rooms. Recently, data heroes from local municipalities have also been featured, further bolstering the idea of partnership and showing that the Region values their contribution.

To be a data-informed culture, trusted data must be shared across the organization. A big part of the success of the DnA Master Plan rests with these data stewards who play a vital role in creating, maintaining, and managing our data – so that it can be trusted and shared. They will be key to setting data priorities, establishing clean data, and enhancing the Region’s data literacy going forward.

COVID DATA HEROES

Everyone's work life changed with COVID-19. The Region's Health Emergency Operations Centre (HEOC) was at the sharp end of the Region's pandemic response. Their team of front-line staff worked with partners to deliver immunization events, manage thousands of individual cases, and do contact tracing – all while providing encouragement, advice, and comfort to residents. Along with all the stress and uncertainty COVID-19 caused, there were many uplifting stories of personal and professional perseverance.

Denise Graham, the HEOC Manager indicated: We've grown substantially and assembled a group of people with a variety of backgrounds. Many are not even from Public Health. But we've established a common culture: for the data to be accurate, the data to be timely, and that no matter what work we do – whether it's data or systems support – that we work as a team.

For several months during the pandemic, several staff were featured as Data Heroes with stories about their work and how they are helping beat back the chaos to ensure a timely, professional, and effective pandemic response. Articles were written about:

- Two key staff members from the HUB who help ensure lab results are accurate, complete and get to the right people
- Two key staff members from Data Entry who support the case managers and their time-critical and sensitive work
- An employee from the HUB who reminds us that even though COVID-19 hogs the spotlight, other infectious diseases still need attention too!
- A supervisor and a staff member from Vaccine Ops who help ensure the Region's vaccination response runs smoothly

COMMUNITIES OF PRACTICE (COPS)

The Communities of Practice are groups of like-minded staff with members in various departments who share an interest in something they do and learn how to do it better as they interact. They are typically the Region's subject matter experts who are available to help other staff as mentors if needed, particularly when new staff are hired.

They get together to talk, identify new areas of interest and recent findings, and learn, often without specific work being assigned or specific projects being delivered. Members support other staff in the Region in their delivery of many of the data services related to each CoP, and in so doing, the CoP members are also helping build data literacy within the Region. They organically evolve the thinking and maturity of the services and the knowledge areas to which they are related.

In developing the Service Interaction Diagrams and establishing the high-level workflows for the 58 services, the appropriate Community(s) of Practice will be identified. By knowing up-front their role in the workflow for a service, the CoPs are better able to support them and potentially assign people to support the projects directly.

Community of Practice and Their Services
Data and Analytics Master Plan Steering Committee (10)
01 - Strategic Objectives
02 - Monitoring Readiness and Progress
04 - Best Practices
05 - Enterprise Policies and Standards
10 - Promoting Data Culture
11 - Communication of DnA Program
22 - Master & Reference Data Management
48 - Communities of Practice Coordination
46 - Partner Coordination
47 - New Partner Negotiation
Geodemographics Community of Practice (1)
37 - Geodemographics
Open Data Advisory Board (1)
51 - Open Data Publishing
Data Stewardship Community of Practice (13)
06 - Local Procedures
07 - Stewardship
08 - Data Audit (Standards Compliance)
18 - Store and Dispose
19 - Classify
20 - Metadata Collection
21 - Metadata Publishing / Catalogue
21 - Metadata Publishing / Data Dictionary
21 - Metadata Publishing / Glossary
23 - Data Profiling

Community of Practice and Their Services
24 - Data Quality Assessment
25 - Data Quality Monitoring
52 - Data Deliveries to Consultants
Corporate Asset Management Committee (3)
09 - Data Valuation
49 - Data Purchasing
50 - Creating and Negotiating Data Sharing Agreements
Architecture Review Board (4)
12 - Data Modelling
14 - Data Asset Management
15 - Tactics for Integration
29 - System to System Integration
Data Warehousing Community of Practice (6)
13 - Data Flows
16 - Data Migration Planning
17 - Capture
26 - ETL and Data Preparation
27 - Cleansing
28 - Integrating and Matching to Master and Reference Data
Web Coordinators (1)
30 - Integration to Portal
Visual Analytics Community of Practice (10)
31 - Report Generation with Data Toolkit
32 - Dashboard Generation and Maintenance Toolkit
33 - Analytics Consulting
34 - Scenario-Based Analysis

Community of Practice and Their Services
35 - Analytics Needs Development
38 - Descriptive and Diagnostic Statistical Analysis
39 - Exploratory Data Analysis
40 - Artificial Intelligence and Machine Learning
41 - Data Visualization
42 - Storytelling with Data Toolkit
Visual Analytics Community of Practice & GIS Community of Practice (1)
36 - Location Analytics
Data Literacy Community of Practice (3)
43 - Awareness
44 - Skills Assessment
45 - Learning and Development
GIS Community of Practice (4)
53 - Requirements Gathering
54 - Solution Architecture
55 - Solution Deployment
56 - Maintaining Data Sharing Platform
Digital Leadership Team (1)
03 - Issue Resolution

COMMUNICATING THE PLAN

A significant amount of thought and effort is going into communications. Communications plays pivotal roles with the pillar “Creating a Data-Informed Culture” and our changing language in a Digital organization. Less formal communications – the “social grease” – has already been instrumental in breaking down barriers and encouraging participation in the DnA Master Plan process. Formal communications do too.

A DnA Master Plan Communications Plan was written and approved. The following are the main messages for staff associated with materials being produced / written as well as a breakdown of key audiences.

MAIN MESSAGES TO STAFF

Those who collect or use data will notice the projects underway as part of the DnA Master Plan will make it easier to access reliable data more quickly and easily. Streamlining services and technology will create a single source of truth, improve data quality, and increase efficiency.

With the plan’s implementation, your role may be re-defined, and additional training and support opportunities will be available to grow your skills. There may be some new processes and programs to learn, however you will know about them well in advance and will receive the training, information, and resources you need.

The plan will benefit other staff too. For example, the data you’d use in a business case or Council report will be easier to get and will be more accurate. You’ll also have more opportunities to develop your skill in using data and analytics.

DATATALK ONLINE MAGAZINE

We established a new online internal magazine called “DATATALK” to create awareness of the DnA Master Plan projects and the impact they are having or will have on groups within the Region and our residents.

Each edition of the magazine brings new stories and messages from staff while providing targeted useful information, new initiatives, and innovative ideas.

The Region already has an internal online news magazine called “York Beat”, so communication like this is familiar and welcome. The first issue of DATATALK featured a few articles about Data Heroes of the pandemic.


DATATALK Issue: 4

SHARE

Published on September 20, 2021

ISSUE #4: SEPTEMBER 2021

DATATALK

How we're putting data to work

DATA HEROES OF THE PANDEMIC: Meet Catherine

DATA DYK

Gather data to answer your business questions

SORRY, THAT'S CLASSIFIED

Helping secure our information and data

DATA MAGAZINE

Helping secure our information and data

At York Region, we care about the integrity, maintenance and protection of the information and data we work with on a daily basis. As Regional employees, we all have a role to play in helping the organization manage, retain, and store that information.

Processes like classification – or grouping items together that share certain

KEY AUDIENCES

Audience	Interest in the work
CAO:	Supports and understands the DnA Master Plan and its purpose. Believes technology enables services. He is recognized as a champion of change.
Digital Leadership Team (DLT)	The DnA Master Plan is included in DLT's Work Plan creating accountability and a vested interest in its success. Members are keen to grow the partnership model at York Region reducing the duplication of staff roles and responsibilities and making services more efficient.
DLT Chair	The Chair of DLT reports directly to the CAO on corporate digital priorities.
Commissioner, Corporate Services	Executive Sponsor of the DnA Master Plan with a clear understanding of its goals and purpose. Sees the opportunity to be a champion of change and how it will help create engagement from other stakeholders and departments.
Senior Management Team (SMT)/Directors	Commissioners across the organization understand the project's goals and purpose. Their support is especially important through the foundational work of prioritizing data and staff engagement. This group will be kept up to date on initiatives that affect their teams to ensure their continued support. They can be champions of change and help create engagement from their teams.
Managers	Managers are critical. All managers must understand how data is a key enabler of transforming business operations. Managers with staff who work with data will be affected by many DnA Master Plan initiatives. Managers are critical to the Plan's success and will be kept informed throughout its implementation to ensure engagement and create buy-in to new systems or processes. Many can and should be champions of change and they should help create engagement from their teams.
DAVS Director	DAVS Branch director is the DnA Master Plan visionary and maintains a high level of accountability and interest in its success. He aims to demonstrate the value of using a partnership model while showcasing York Region as being a leader in transforming how governments use and manage data.
DAVS Branch	DAVS Branch leads the DnA Master Plan implementation. Many of its initiatives directly affect the branch, and the Plan sets up DAVS to be a governance body to oversee the development and roll-out of policies, procedures, and standards.
DnA Steering Committee	The DnA Steering Committee is comprised primarily of managers with "data" staff. They lead the development of the DnA Master Plan and ensure its deliverables are implemented. To keep everyone engaged, their roles and responsibilities must be clear.
Data Staff: Novice Users	About 400 staff across York Region (10% of all staff) are considered "data staff." They will be affected by many of the DnA Master Plan's initiatives. They will be kept informed throughout implementation to alleviate concerns and

	gain their support. Skills assessment and training will become key as roles are redefined and new tools / processes introduced.
Data Staff: Expert Users (i.e., Data Stewards)	Of the 400 data staff, approximately 120 are “Expert Users”. They have helped inform the plan and they will be affected most by the projects. Their engagement is critical to the Plan’s success. Their work processes may need to change, and they will enable many of the services to be delivered. This group will need to be kept up to date throughout implementation.
Other York Region Employees	In general, the impact on this group is less than those who work directly with data. As the data-sharing structure matures, all employees will have easier access to data as well as new tools and resources to use and analyse those data. Key messages will be shared with this group through Region-wide communications vehicles.
External	
YorkInfo Partnership (Municipalities, School Boards and Conservation Authorities)	The YorkInfo Partnership was created so the partners could save money, improve their operations, and increase staff capabilities through data sharing, group purchasing, training opportunities, and collaborative software development initiatives. The YorkInfo Partnership is now a recognized lead in how organizations can partner to further the greater good of each organization and their communities. The DnA Master Plan, while internal to the Region, will have a significant peripheral impact on the partners as they take part in and benefit from its initiatives.
York Regional Police (YRP)	YRP already uses regional spatial data to assist their fleet and in their daily operations, along with supporting their BI and analytics program. There may be an opportunity to profile their access to improved data and more efficient software or processes.
GTHA Partners (Durham, Peel, Toronto, Hamilton, Simcoe...)	The DnA Master Plan’s implementation helps further establish York Region as a leader in using data more effectively and strategically. Many of the approaches and their outcomes can be shared within this group and beyond. There are operational benefits to York Region to have others in the GTHA reach a similar level of competence and understanding in data management – thus enabling improved data sharing and cross-border planning / initiatives.

Pillars, knowledge areas and services. These are the WHAT of the DnA Master Plan. Establishing pillars and developing knowledge areas is relatively easy to understand – but it’s with SERVICES that things get tricky. Specifying data-related services is a new concept for many, yet it’s through the delivery of these data and analytics SERVICES we become a PARTNERED organization.

CHAPTER 3: HOW WE NOW WORK IN A PARTNERED MODEL

In this chapter we start to sweat the details of what it means to become partnered in a large, federated organization whose various business areas work together with data and analytics. Whereas above we looked at the WHAT, this section delivers the WHO and the HOW.

The key is how services are assigned ownership / accountability within the organization and then how they are delivered corporately or by the business areas. The process to determining that uses “service interaction diagrams”. And, working through each of these is almost as valuable and the result!

"FEDERATED" AND "PARTNERED"

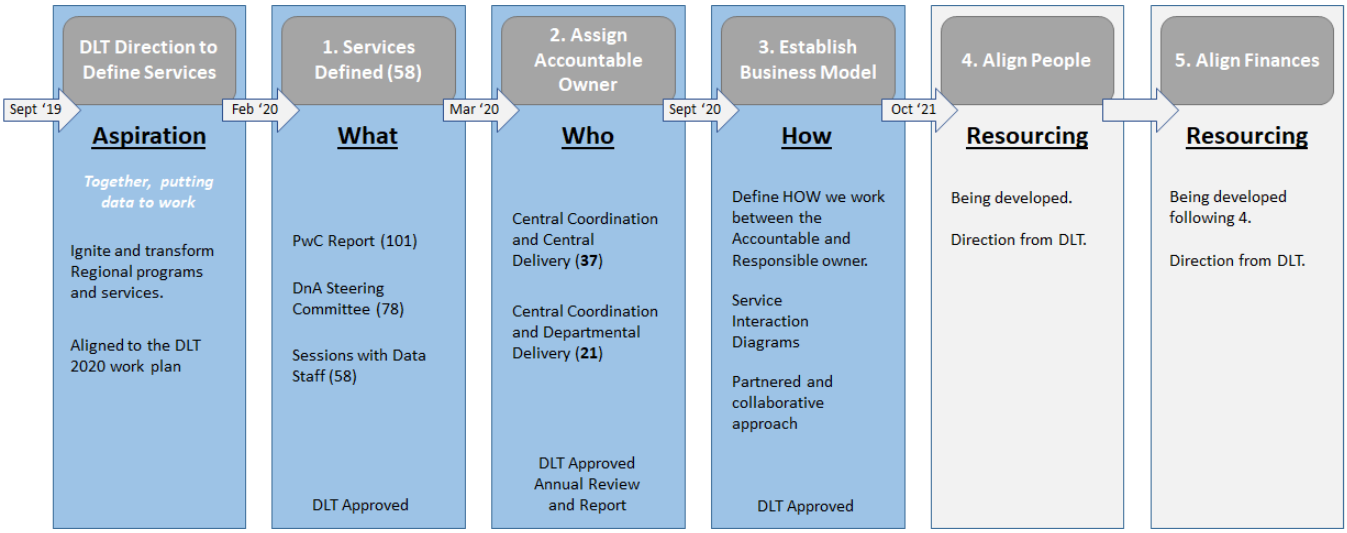
To recap, "**federated**" organizations have business areas delivering unique services. These areas can have trouble treating data as a corporate resource and leveraging the data and insights from areas other than their own. That's because data is managed in silos to suit the business needs of that business area. It's duplication. It's confusing. It's inefficient. It's unsustainable.

York Region is federated in structure and there's now a clear path to be "**partnered**". Data and analytics are the first of the digital pillars (Data and Analytics / Information / Technology) to begin to bring the partnership to life by organizing and defining our approach within the DnA Master Plan.

Figuring out our partnered approach within our federated organization **may be our most important outcome** of the DnA Master Plan. Our still-developing "partnered" paradigm will enable the establishment of our DnA pillars, the ongoing growth / maturity of our knowledge areas, and the delivery of our services.

THE JOURNEY TO DATA SERVICES

The following diagram outlines our journey in defining the services associated with the DnA Master Plan.



The Background, Introduction, Chapter 1, and Chapter 2 of this Playbook deal with the first two Chapters in this diagram – the "**Aspiration**" and the "**What**". This Playbook chapter deals with the "**Who**" and "**How**".

As the diagram illustrates, the Digital Leadership Team (DLT) consisting of senior management from across the Region, received the consultancy from PwC, established the DnA Steering Committee and gave us the task to "Figure out Federated" through the implementation of the DnA Master Plan in alignment with the Region's Digital Strategy and their 2020 work plan.

By Feb 2020, and after significant effort (and Social Grease!) we had identified the "**What**" – i.e., what the 58 data services are, based on the five pillars and the 11 knowledge areas (based on DAMA). This was then approved by DLT.

The next steps (outlined below) involve determining **Who** should be the "accountable owner" of each service (a central body like DAVS, or each department); and, then **How** that service would be delivered.

The final fourth and fifth steps have yet to be completed as of the time of writing, and these both involve resourcing the service delivery through the assignment of people and the assignment of funding / capacity. Notably for these, the expectation is the Region likely won't need to create many if any new positions nor will the financial requirements overall increase. The expectation is for the most part, the DnA Master Plan because of how it's being delivered, can be done within current staffing and financial resources.

WHO SHOULD DELIVER A SERVICE?

Determining WHAT services are being delivered in each of the knowledge areas (the 58 services identified in the plan) was a good start, but we needed to confirm them within the context of the organization.

This meant we needed to identify WHO should best deliver each service. Should a service be **delivered centrally?** Or should it be **delivered within the departments**? We worked through this "Goldilocks-like" puzzle and have ended up with a solution that is *just right* – some of each!...

THE JOURNEY TO "WHO"

We first created some **principles** for defining where a service would be coordinated/delivered, centrally or by the department. For your organization of course, the names will be different, but the exercise would be similar.

Principle 1. The delivery of **centrally coordinated services** is NOT duplicated within any other business area, but are delivered by the central group of DAVS, IT and Clerks (for information management) for the entire Region. For example, Open Data is delivered centrally by DAVS and therefore there are no open data programs anywhere else.

Principle 2. The large departments (TRN, CHS and ENV) will deliver each of the departmental services (22) within their department. The department is currently responsible for the maturity of their services.

Principle 3. The large departments will support the delivery of centrally owned services to staff in their department.

Principle 4. Other business areas like Legal Services or Finance will get all 58 services from the central group until they build capacity to do any of the 22 themselves. (This prompted some groups to consider creating their own data strategy aligned to the DnA Master Plan!)

Each service needed a discussion and an agreement for ***who*** would take accountability for its delivery – whether that would occur centrally or by a department for the Region. Ultimately through the input and staff sessions, the recommendation was that 36 should be centrally coordinated and delivered by DAVS, the Clerks Dept, and IT services, while 19 should have their delivery done departmentally and three to the DLT and the DnA Steering Committee. The was approved by DLT for annual review because as the Region's DnA abilities mature there may be a change in services and who delivers a service.

THIS HAS NOT BEEN EASY

It was **difficult to get agreement** on how to divide the responsibility for the services! Misunderstood intentions and doubt permeated the early conversations of "what" and "who". The threat of losing control and ownership was real. Centres of excellence existed throughout the organization, and many assumed the initiative was a way for central command and control to be put in place. "Partnered" does not mean "central control" – but this is a hard message to deliver unless it can be demonstrated.

For the larger, more capable departments, it was a culture change. In addition, they were often being asked to slow down to align to a central group. It created doubts about whether a centralized service would still maintain the service levels and priorities they were used to.

TWICE, the team brought a proposed services breakdown plan to the Digital Leadership Team (DLT) outlining which services would be departmental and which would be centralized. Both times DLT did not approve it but provided further direction on our approach – and the healthy debate continued.

Throughout, DLT provided guidance and issue resolution and at their meeting in March 2020, a final breakdown was discussed and approved.

The process highlights that just because data are a corporate resource, the responsibility for services associated with data and analytics do not necessarily need to be centralized.

At York Region, DAVS Branch is a central service branch – like HR or IT. As a result, the tendency was to think DAVS should be responsible for DnA services. It was a big breakthrough to realize otherwise! Responsibility and even accountability rests where it makes most sense.

The move away from central delivery was deliberate and is helping strengthen the collaboration and "togetherness" associated with the overall DnA plan.

A LOOK INSIDE THE DISCUSSION

Determining the best placement of a data service within the organization was the most difficult aspect of the DnA plan and took over a year. Using the principles noted above, the conversations for each service, went something like this:

a) Is this a data service that a central group should *obviously do*? For example, Open Data should be a centrally provided data service as it would make no sense to have multiple open data programs from many departments. And if so, then which central group? In our case it was DAVS.

b) Is this a data service that a central group should *obviously not do*? Metadata collection is an example. A central group wouldn't tell departments what information they needed to collect about their business data. And so, this was a departmental service – and each department would determine who best to deliver it.

Using this approach, the delivery of about 45 of the 58 services was determined.

The other data services were not obvious.

For these we asked ourselves, "is this a centrally-delivered service the departments are mature enough to take over?" If they were, then the service would be delivered by them. If not, it stayed central. One such example is GIS. Each department is mature enough to handle GIS for them to take on ownership of that service within the department.

For a few we needed to consider, "is this a service that neither a central group nor department should do?" Three services fit this reasoning and were assigned to the Digital Leadership Team and the DnA Steering Committee. One example is setting the workplan and direction. That had to be done collaboratively.

Even with all this good work in defining the ownership and responsibility for services, the unfortunate reality is that some departments still need help with the delivery of some "departmental" services from the central groups. So, the flaw is: for those services, some departments will still come to a group like DAVS to support them until they have the resources / capability to handle the service themselves.

Notably, the Data Services Catalogue is helping address this. Using the catalogue, a department needing help might be able to connect with someone in another department rather than relying on a central group.

THE RESULTING DISTRIBUTION OF SERVICES

Central Delivery Responsibility	Service
Digital Leadership Team	03 - issue resolution
DnA Master Plan Steering Committee	01 - strategic objectives 04 - best practices
Clerks	05 - enterprise policies and standards 18 - store and dispose 19 - classify
ITS	15 - tactics for integration 26 - ETL and data preparation 28 - integrating and matching to master and reference data 29 - system to system integration 30 - integration to portal
DAVS Branch ** some of these services will transfer to Departmental ownership / accountability as they mature throughout the Region.	02 - monitoring readiness and progress 09 - data valuation 10 - promoting data culture 11 - communication of DnA program 12 - data modelling 14 - data asset management 16 - data migration planning 20 - metadata collection 21 - metadata publishing / catalogue 21 - metadata publishing / data dictionary 21 - metadata publishing / glossary 22 - master & reference data management 27 - cleansing 31 - report generation with data toolkit 32 - dashboard generation and maintenance toolkit 39 - exploratory data analysis 40 - artificial intelligence and machine learning 42 - storytelling with data toolkit 43 - awareness 44 - skills assessment 45 - learning and development 48 - communities of practice coordination 49 - data purchasing 50 - creating and negotiating data sharing agreements 51 - open data publishing 52 - data deliveries to consultants 55 - solution deployment 56 - maintaining data sharing platform

Departmental Delivery Responsibility	Service
Leader within each Department ** additional services will be moving to departmental responsibility from DAVS as the Regional capability in those services matures.	06 - local procedures 07 - stewardship 08 - data audit (standards compliance) 13 - data flows 17 - capture 23 - data profiling 24 - data quality assessment 25 - data quality monitoring 33 - analytics consulting 34 - scenario-based analysis 35 - analytics needs development 36 - location analytics 37 - geodemographics 38 - descriptive and diagnostic statistical analysis 41 - data visualization 46 - partner coordination 47 - new partner negotiation 53 - requirements gathering 54 - solution architecture

REVIEWING THE WHO

As knowledge areas mature, the service delivery responsibilities may change. For example, the delivery of GIS is so mature within the Region, that it doesn't need to be centrally handled by DAVS Branch. Instead, responsibility for GIS now resides within each department. This was initially difficult for DAVS management and staff to see some of their GIS delivery responsibilities being pushed out throughout the Region, but that is the nature of a mature organization. We expect this to happen with other services as the service and the organization matures.

The DnA Steering Committee will annually review the "WHO" split and if warranted may assign delivery for a service to the departments. Any change of service delivery responsibility would be approved by DLT to ensure every department agreed and had the resources available to meet the need of the service.

Each organization using this Playbook's approach will decide the WHO differently. The important thing is the journey and making sure the right people are engaged.

HOW SHOULD A SERVICE BE DELIVERED?

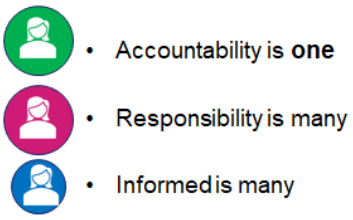
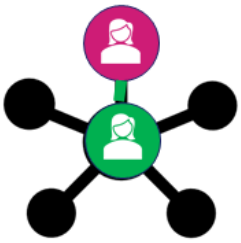
THE JOURNEY TO "HOW"

Once we had the WHAT and the WHO, the DnA Steering Committee then were tasked with figuring out HOW we were going to work together to implement the 58 services in the Region. These services were already being delivered (perhaps under a different name) often in numerous departments and centrally.

Determining ***how*** each service is delivered requires an in-depth understanding of the service's process and the likely and necessary interactions required to deliver that service. We developed service interaction diagrams and interaction principles to provide a template in determining HOW.

SERVICE INTERACTION PRINCIPLES

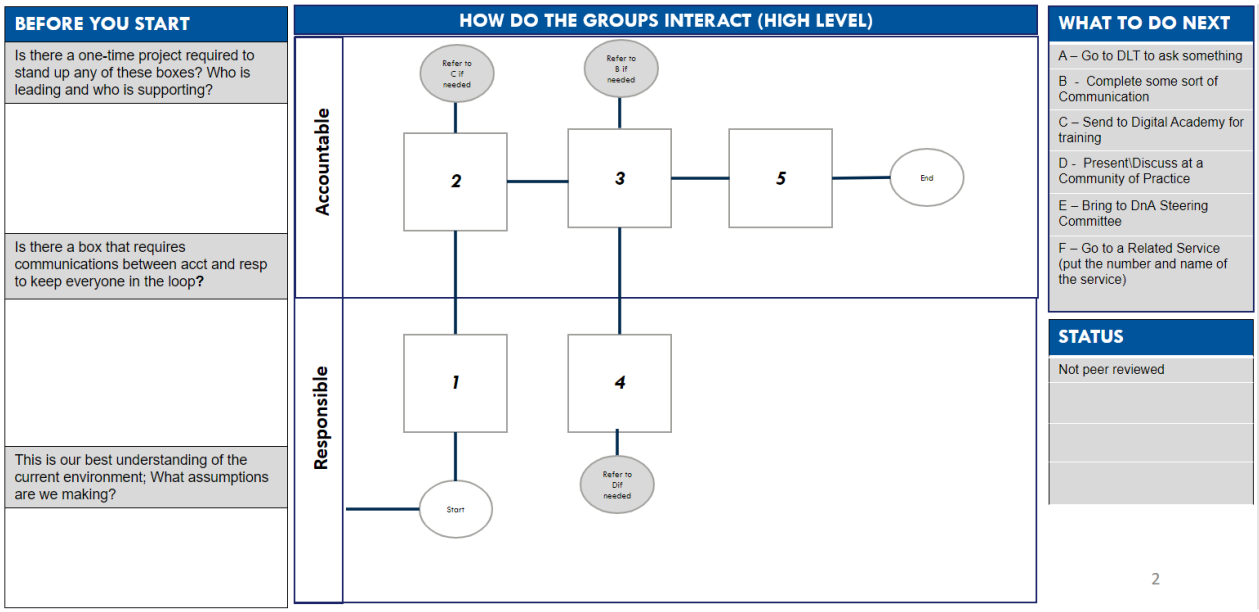
To determine how best a service would be implemented, we initially developed some guidelines that would identify the accountability (ownership) of a service and those responsible for its delivery.

Principles	
Accountability is one. One central group is accountable for the service's direction. **Responsibility is many**. There can be several groups responsible for delivering a service, (although delivery of a service request is handled by one responsible group). **Informed is many**. Many people may need to be informed.	
Every service delivery has at least one interaction between the **accountable** and the **responsible.**	
The group that is **accountable** coordinates the service's maturity framework. The groups **responsible** use guidelines provided by the accountable group to deliver the service. For small departments DAVS is both the Accountable and Responsible.	

Principles	
Communities of Practice (CoPs) inform, discuss, and advance a service's maturity but they are not accountable or responsible.	
Service Interaction diagrams (i.e., the process workflow for the service delivery) are reviewed annually. These are outlined below in the next section. The service's **responsibility may change** based on that service's maturity throughout the organization. For example, a centralized service may become a departmental service if the maturity level of that service in the departments enables it.	
The **DnA Steering Committee manages** the service interaction diagrams and brings them to DLT. **DLT approves** all service interaction diagrams.	

THE SERVICE INTERACTION DIAGRAM

The team developed a facilitation model called a Service Interaction Diagram. This has been very useful in establishing the interactions associated with delivering a service.



The process for defining the process model for a service includes the following:

a) Determine the activities associated with delivering the service. These will be the “boxes” in the interaction diagram.

b) The section on the left called “Before You Start” asks three main questions:

   1. Is there a one-time project required to stand up any of the boxes (activities associated with the process)? If so, who is leading and who is supporting that?
   2. Is there a box (activity) that requires communications between the accountable and the responsible to keep everyone in the loop?
   3. This is our best understanding of the current environment. What assumptions are we making?

c) The central part of the diagram shows the streams of a service. The top stream is the accountable group’s role. Below this are the one or more responsible groups’ roles.

   a. Open square shapes represent an activity.
   b. Open oval shapes start or end a process.
   c. Shaded oval shapes indicate an interaction or linkage / dependency with another group or service.
   d. Lines link process steps and are assumed directional left to right and bottom to top unless otherwise indicated by an arrow.

d) The right side provides lettered options for some of the activities which would typically be indicated in a shaded oval. Those are: A. Go to DLT to ask something; B. Complete some sort of communication; C. Send to Digital Academy for training; D. Present/discuss at a Community of Practice; E. Bring to DnA Steering Committee; F. Go to a Related Service (put the number and name of the service)

e) The Status is typically used to indicate if the service interaction diagram has been approved, in review, and any other related detail.

Nomenclature for Services: Within the document and in some diagrams, services may be referred to by their numeric identifier. The identifier is formed by using the number of the knowledge area and the service number. So, the service “Strategic Objectives” is 01-01; and “Skills Assessment” is 05-44. (Note: service #21 “metadata” is split into three, 21a, 21b, 21c, which is why the services numbering ends at 56.)

COMPLETING THE 58 SERVICE INTERACTION DIAGRAMS

The **process** of creating all these service interaction diagrams has **changed our culture**.

The development of each service interaction diagram was an important task and offered another opportunity for those involved to dive into the services and confirm the logic and appropriateness of each. Members of the Steering Committee were assigned various services to lead the definition of their interaction diagrams. Services being delivered by the departments had a departmental committee member lead its development.

Once ready, the lead for each interaction diagram presented their diagram to the Steering Committee. It was debated, discussed, edited if necessary and voted on. The entire process took 10 months before going to DLT.

The diagram reflects the interaction between the accountable owner and the responsible owner(s) of a service. There can be only one accountable owner, so we had to create and negotiate all the interactions that need to occur for each service between the accountable and responsible groups.

EXAMPLE: SERVICE #06-50 DATA SHARING AGREEMENTS

The Data Sharing Agreements Service is “owned” centrally, and DAVS is identified as the accountable organization. Departments can be responsible for the service. In other words, departments can create a department-specific data sharing agreement, but they need to involve DAVS, and the process of establishing an agreement is the same regardless of which department is involved.

In this example, one assumption made is that each partnership agreement is negotiated on behalf of all departments. That assumption is important, since not all departments would necessarily be involved in each data partnership agreement’s negotiations.

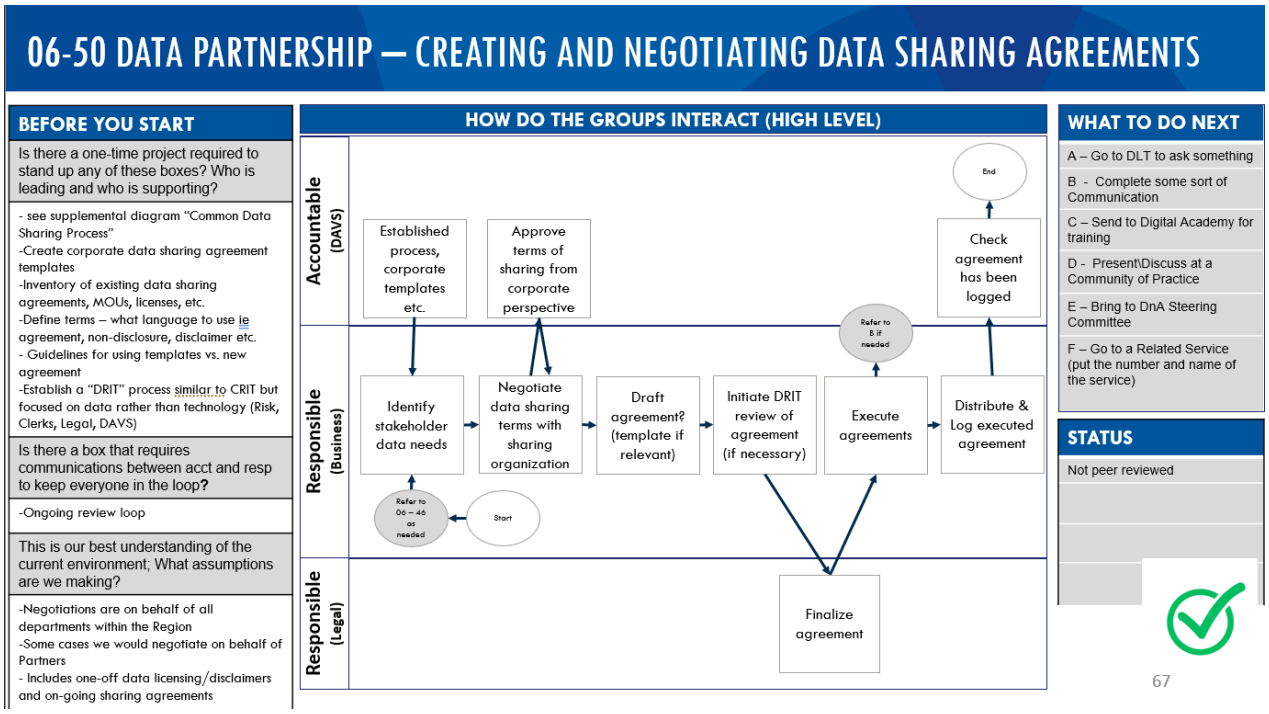
The Service Interaction Diagram then shows how – in the middle lane – the **responsible** business area identifies the opportunity for sharing data and uses the process and template provided by the **accountable** DAVS – in the top lane – to begin the negotiating process. Prior to

this, the business may refer to Service 06-46 (Partner Coordination) as/if needed. They then negotiate the agreement with the sharing organization with ongoing support from DAVS. They create a draft agreement, initiate an internal department review if needed and – in the bottom lane – receive sign-off from Legal, before executing the agreement. Once in place, they provide DAVS with the agreement and log it. DAVS confirms the agreement, and this service is now ended. None of the "What to Do Next" options are identified as being required with this service, although there may be agreements to which one or more apply.

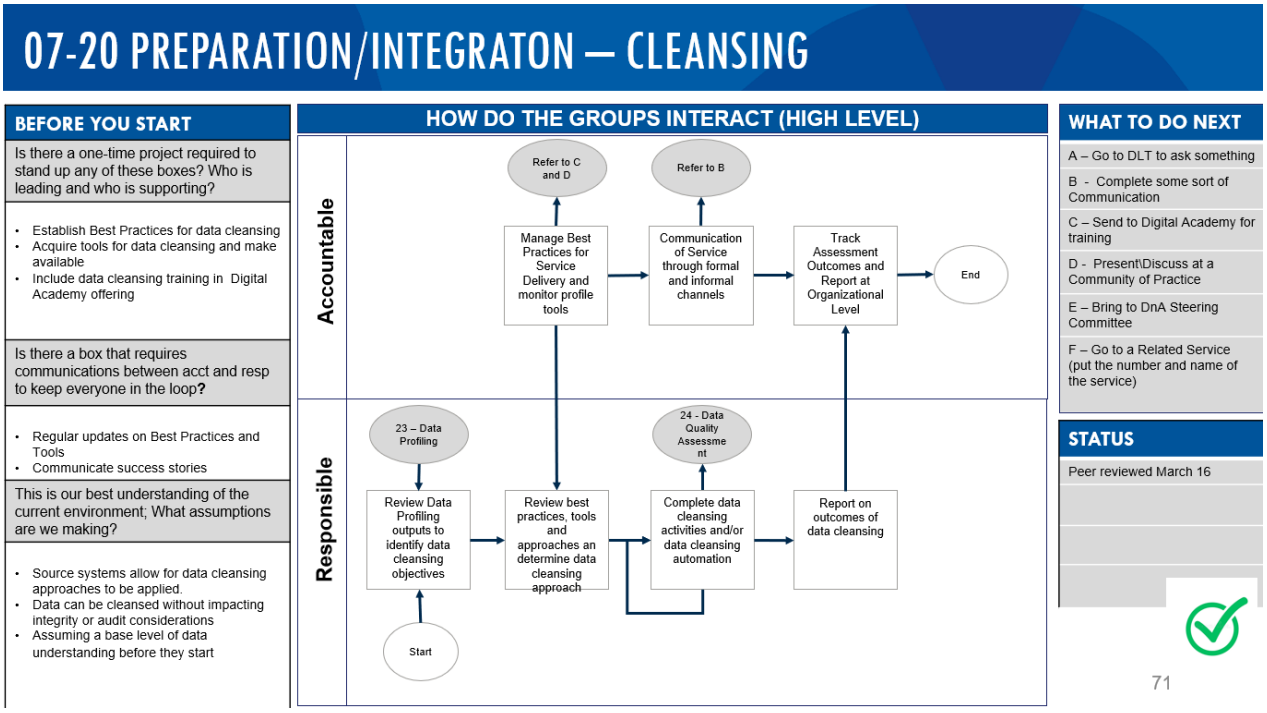
To use an example of how this service interaction might take place and a data sharing agreement created, let's say that a transit organization and the Region need to share data to support that transit company's expansion into York Region.

Prior to the DnA Master Plan, the Region's Transportation Department (TRN) would likely be the primary partner / negotiator of that data sharing agreement with that organization. They might put the agreement in place without necessarily knowing or considering how that transit organization's data might be useful to other departments – for planning or environmental interests perhaps.

Now, with the service interaction defined, when that organization comes to the Region to set up a data sharing agreement, TRN will use the service interaction diagram. They will see that data sharing agreements are a DAVS service, and they will bring DAVS on board to support them. In this way, TRN will negotiate a data sharing agreement that suits the broader needs of the corporation as well as their own.



Department Example 2. Data Cleansing



This diagram shows how the “data cleansing” service is delivered. For this service, DAVS is accountable and typically the departments are responsible for implementing. When faced with a dataset that needs to be cleansed, it’s up to the responsible department to identify it, prepare to undertake the work with supporting best practises. DAVS may need to refer to the Community of Practice for expertise about that data or refer an employee to the Digital Academy for training.

This service also interacts with service #24 (Data Quality Assessment) during the cleansing process.

BUILDING AND MEASURING MATURITY

We aim to reach a maturity level of **four** for each knowledge area within four years. Level four is the point at which we can be confident that each Pillar is set throughout the organization and the Region is comfortable introducing DnA into its programs and services while meeting any new challenges and changes. Even though reaching level four is a more ambitious target for some knowledge areas than others, we expect that improvements in one knowledge area will tend to support improved maturity in others making it easier to achieve higher maturity levels throughout.

Maturity levels have undoubtedly already begun to rise with the definition, implementation, and growth of the data and analytics **services** associated with each knowledge area. While several processes will increase the DnA maturity within York Region, it's the delivery of **data services** in a partnered approach that will have the largest impact.

(Note: The Maturity Model that PwC used to establish the maturity levels at the start of the DnA process is briefly outlined in the section introducing the Knowledge Areas above).

MEASURING MATURITY

Keeping track of the Region's maturity will help show us how effective our strategies and tactics are. We are establishing key performance indicators to help measure how well we're doing for many of the knowledge areas' services.

The initial maturity levels found by our consultant through their extensive interview process with staff throughout the Region gave us a baseline for each knowledge area.

Each baseline will be compared against the status of the knowledge area. Along with using the results of an annual survey of maturity levels (see below), the maturity index scoring will be based on tracking:

- online metrics associated with the DnA Master Plan portal page and related links (i.e., service support)
- online metrics associated with views of / use of the DnA Master Plan web page on York.ca
- click-through rates from York Beat stories, DATATALK, and quarterly newsletters
- the number of staff seeking help with data and analytics-related services through MyPortal
- the number of attendees signing up for learning and development through the Digital Academy
- the number of articles about York Region or referencing the Region and their content published in industry publications
- anecdotal feedback from stakeholders

There are many signs that we are becoming more mature:

- Our language and our **conversations are changing** to reflect the new digital nature and direction
- New projects are being born within departments that don't just have a departmental focus but have a **corporate lens**
- The DnA plan's activities are being included in **departmental work plans** and in individual **performance plans**
- In **three months**, we designed, developed, tested, and *launched* the online map based "**All Construction**" application for use by the nine local municipalities and the Region. The system provides an integrated picture of each partner's current and planned road related construction projects.
- The Region's monthly DATATALK e-magazine keeps staff informed of all the latest data happenings
- **Data Heroes**. Since 2018, we've regularly featured staff members as "data heroes" on posters and in articles that describe their work and their passion for data. The program recently started featuring partner staff from our local municipalities too. By now, everyone knows about the Data Hero program, and new "heroes" are anticipated and celebrated!
- The **partnership** is expanding. The success of the long-standing YorkInfo Partnership is leading to similar discussions among municipalities with the GTHA (Greater Toronto and Hamilton Area)

Plus, there's a few good numbers to throw in the mix!

- 189,243 YorkMaps.ca visits in 2020 (110,000 more than 2019)
- Over 400+ participants at 36 Digital Academy learning events
- Over three million hits on COVID-19 dashboards; more than 2,400 hits on four interactive web mapping viewers; and about 1,000 businesses responded to the COVID-19 impact survey

MATURITY LEVEL - ANNUAL SURVEY

The Region will use an online staff survey soon to do a maturity level assessment. It will help identify the level of understanding adoption of the 11 knowledge areas and their data services by asking questions associated with each. Here are a few of the questions that will be asked.

Knowledge Area: Data Governance

Data Service	Question (strongly disagree, disagree, agree, strongly agree, N/A)
01 - Strategic Objectives	I believe York Region values data as a strategic asset
02 - Monitoring Readiness and Progress	I have transparency as to how all layers of the governance structure, from front line to leadership manage data at York
03 - Issue Resolution	I can mediate conflict when another group is working with the same dataset as I am, but with different goals
04 - Best Practices	I have the right tools, techniques and processes documented when I need to put data to work
05 - Enterprise Policies and Standards	I / My department follow enterprise-set policies and procedures in storing, managing, and using data
06 - Local Procedures	My department has data rules in place to keep our team aligned in how data is best used for our localized needs
07 - Stewardship	There are people in my department that are responsible for identifying and managing our critical data
08 - Data Audit (Standards Compliance)	I can initiate a data audit as needed to ensure best practices and data standards are being followed
09 - Data Valuation	I / My department have successfully quantified the value of our data
10 - Promoting Data Culture	I feel like my leadership and programs like data heroes contribute to the data-informed culture at York
11 - Communication of DnA Program	I understand the overall strategic view of York's D&A Master Plan
11 - Communication of DnA Program	I can clearly articulate our strategic focus areas for this year and next, both departmentally and more broadly for the Region

Knowledge Area: Data Literacy

Data Service	Question (strongly disagree, disagree, agree, strongly agree, N/A)
43 - Awareness	I have increased my data literacy using the Digital Academy, as needed
44 - Skills Assessment	I have a tailored learning plan to increase my data skills, relevant to my role within the organization
45 - Learning and Development	I / my department has the right training opportunities for all staff to improve data literacy skills across data management and analytics
48 - Communities of Practice Coordination	I participate in communities of practice to learn and share data and analytics best practices

The second section of the survey includes multiple questions about five key impact areas and the person's understanding of and any impact from: D8aLinx, Figuring out Federated, Dashboard Catalogue, Healthy Data Healthy Response, and the Digital Academy.

The final section of the survey looks at the overall benefits of data and analytics and how their job is affected (e.g., ease of access to data, time to build an analytics product, etc.)

Service interaction diagrams are the key to a partnered organization?! It sounds like a bunch of system architects got hold of the DnA Master Plan. Partly true, and yes, defining who is accountable and responsible within a service delivery model for data services is key. As important though is the SOCIAL GREASE, interactions, communications, the breaking of trust barriers. If you don't do that, it won't work.

In the next Chapter, we make sure staff have the skills they need. That means knowing what skills, the appropriate skill levels, and having the training available to get them there from where they are.

CHAPTER 4: THE DNA SKILLS REQUIRED TO SUPPORT A SERVICE

In this Chapter, we identify the skill / competency requirements associated with the services. We outline some issues we have by not having staff with DnA-specific job descriptions and titles and how defining and using DnA-related job families would be helpful in identifying learning pathways for those employees and in identifying gaps in our ability to deliver a service for management.

THE PEOPLE DELIVERING THE SERVICES

With the data and analytics services identified and defined, our attention turns to their delivery. That means having the right people with the right skills in the right places. It also means we need to figure out what skills are required for the various services and what skill development programming we'd need for each.

There are a lot of skilled people in the Region. DnA is in our DNA! Training though will always be part of the job as technology changes and as staff seek to advance.

The HR-related component is tricky. One element that adds to the difficulty is that DnA-type jobs don't usually have generic DnA job titles and descriptions. Typically, those positions are defined within the context of the business and the specific work they do (e.g., traffic analyst not data analyst).

Two assumptions going into the planning:

- As much as possible we build talent internally
- Growing DnA capability will grow our data-informed culture

WHAT DOES YOUR ORG CHART SAY?

This Playbook is not prescriptive about what positions an organization needs or how an organization should be organized. But there's no doubt that the Region's re-naming and re-framing "GIS Branch" to "Data, Analytics, and Visualization Services (DAVS) Branch" played an important role in the few years leading up to the DnA Master Plan and that continues, both operationally and optically. It tells the rest of the organization that data is important.

What's the highest-level "data" position in your organization? If your highest data position is an "Analyst", you might have trouble getting data on the corporate agenda; and conversely, if it's a CIO, that person may not have the time and attention for data, since they are often focused with security, networks, mobile, cloud, computing issues. Elevating and focusing the data role at a Director's level or similar corporately such as Chief Data Officer or Chief Analytics Officer has played an important role for us in raising the profile of data and getting the results.

THE DIGITAL ACADEMY

Data literacy is a pillar of the DnA Master Plan. The Digital Academy is York Region's primary initiative supporting the development of data literacy among employees. Data underpins everything we do. For the Region to enhance the data literacy of its employees and become more data-informed in our decision-making, we must ensure data is at the centre of departmental digital strategies and employees can assess and build their data skills.

ABOUT DIGITAL AND DATA LITERACY

Digital is about how we bring people, data, and technology together to create simpler, faster, better experiences for our employees and customers. This means changing the way we work:

- Using an open and agile approach
- Putting people and process before technology
- Designing solutions with users
- Delivering solutions quickly and continuously improving
- Intelligently connecting our data and information assets to drive insight and knowledge

The Canadian federal government created their Digital Academy Canada several years ago as part of their Canada School of Public Service with a curriculum to help their staff "modernize operations to deliver the kind of digital services that people expect."

Digital literacy and data literacy describe someone's comfort level in Digital. Digital literacy describes skills and knowledge to keep up with changing technology and the ability to use technology to communicate effectively. Data literacy refers to the competency in caring for, understanding, analyzing, and using data.

Data and digital literacy concepts are related and can overlap. Being well-versed in technology (digitally literate) is needed to work effectively with data (data literate).

Data literacy requires more than being digitally literate. Being able to work with the latest technology is not enough to be able to read, work with, analyze and champion data effectively.

HOW THE DIGITAL ACADEMY WORKS

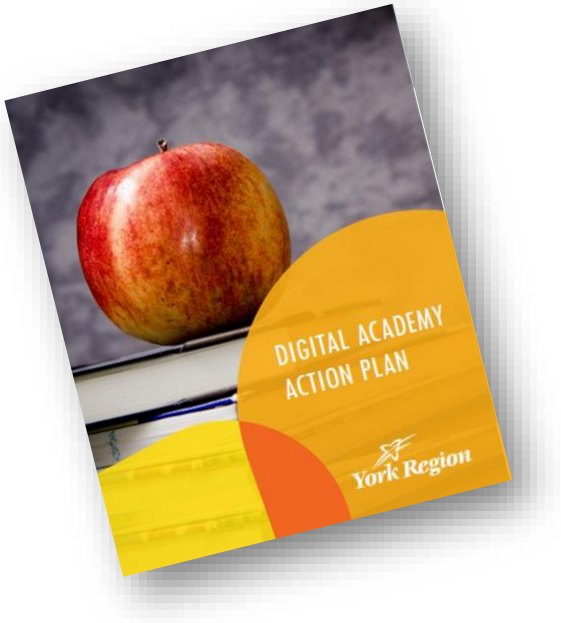
The DnA Master Plan's five pillars show how the Region will build a data-informed culture and work effectively with data. The plan identifies the importance of "enhancing data literacy by providing new training and supports so employees can read, work with, analyze and champion data more effectively."

DAVS along with Information Technology and with Clerks are leading this and are doing so through the "Digital Academy" and an internal online portal (MyPortal) that gives staff access to learning opportunities.

The Digital Academy enhances all three streams of digital literacy (information, technology, data) organization-wide by offering a variety of learning and development tools and opportunities such as in-class training, workshops, webinars, podcasts, and other resources. Through these, staff can gain new competencies and learn new programs, keeping their current skills sharp while picking up new ones. Online training opportunities, webinars, etc. have been offered for years, however, this function has been given new focus because of the DnA Master Plan.

Staff use MyPortal to find, review, and potentially register for the Digital Academy's programs.

Some Digital Academy programs are also available to external public sector staff from local municipalities, school boards, and conservation authorities (principally through the YorkInfo Partnership) and even to external stakeholders. These opportunities are posted online, since they do not have access to MyPortal.



The Digital Academy is working towards being able to do provide other enhanced capabilities that include:

- a **skills matrix** which staff can use to evaluate their data readiness

- personas that identify "typical" roles (within three types of positions program staff, specialists, management) and what their skill sets should be

- learning pathways that show how to go from one skill level to another

As well, learning opportunities will be expanded and rationalized within this context, so that taking a course, like *Introduction to GIS*, "checks a box" on one or more learning pathways and delivers specific skills associated with one or more services.

MYPORTAL

Staff typically interact with the Digital Academy through the Region's Intranet called "MyPortal."

MyPortal is being enhanced to include tips, toolkits and support contacts associated with over 50 of the DnA services, so staff can get the support they need, when they need it. This new, streamlined way for staff to get support will help staff complete tasks more quickly and easily, and further the self-serve capabilities toward increasing their data literacy. My Portal's self-serve approach will increasingly enhance an employee's ability to care for, understand, analyze, and use data.

We now will look for digital literacy in new hires. Questions like "What are the qualities of good data?" can be part of the interview process.

JOB CLASSIFICATIONS

During the DnA Master Plan process, 400 or so "data" staff were identified throughout the Region. We found that although many employees have similar roles from one department to another, their job titles and classifications varied. There was no easy way to see that someone working in one department or branch has essentially the same roles and skill sets as someone working elsewhere – despite the fact they use different data and do different analysis to solve different business problems.

As a "digital organization," we hope to ultimately modernize job descriptions to incorporate the new skills and understandings associated with digital.

Re-defining and modernizing the job titles and descriptions for these "data" positions would help staff in those positions to assess and upskill their capabilities, find others with similar jobs and make it easier to exchange ideas and support each other and grow their careers. Those staff will have a clearer idea of possible opportunities within the Region for advancement along with a better idea of the type of training and skill development they might need.

The Region is corporately looking at a Job Architecture project to consider how best to create and enhance positions to reflect "Digital".

Current job descriptions do not necessarily have data management roles defined or give them the weight they now deserve.

There are, of course, sensitivities associated with any kind of job re-classification, and it may be several years before the "data" positions are modernized. One approach is to focus on new positions and positions that have been vacated.

There are several advantages to having a harmonized job classification system. For instance, an employee who is a Data Analyst 2 would easily know what training they'd need to be at the level of a "Data Analyst 3". This makes it easier for staff to create and follow learning pathways to advance in their jobs more easily and clearly.

The Digital Academy would also benefit, by knowing what training to offer and instead of offering training for employees in roles "similar to" or with "these characteristics", the Digital Academy will be able to use consistent and meaningful skill level descriptions in defining programs.

THE DNA COMPETENCY FRAMEWORK

Ensuring that either we have staff who are competent to deliver the 58 DnA services, or we can build their competency so the services can be effectively delivered means first understanding what DnA knowledge, skills, and abilities each service needs.

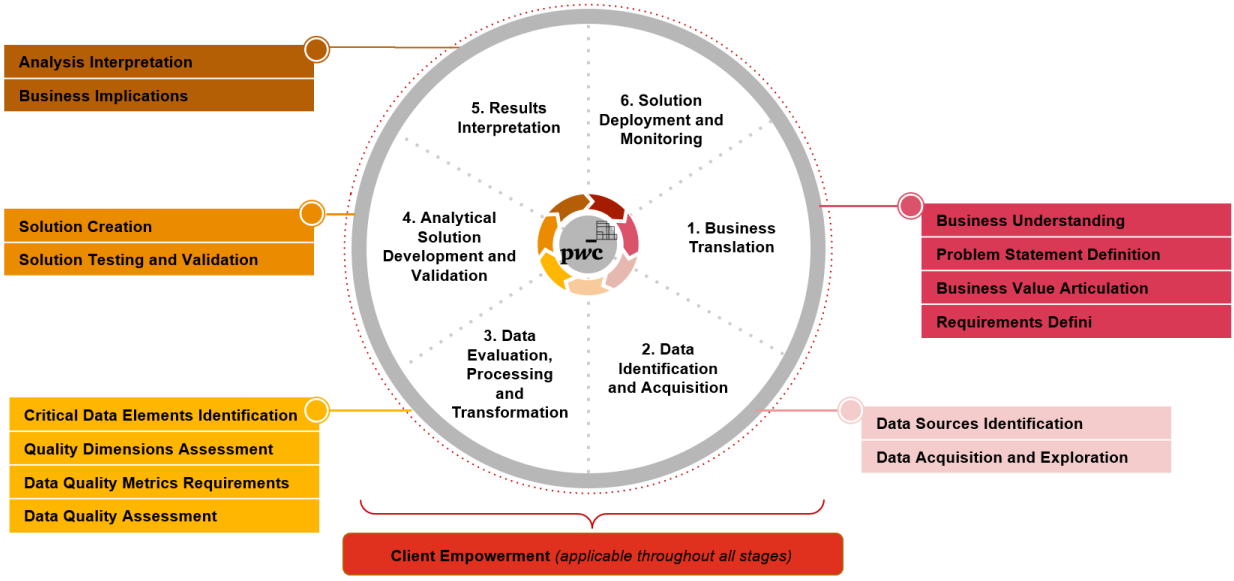
That's what the DnA Competency Framework does. It systematically looks at each service and establishes the levels of understanding and ability needed for each in six common stages.

The framework could also be used to support workforce planning, recruitment, developing individuals and teams, recognizing individual competency levels, and highlighting career pathways and training.

Competencies are categorized by the various stages of the DnA lifecycle which has six stages:

1. Business Translation
2. Data Identification and Acquisition
3. Data Evaluation, Processing and Transformation
4. Analytical Solution Development and Validation
5. Results Interpretation
6. Solution Deployment and Monitoring

Services can also be categorized this way. The structure provides a straightforward way to identify the competency needed in the delivery of a service based on its mapping to the same DnA lifecycle stage(s).



COMPETENCY TYPE

Competencies are either:

- **Technical**: the skills and abilities needed to perform and execute data analytics activities such as undertaking data exploration, doing qualitative and quantitative analysis, and applying technologies and tools

- **Business**: the skills and abilities needed to analyze and create business value, such as setting request priorities, articulating business need, identifying document requirements, and assessing the potential solutions using data and analytics

COMPETENCY SKILL LEVELS

The skill levels are:

- **Basic**: Has some understanding of the competency in routine situations requiring some supervision or support, and can refer to the appropriate service areas or individuals when required

- **Intermediate**: Moderately understands the competency including its best practices, process and techniques required to deliver the competency. Applies the competency in routine situations with limited supervision or support

- **Advanced**: Has a strong understanding of the competency and its best practices, and consistently applies them. Applies / executes the competency in moderate to complex situations and needs no supervision. Serves as support to peers in routine situations

- **Expert**: Possesses extensive experience in applying the competency in complex and abstract situations. Demonstrates a thorough understanding of best practices and can tailor those best practices to the Region. Demonstrates extensive expertise in the design, development and application of concepts, principles, methods, and tools related to the competency. Can be an advisor to enhancing a competency. Serves as a mentor to peers in a competency

STAGE 1. BUSINESS TRANSLATION

Definition: Identify the business objectives and problem to be solved through the requested service, determine potential analytical uses and the necessary requirements.

Competency Outline	Skill Level
Competency: **Business Understanding** **Type**: Business **Description**: The ability to establish and/or understand the business objectives through either effective collaboration and communications with clients or independent business opportunity exploration, and determine whether data analytics can provide business value	**Basic** • Demonstrates a general awareness of the department or business area • Determines if data analytics can be used to provide business value if given a clear statement outlining the business objectives and potential analysis required **Intermediate** • Demonstrates some understanding of the vision, strategies, and services of a department or business area • Understands facilitation techniques (e.g., direct questions, brainstorming, subgroups) and can use them to engage clients to identify their business objectives and then determine if data analytics can provide business value **Advanced** • Demonstrates a strong understanding of most departments or business areas in the Region, including their processes and people • Brings stakeholders together including from various business areas to articulate common needs and prioritize those needs as they relate to data and analytics to determine business value **Expert** • Demonstrates a strong understanding of all department or business areas in the Region, including their processes, people, and interdependencies across various business areas • Brings stakeholders together including from various business areas to articulate common needs and prioritize those needs as they relate to data and analytics to determine business value

Competency Outline	Skill Level
Competency: **Problem Statement Definition** **Type**: Business **Description**: The ability to translate business purpose, objectives, and requirements into a data-driven problem statement (decision-centric thinking) or exploratory data hypothesis to drive business insight (data-centric)	**Basic** • Demonstrates an appreciation for the importance of having a well-articulated, defined problem statement to guide data and analytics initiatives and communicates this importance to stakeholders • Needs help to effectively translate business needs and understanding into a problem statement to guide data analytics **Intermediate** • Defines data-driven problem statement using decision centric thinking yet may require additional support when creating a clear statement from ambiguous business needs or exploratory hypothesis **Advanced** • Demonstrates a strong understanding of service offerings and data available to translate business needs into an actionable problem statement • Takes ownership of problem statement definition and is comfortable creating a clear purpose statement from ambiguous needs to guide data and analytics **Expert** • Brings together stakeholders through a structured process to co-define a problem statement and effectively aligns business objectives between groups and individual stakeholders • Leverages extensive understanding of various analytical techniques and their requirements to support and/or advise others to articulate a problem statement, determine key variables, and define key metrics

Competency Outline	Skill Level
Competency: **Business Value Articulation** **Type**: Business **Description**: The ability to clearly articulate the "end product" or outcome of the service in a way that resonates with the client (e.g., agile prototype development). This may require an understanding of how the outcome will affect business processes as well as the key stakeholders involved.	**Basic** • Understands the importance of articulating business value and embedding business needs and objectives **Intermediate** • Articulates the high-level business value of the data or analytics at the onset of a project using plain language • Proactively identifies affected areas (e.g., business processes) **Advanced** • Customizes the business value based on specific business needs and the processes that may be affected when several stakeholders are involved • Provides visual summaries, case study examples, or other methods to convey business value to stakeholders • Proactively identifies key areas of change and identifies methods to mitigate change-related resistance **Expert** • Demonstrates an extensive understanding of people, processes and technology affected by the data and/or analytics initiative and can identify the business value for each affected area • Uses agile methodology to develop prototypes with desired data to provide customized proof-of-concepts or mock-ups to stakeholders • Communicates the rationale for change with a compelling reason(s) for change generating excitement and buy-in

Competency Outline	Skill Level
Competency: **Requirements Definition** **Type**: Business **Description**: The ability to translate business requirements to technical or data specifications, architecture, solution design and/or internal service offering(s) and to guide analytic process and determine feasibility. Requirements will vary based on the defined strategic, analytical, or operational business purpose.	**Basic** • Works with stakeholders to set business requirements priorities based on overall objectives. Documents the business requirements as directed ensuring they can be traced to their source • Demonstrates a general awareness of the requirements' implications regarding their necessary technology, tools, service offerings and data and in so doing can challenge them. **Intermediate** • Works with stakeholders to set business requirements priorities and translates these requirements into technical requirements • Demonstrates a moderate understanding of organizational capabilities and technical specifications and can challenge the technical feasibility of business requirements **Advanced** • Able to get consensus from a large and diverse range of stakeholders on the scope and priorities of the most stringent of business requirements and their translation into technical specifications • Identifies and articulates any specific limitations that may inhibit the achievement of business requirements (e.g., required applications, technologies, data practices) **Expert** • Manages complex negotiations with multiple stakeholders building consensus with key stakeholders • Proactively identifies existing limitations that affect the initiative's feasibility and develops the business case for procurement of any required services, applications, tools, etc. based on business value associated with the specific use case as well as its future benefit

STAGE 2. DATA IDENTIFICATION AND ACQUISITION

Definition: Determine potential data sources, understand the availability and accessibility of the data, and acquire necessary data.

Competency Outline	Skill Level
Competency: **Data Source Identification** **Type**: Technical **Description**: The ability to identify the required data source (internal or external) to achieve desired business outcomes.	**Basic** • Demonstrates basic awareness of the data sources / data sets available across the Region and requires support **Intermediate** • Demonstrates a moderate understanding of organizational data sources, and can leverage assets (e.g., data catalog where available) in compliance with data governance processes to locate necessary data and authoritative data sources with some support • Leverage's metadata to verify the relevance of potential data sources and data sets to the business need (e.g., how they are collected, stored) **Advanced** • Demonstrates a strong working knowledge of the organization's data sources as well as their key attributes to determine whether they are fit for the business need, and can support others in identifying data sources • Leverage's assets such as data catalog, metadata, and data classifications (where available) to identify the relevant data source(s) in a timely manner • Possesses knowledge of third party or external data sources currently in use by the organization **Expert** • Demonstrates an extensive understanding of organizational data available (documented and undocumented) and mentors others to address gaps and improve their ability to quickly identify relevant data sources • Acts as an advisor to instill behaviors and change to drive proper documentation of data sources in compliance with governance processes • Identifies additional third-party data sources or alternative proxy data in a proactive manner, recommends innovative partnerships, and/or suggests changes to data sourcing (e.g., collection, practices) to drive value and efficiency based on leading practices

Competency Outline	Skill Level
Competency: **Data Source System Understanding** **Type**: Technical **Description**: The ability to understand data source systems, which may include but is not limited to an understanding of the system's data model, security standards, integrations, and general system usage / functionality.	**Basic** • Demonstrates a basic awareness of data source system(s) and the respective policies and procedures governing access and use **Intermediate** • Demonstrates a moderate understanding of data source system(s) including fundamental characteristics (e.g., refresh schedules, conceptual data model and schema) and the respective policies and procedures governing their use **Advanced** • Demonstrates a strong understanding of the data within a data source system and how it is stored, accessed, and processed including an understanding of the data model (e.g., logical model), table inter-relationships and how the system integrates with other systems (i.e., data interfaces) • Demonstrates an understanding of how to extract data from such systems using the most appropriate and compatible method (e.g., through APIs, batch files etc.) • Demonstrates a moderate degree of knowledge of how data is used from a business context as part of business operations that serve as further input to ETL, data quality and / or solution creation **Expert** • Demonstrates an extensive knowledge of the data source system including the data model (conceptual, logical, physical), attribute level characteristics of the model schema, and upstream and downstream integrations the data source system is connected to • Demonstrates a strong degree of understanding of how data within the data source system is used from a business context including business to technical term translations and vice versa and knowledge of appropriate calculation of derived fields etc. that serve as important KPIs and metrics measured by the business • Possesses sufficient knowledge of the overall data source system to be able to provide input to technical system design changes and data management related policies, processes and procedures that govern the system including maintenance of data assets such as metadata, data glossary and lineage related documentation

Competency Outline	Skill Level
Competency: **Data Exploration and Acquisition** **Type**: Technical **Description**: The ability to acquire and explore (e.g., through data mining) required data, through means such as collecting, exchanging, transforming, hunting etc. while in accordance with data, security and privacy standards and processes.	**Basic** • Possesses an awareness of processes to source internal and external data, as well as general security and privacy standards • Demonstrates the ability to self-serve and collect data from the data sources, where data already exist in an easily consumable format and extraction is possible via a friendly end user UI • Possesses limited abilities in exploring data (e.g., looking through raw data and applying basic filters, pivot tables etc.) **Intermediate** • Demonstrates the ability to conduct data acquisition using simple data collection tools (e.g., UI, Microsoft SSMS, basic queries etc.) • Demonstrates the ability to conduct fundamental data exploration and wrangling by selecting appropriate techniques to transform the data into appropriate structures / formats suitable for further profiling and analysis **Advanced** • Demonstrates an understanding of various techniques / tools that can be used to extract data from existing systems (i.e., legacy) but also possesses experience and knowledge of more modern techniques/tools such as various data connectors, REST APIs etc. to acquire internal, external, and open-source data • Demonstrates the ability to explore relationships between distinct or divergent data and can aggregate or consolidate data sets to form complete data structures through data transformation techniques (e.g., joins, cross table etc.) **Expert** • Contributes to the design and documentation of data acquisition, transformation, creation, and maintenance processes as part of organizational standards • Possesses the ability to utilize leading edge sophisticated techniques to acquire data (e.g., web scraping, ingesting streaming data, OCR etc.) for both structured and unstructured data • Develops complex data queries to integrate and reconcile vast arrays of internal data (in line with system capabilities) across the Region overlayed with external data and feature engineering to produce data structures capable of uncovering previously unknown insights and relationships

STAGE 3. DATA EVALUATION, PROCESSING AND TRANSFORMATION

Definition: Determine data's fit for purpose through quality assessment, identify and resolve data issues to ensure it is fit-for-purpose.

Competency Outline	Skill Level
Competency: **Critical Data Elements Identification** **Type**: Technical **Description**: The ability to determine data that is critical to success for a given business line or operational purpose.	**Basic** • Demonstrates a basic understanding of what a critical data element is and demonstrates an appreciation for the role of critical data elements identification in the data valuation process and the significance of critical data elements to business operations **Intermediate** • Demonstrates an understanding of what a critical data element is and can identify such elements through a structured process and if available, reference an organization's critical data element inventory (as applicable) • Applies their understanding to give reasons for a data element's criticality with a given stakeholder and its impact on business operations **Advanced** • Works with various stakeholders in a collaborative effort to identify not only existing but also new critical data elements using a structured process, determine their authoritative sources, and agree on their definitions • Articulates reasons why a data element is critical including its impact to specific business processes and external factors such as legislative or regulatory requirements **Expert** • Establishes and communicates organizational processes for identifying critical data elements and serves as an advisor to changes or enhancements to such processes • Defines the governance of critical data elements and processes • Has significant knowledge and awareness of changing business operations and external conditions that can result in identification of new critical data elements for the organization including additional factors / drivers that influence why a data element is critical

Competency Outline	Skill Level
Competency: **Quality Dimensions Assessment** **Type**: Technical **Description**: The ability to assess which quality dimensions (e.g., completeness, consistency, timeliness uniqueness, validity, accuracy) are required for data to successfully support and fulfill a given business purpose.	**Basic** • Demonstrates an understanding that the quality of data must be understood within the importance of being “fit-for-use” and demonstrates an awareness of the various business drivers of quality assessment (e.g., regulatory compliance, industry standards, analytics project, data exchange formats, etc.) **Intermediate** • Demonstrates an understanding of data quality dimensions and their key characteristics (e.g., completeness, cardinality, accuracy, etc.) and can work with stakeholders to prioritize dimensions for specific data sets and elements according to specific business and analytical needs **Advanced** • Demonstrates a strong understanding of various data quality dimensions, and can assess which quality dimensions are required to support analytical, regulatory and / or operational purposes • Serves a supporting role for others assessing and prioritizing data quality dimensions **Expert** • Demonstrates extensive knowledge of data quality dimensions and possesses sufficient business know-how in understanding detailed regulatory, analytical, and operational implications of various dimensions • Serves as an advisor and mentor, and contributes to the definition and development of processes, guiding principles and rules that inform proper consideration and prioritization of dimensions and their respective implications for various purposes and business processes

Competency Outline	Skill Level
Competency: **Data Quality Metrics Requirements** **Type**: Technical **Description**: The ability to define values or ranges representing required data quality metrics to be fit-for-purpose for each data quality dimension.	**Basic** • Demonstrates a basic understanding that poor data quality affects the achievement of business objectives, and that measurements / indicators of data quality performance help to report whether data quality is sufficient or below acceptable business thresholds and poses risks to business operations **Intermediate** • Defines fundamental data quality metrics (e.g., blank, or not blank) for data attributes / elements across various data quality dimensions (e.g., completeness) and understands that data quality metrics and dimensions should be defined for each critical data element **Advanced** • Determines data quality metrics across various dimensions for critical data elements and possesses the necessary business understanding of implications of data quality metrics and how they may affect analytical and operational needs (e.g., correctness of postal code format for accurate geospatial analysis within York Region) • Serves a supporting role in helping others define data quality metrics **Expert** • Serves as an advisor in the development of guidelines and frameworks to define fit-for-purpose data quality metrics for both specific analytical needs and operational needs • Has extensive technical knowledge including emerging trends and business subject matter knowledge that help inform the appropriate metric guidelines (e.g., 80% completeness in a column is required to enable statistical imputation of missing values) or the evolution of metrics (e.g., introduction of new allowable postal code values in York Region)

Competency Outline	Skill Level
Competency: **Data Quality Assessment** **Type**: Technical **Description**: The ability to apply the assessment criteria to the critical data elements and review the results to determine if data quality is sufficient.	**Basic** • Demonstrates awareness of the data quality assessment process, from critical data elements identification to data profiling but requires support in applying techniques to be able to evaluate dimensions and associated metrics criteria **Intermediate** • Has knowledge of fundamental data assessment techniques and tools (e.g., MS Excel) in applying rudimentary dimensions (e.g., completeness or uniqueness dimensions) to evaluate sufficiency of data quality against metrics **Advanced** • Has experience with a range of data assessment techniques and approaches and can apply them in complex settings (e.g., assessing correctness of postal codes and identifying postal codes outside the geographic boundaries of York Region) • Demonstrates a strong understanding of the various tools, templates, and methods possible to take corrective action to improve data quality on the spot **Expert** • Has extensive knowledge of tools and techniques that help automate data quality assessments for dimensions and metrics that can be adopted as organization wide standards • Serves an advisory role in the establishment and maturation of data quality assessment processes and standards • Demonstrates balanced business and technical expertise in being able to conduct root cause analysis and can propose solutions to eliminate problems at the source

STAGE 4. ANALYTICAL SOLUTION DEVELOPMENT AND VALIDATION

Definition: Prepare data in presentable format for decision making, design data science/analytics solutions based on the business and data understanding.

Competency Outline	Skill Level
Competency: **Solution Creation** **Type**: Technical **Description**: The ability to understand different modeling, reporting, and visualization techniques, and develop a solution whether it be descriptive analytics, predictive analytics, prescriptive analytics, or other techniques in addressing a given business need.	**Basic** • Has a high-level awareness of a wide range of core data analytics techniques, their advantages, disadvantages, and areas of application • Demonstrates an ability to prescribe viable techniques to use in creating a solution, but requires supervision for execution **Intermediate** • Demonstrates an understanding of common data analytics techniques and can narrow down, identify, and apply the appropriate solution type to address a given business need with some assistance depending on complexity of the technique (e.g., regression vs. machine learning) • Capable of applying traditional statistical techniques (e.g., regression analysis, cluster analysis etc.), leveraging statistical tools (e.g., R or Python), database querying languages (e.g., SQL) and basic visualization techniques (e.g., common charts and drill downs) for solution development **Advanced** • Has a strong understanding of, and execution experience in using advanced data modeling and visualization tools and techniques? • Demonstrates proficiency in various technical skills beyond traditional statistical techniques (e.g., Machine Learning algorithms such as Random Forest etc.) and advanced visualization techniques (e.g., sunburst, Sankey etc.) Serves a supporting role for others requiring guidance on solution design and development **Expert** • Provides guidance to others on technical skills and serves as an advisor in researching, evaluating, and implementing new analytics techniques and technologies that would drive value (e.g., use of new machine learning techniques or 3rd party marketplace custom visualizations etc.) • Capable of serving as an advisor and providing input into solution creation processes and standards. • Has leading edge skills in emerging analytics areas (e.g., AI, Automation etc.)

Competency Outline	Skill Level
Competency: **Solution Testing and Validation** **Type**: Technical **Description**: The ability to apply relevant testing and model validation techniques for a created solution and associated data set(s).	**Basic** • Demonstrates an awareness of the need for solution testing and validation within the data and analytics life cycle • Has the ability to perform basic testing and validation but more so from a business end user standpoint **Intermediate** • Demonstrates moderate understanding of the process for testing of different models and general analytics solutions on a dataset • Executes business and technical test cases to validate the robustness of solutions • Capable of applying basic model fit testing (e.g., overfitting checks), tuning and validation techniques to assess overall solution performance for analytical models and has a general understanding of data attributes that affect testing process, such as size of data set and how it is partitioned • Documents and reports on testing results **Advanced** • Demonstrates a strong understanding of various testing approaches and methodologies (e.g., agile testing, unit, SIT, UAT etc.) and can apply the required level of testing rigour depending on the nature of and complexity of a developed solution • Capable of applying advanced testing and validation techniques (e.g., confusion matrices, lift charts, ROC curves etc.) and assessing solution model accuracy and performance • Supports others in solution testing and validation **Expert** • Has extensive experience in testing and can design test strategies, test plans and test cases for large projects • Has extensive understanding of testing tools and can implement and deploy automated test scripts • Identifies model evaluation metrics and has sufficient knowledge in understanding implications of such metrics in achieving business and analytical requirements • Provides mentorship and support in applying suitable best-practice techniques for solution model testing

STAGE 5. RESULTS INTERPRETATION

Definition: Compare completed analysis / work with the original objective and drive data informed decision-making. Communicate insights, results, and business value.

Competency Outline	Skill Level
Competency: **Analysis Interpretation** **Type**: Business **Description**: The ability to make meaning of and gather insight from the results of a data report, dashboard, or other analytical solution.	**Basic** • Can interpret rudimentary insights (e.g., direction of trends) supported by a basic ability in using tools that support conveying of insights (e.g., usage of supplemental charts etc.) **Intermediate** • Understands various tools to convey insights from varying perspectives / lenses (e.g., use of supplemental charts and graphs to zoom in on areas of importance etc.) and an ability to provide insights via a basic story in the form of a report or presentation **Advanced** • Has a strong ability in using tools and information design practices to augment insights (e.g., visualizing using a suitable infographic) in producing compelling stories and focusing an audience's attention on key messages • Has sufficient business knowledge to convey 'so what' messages to business audiences and has sufficient technical experience to describe the implications of the solution's outputs and performance (e.g., model accuracy and model variables deemed most influential etc.) on business decisions **Expert** • Acts as advisor and mentor to others in developing the craft of storytelling and provides input into storytelling and information design leading practices and standards to be used throughout the organization • Can develop powerful, convincing messages and convey the 'so what', has enough business expertise to provide positive business courses of action by presenting options with pros and cons to decision-makers

Competency Outline	Skill Level
Competency: **Business Implications** **Type**: Business **Description**: The ability to translate insight gathered into clear and actionable business value, and communicate these insights and their implications (e.g., process or other changes) effectively	**Basic** • Expresses ideas in a clear, concise, and organized manner in written and oral communications • Responds to stakeholders on an ad hoc basis and initiates communication only when required • Produces reports, graphs, summaries, and presentations that clearly convey analytics results **Intermediate** • Strives to make written and oral communications compelling and uses analogies, visuals etc. to enhance presentation and to makes complex and technical information and language simple and accessible for non-technical audiences • Proactively communicates with stakeholders when business insight is generated • Communicates a compelling story on the analytics results and insights that link back to the overall business question, and clearly articulates the answers to the business question(s) **Advanced** • Uses content, style, tone, and method of communication to adapt the presentation to the target audience • Actively ensures full understanding of key messages and solicits input and feedback to drive stakeholder alignment • Communicates not only business answers but proposes implications in relation to business strategies, processes, etc. to address existing and future business issues or objectives **Expert** • Presents very complex, sensitive, or strategic information effectively, adjusting style and approach to the audience • Coaches others on effective communication skills and securing stakeholder buy-in • Develops powerful, convincing messages that consistently influences a positive course of action in relation to business strategies, processes, etc. • Identifies opportunities to use data to monitor and evaluate the effectiveness of business process or other changes

Competency Outline	Skill Level
Competency: **Client Empowerment** **Type**: Business **Description**: The ability to drive data informed decision making on the part of the client by increasing their data literacy and, when applicable, helping clients maintain and/or operationalize their own D&A environment or solution.	**Basic** • Demonstrates an understanding of the importance of driving data literacy in stakeholders and facilitates a basic conceptual understanding of the service delivered • Engages the stakeholder once or twice **Intermediate** • Articulates the importance of the service delivered, its role in the overall data analytics lifecycle, as well as the processes and best practices involved to drive data literacy • Engages stakeholders only at key milestones **Advanced** • Equips stakeholder(s) with the necessary subject matter knowledge required to make key data-driven decisions • Engages the stakeholder throughout the processes, facilitating an in-depth understanding of the service and the intricacies involved, and helps the client/business to understand, own and resource appropriately to operate and maintain their own D&A environment/solutions (when applicable) • Drives data literacy not only through direct stakeholder engagement as required for a service, but may also host organizational workshops or otherwise to build literacy **Expert** • Facilitates knowledge transfer and builds stakeholder technical skills in relation to the service delivered to the extent that the client reaches a basic or intermediate level of proficiency of required competencies • Engages stakeholders throughout the service delivery and actively involves them in the process and supports change management to effectively operationalize a D&A environment and/or solution (when applicable) • Collaborates with internal and external partners (e.g., community researchers, academic partners, and other appropriate organizations to facilitate data literacy and knowledge exchange)

STAGE 6. SOLUTION DEPLOYMENT AND MONITORING

Definition: Deploy the model/solution to a production or production-like environment for application consumption and integration.

Note: the outline has not yet been fully completed as of time of publication.

Competency Outline	Skill Level
Competency: **Type**: **Description**: CONTENT NOT AVAILABLE	**Basic** **Intermediate** **Advanced** **Expert**

HOW WE DEFINE SKILL LEVELS

We used expert external perspectives and industry frameworks to define skill (proficiency) levels appropriate to the Region. Proficiency level targets were defined and validated for each prioritized service area. Inputs to Defining Skill Levels

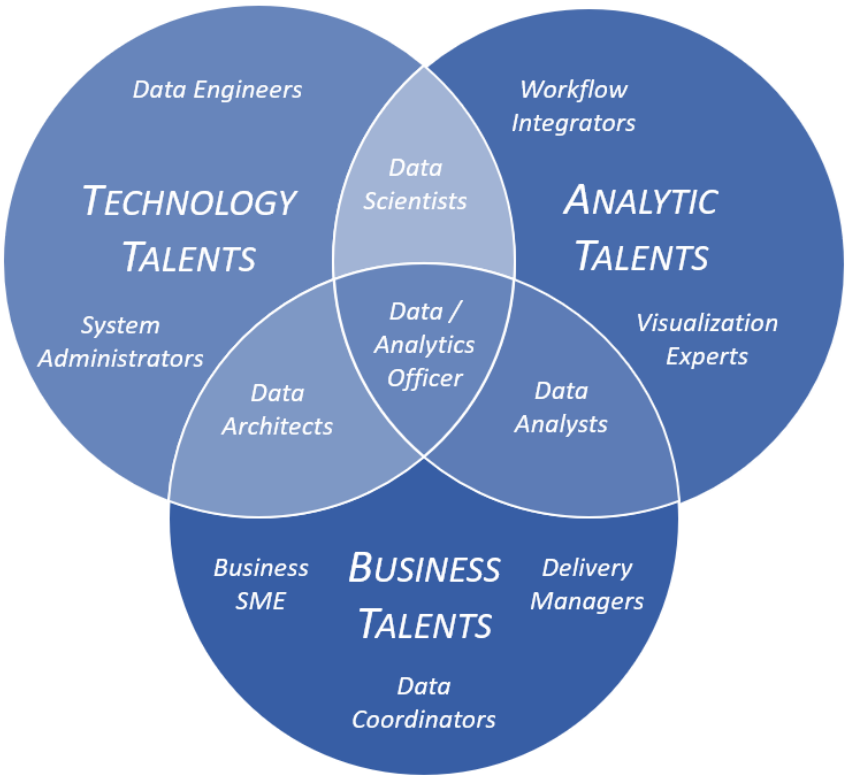
- PwC's competency frameworks and experience that focus on data analytics and business competencies (e.g., Analytics Talent Competency Model, Digital Fitness Framework and Assessment Criteria) and their know-how in the processes, technology, people, and capabilities associated with developing data and analytics organizations in the public sector and other sectors
- York Region's data and analytics stakeholders and specialists met to review, refine, and validate proficiency level definitions and define target proficiency level for service delivery
- We matched proficiency levels to organizational context and objectives by exploring service definitions and relevant DnA job descriptions
- Other public sector competency frameworks focused on data science skills and characteristics (e.g., UK Digital, Data and Technology Profession Capability Framework (https://www.gov.uk/government/collections/digital-data-and-technology-profession-capability-framework) and the Australian Government Data Science Competency Framework (https://research.csiro.au/distributed-systems-security/data-science-competency-framework-and-its-development-planning-tool/))

EXAMPLE OF COMPETENCY / SERVICE LINKING

Each of the services have been linked to their competency requirements based on the competency framework. These are shown below for each of the services. They show which competencies are applicable for that service, and then which minimum skill level for each would be suitable along with the highest skill level among all competencies. For example, for the service #09-51:

09-51 Open Data Publishing

Proficiencies	Competencies	Skill Level
Business Translation	**Business Understanding**	Basic
	Problem Statement Definition	
	Business Value Articulation	Intermediate
	Requirements Definition	
Data Identification and Acquisition	Data Source Identification	
	Data Source System(s) Understanding	Intermediate
	Data Acquisition and Exploration	
Data Evaluation, Processing and Transformation	Critical Data Elements Identification	
	Quality Dimensions Assessment	
	Data Quality Metrics Requirements	
	Data Quality Assessment	
Analytical Solution Deployment and Validation	**Solution Creation**	Basic
	Solution Testing and Validation	Basic
Results Interpretation	Analysis Interpretation	
	Business Implications	
	Client Empowerment	
	Total # of Competencies	**5**
	Highest level	**Intermediate**



There is a lot more that needs to go into creating and putting in place the competency level assessments and the creation of learning paths for staff, as well as the broad definition of position requirements. If your organization has a Learning Management System, it should be helpful in moving forward.

DnA positions, requirements and the technology skills are always going to change. The key is to have the framework.

CHAPTER 5 - SO, WHAT'S NEXT?

Publishing a "Playbook" does not mean we've completed everything we set out to or need to do. While many things have been done, the Playbook also describes some things we figured out but haven't been done yet. And many of those activities are well underway.

The Region is beginning to put an increased emphasis on the "A" (analytics) side of "DnA" by defining and implementing new solutions that incorporate advanced analytics, AI, and intelligent automation opportunities.

That work is briefly outlined below along with some concluding thoughts and insights on what the introduction of the DnA Master Plan has meant within York Region.

Governments face significant challenges like climate change, the COVID-19 recovery, an increasingly diverse demographic, an aging population, changes to the job market from automation, and more. Our policy and program responses to these must be informed by analytics to ensure we know what's knowable about these challenges and can communicate it. With analytics, we can be smarter.

REVIEWING OUR PROGRESS

In the Fall of 2021, PwC returned to re-assess our maturity levels and identify the progress made since their original assessment in 2019.

Over 40 people across the organization completed a detailed 100+ questions survey about changes in each of the 11 knowledge areas, the impact of five strategic DnA projects, and the overall quantitative and qualitative benefits of the work at York Region.

The survey was designed to be repeated annually.

The review's objectives were to:

- assess maturity levels for each of the 11 knowledge areas
- analyze the benefits of the DnA Master Plan to date
- review opportunities for continued improvement in the major projects
- identify what corporately delivered services are ready to be reviewed and moved to departmental delivery
- identify potential projects to build up capacity of the services
- define areas for continued advancement in York Region's DnA journey

KEY FINDINGS FROM THE REVIEW

INCREASE IN MATURITY LEVEL

In the four-year DnA Master Plan, the first three years' focus has been on building a data-driven culture and on establishing the data foundation. The survey results reflected this focus as the maturity levels rose substantially (over 30%) in the knowledge areas of Data Governance, Data Quality, Data Insights, Data Literacy, and Data Partnerships.

Taking the average of all 11 knowledge areas, York Region's DnA maturity level has grown from having a somewhat "reactive" score in 2019 to now having a "proactive" score.

The strongest drivers of change in maturity have been:

Data Insights and Reporting (22% increase): The Region worked hard to increase the use of data to drive data-informed decisions by making dashboards and reports more readily accessible and consumable, such as through the Dashboard Catalogue initiative.

Data Partnerships (22% increase): The Region continued to expand current data partnerships and create new ones with external stakeholders, such as through the Data Co-op project.

Data Literacy (16% increase): Both the expansion of the Digital Academy and the implementation of the Healthy Data Healthy Response initiative increased the organization's data literacy and enabled more data-informed decision-making.

SERVICE DEFINITIONS AND DELIVERY

A primary achievement of the DnA Master Plan was the identification of the 58 services and their associated delivery processes and responsibilities (see Chapter 3). In the review, staff indicated the services are being very well used, acknowledged their importance, but (not unexpectedly) indicated that their delivery could be better coordinated and standardized.

Specifically,

- The services associated with all 11 knowledge areas were reported as being "important for regular consumption" or "helpful for regular consumption" with the highest scores associated with services in Technology (95%); Data Integration and Preparation (93%) and Data Quality (83%)
- The services associated with six of the 11 knowledge areas were already meeting or exceeding expectations for most respondents, particularly those associated with Data Insights and Reporting (78%); Technology (78%) and Data Integration and Preparation (73%). The weakest knowledge area was the Data Catalogue (Master and Metadata Management) which scored 41%
- Only three of 11 knowledge areas scored reasonably well with respect to the standardization of processes in getting services. Those three were Technology (61%), Data Literacy (61%), and Data Insights and Reporting (51%). This finding highlights the importance of the work outlined in Chapter 3

CONTINUE TO ENHANCE THE FOUNDATION

Although work in all knowledge areas will continue, the next couple of years will incorporate a greater focus on those knowledge areas that haven't matured quite as well yet. These include:

- Data Architecture
- Data Catalogue and Master Data Management
- Data Preparation and Integration
- Data Security, Access, and Privacy

STRATEGIC INITIATIVES REVIEW

The review also reviewed the impact of five strategic initiatives currently underway. Each has been fundamental to enhancing the foundation for data and analytics within the Region since they all contribute to at least one of the five “Pillars” of the DnA Master Plan.

1. D8aLinx
2. Dashboard Catalogue
3. Healthy Data, Healthy Response
4. Digital Academy (Data Stream)
5. Figuring Out Federated

In the review, all five initiatives ranked between 3.2 and 3.9 out of 4 (where 0 is “strongly disagree” and 4 is “strongly agree”) on **Resource Allocation and Scalability**, which shows that staff across the organization believe in the long-term potential of these initiatives and see their costs as justified by their benefits.

The review identified recommendations for each in terms of improving their effectiveness. These are outlined below:

1. D8ALINX

The Region's departments still store much of their data in a variety of systems. D8aLinx brings all data together in one place where it can be shareable and searchable across all departments, and, in some cases, with the public through the Region’s Open Data initiative. D8aLinx provides decision-makers a “single source of truth” of high-quality data and increases the value of data-driven decision making at York Region.

Recommended Future Focus:

a) Work with DnA champions from the various departments and branches to share the art of the possible with D8ALinx.
b) Identify mechanisms that can improve user experience. Identify the services that will depend on D8ALinx and design processes to enable service delivery. Allow both technical and non-technical users to drive design decisions. Aim to increase use of the platform, while reducing administrative burden for activities associated to management of data.
c) Build on Open by Default based on the security classification scheme and showcasing the mechanisms that enable security controls for sensitive data. Consider strategies such as column removal, anonymizing data, grouping sensitive data values to remove specificity (like an age range rather than exact age), and aggregation.

2. DASHBOARD CATALOGUE

The Dashboard Catalogue is a one-stop-shop for quick and easy access to many of the Region's dashboards. It was developed in partnership with employees across the organization. Whether a manager is looking to understand the team's vacation status, or a data analyst needs inspiration from other published dashboards, the Dashboard Catalogue supports this. Its main objective is to reduce time and effort in creating / using dashboards across departments and simplify access to the dashboards staff need.

Recommended Future Focus:

a) Simplify and enhance the user experience by creating a wizard-like experience to submit dashboards and gather the associated metadata to enable enhanced consumption. This can be used for data and dashboards, enhancing how content gets consumed for end users. Add other functionality like "favourites" and sorting by department.
b) Communicate and link dashboards to their data's classification (shown below).

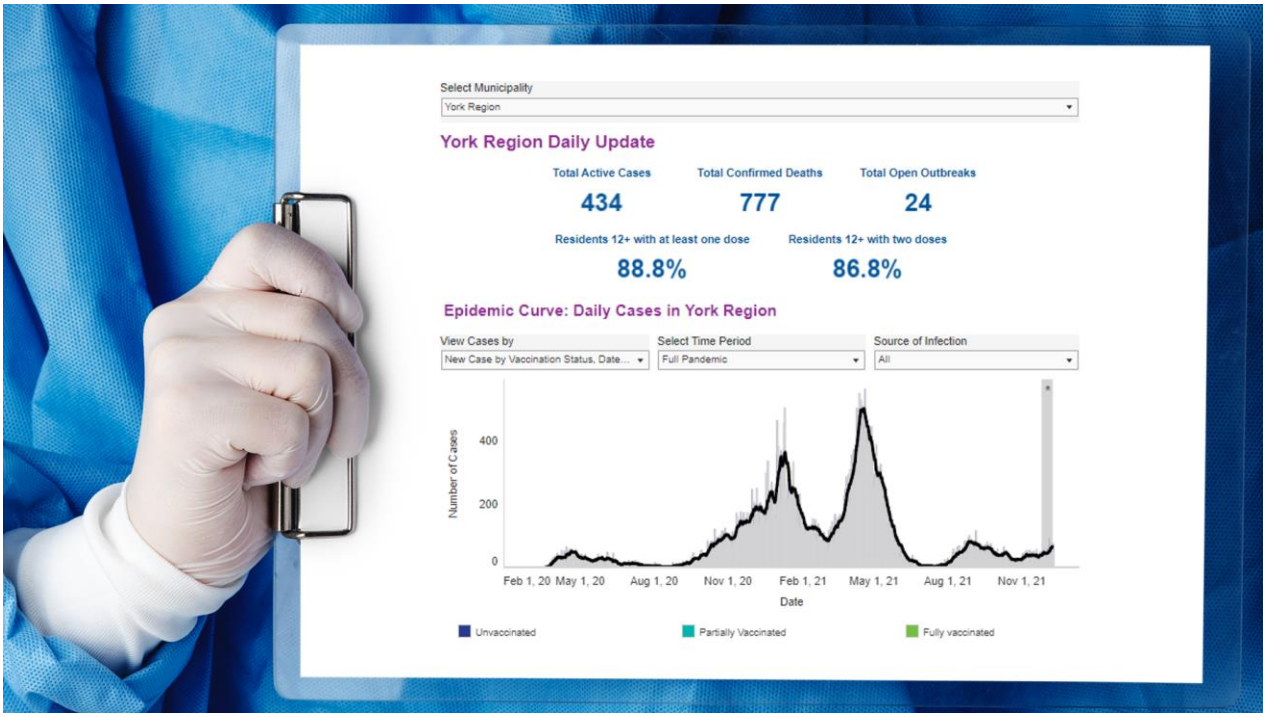
Level 1	Level 2	Level 3	Level 4	Level 5
Open to Public	Open to Internal Staff	Service Area Sensitive	Protected	Restricted
Access to all and public	Access to anyone within York with repository access	Access default to anyone with repository and in service area(s) identified	User level access to specific groups or program areas	User level access to a very small group on a per user basis
Default for public	Default for internal staff (across service areas), request required for public	Default within service area, request required for other service areas	Group/role specific access, business case required for exception	Exclusive access by selected groups

3. HEALTHY DATA, HEALTHY RESPONSE (HDHR)

“Healthy Data, Healthy Response” was created in response to COVID-19 to serve both internal staff and external stakeholders such as public health, emergency operations, and business owners - getting the right data in front of the right people at the right time. HDHR has tools such as its map-based vaccine reporting system as well as proprietary DB tools for frontline professionals. The data is published in an integrated online dashboard on the Region's website and has generated over three million hits.

Recommended Future Focus:

a) Document, communicate and leverage the lessons learned in standing up a broad corporate application and what went into it to making it a success
b) Design processes to measure, track, remediate and monitor data quality at both the data element and data set level
c) Create mechanisms to measure both the objective and subjective measures of data quality using the data catalogue to gather user feedback



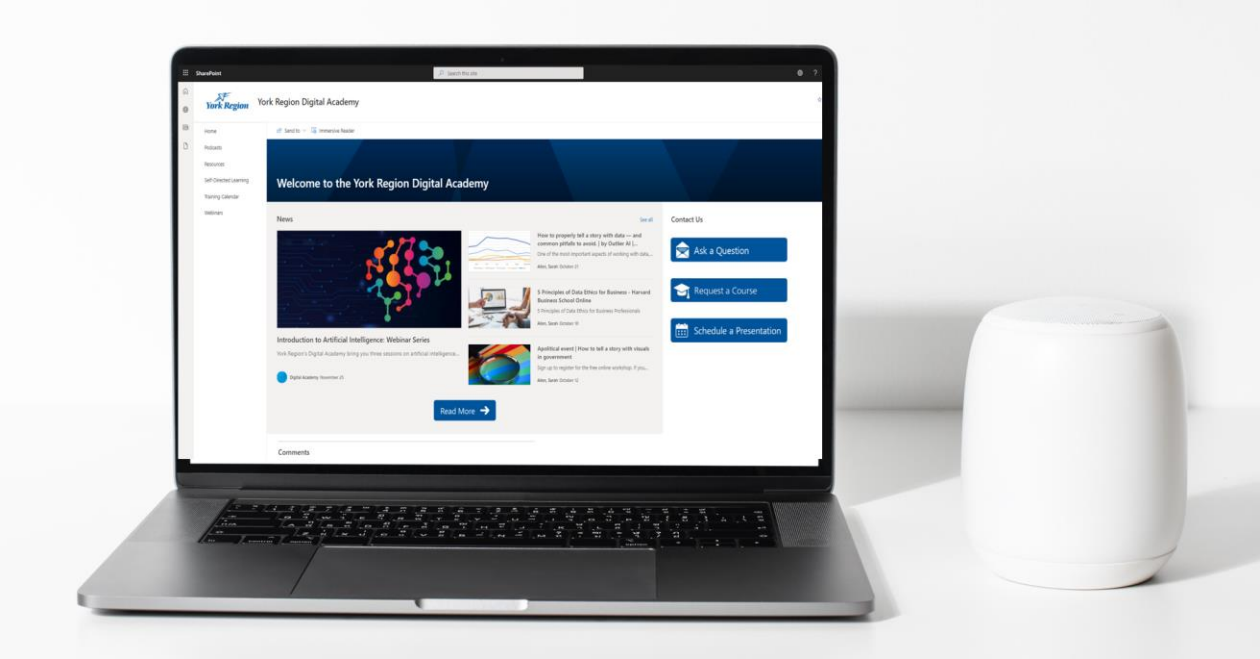
4. DIGITAL ACADEMY (DATA STREAM)

Data literacy reflects a person's competency in caring for, understanding, analyzing, and using data. The Digital Academy supports the development of data literacy among employees through learning and development offerings such as online and in-class training, workshops, and webinars.

The main objective of the Digital Academy's data program stream is to increase the data literacy of the workforce while decreasing their reliance on DnA experts across the organization.

Recommended Future Focus:

a) Pair upskilled workers with a "coach" to generate value from their new skills allowing them to more effectively "put data to work" without needing to customize training for each department
b) Find and leverage online open-source training from accredited institutions such as EdX and Coursera
c) Help senior leadership identify and prioritize opportunities for digital and analytics use within their program areas



5. FIGURING OUT FEDERATED

This initiative defines how data and analytics services can be delivered in a federated model across the organization. It did so by establishing a Digital Leadership Team (DLT) and identifying and operationalizing DnA services in either a corporate or local (departmental) manner without needing to change the structure or significantly realign budget allocations.

The main objectives of figuring out federated are to tackle the duplication of effort in managing data happening across departments, increase efficiencies and establish accountability in managing data.

Recommended Future Focus:

a) Communicate and implement! The tactical details for making “federated” are defined and they work but they are not yet well *understood* across the organization (i.e., staff don’t necessarily know who is responsible for design of a service, for its build/deployment, for its maintenance /operationalization)
b) Package services in commonly understood and required bundles so that DnA services are acquired in a way that is more meaningful
c) Map out and understand the state of each service, using incoming use cases and business needs to prioritize the design, build and operations of services

FOCUS ON ANALYTICS

York Region has made significant advancements in its data practice by building a foundation for data to thrive. The Region is ready for the next *phase* of the DnA Master Plan by preparing for and enabling advanced analytics. We will be going beyond the dashboard to focus on artificial intelligence, machine learning and intelligent automation. We will focus across the organization on projects that enhance business value. These projects will take our analytics to the next level and into new relationships with structured and unstructured data. We will *put data to work* by continuing to work together to serve our thriving communities – today and tomorrow.

WHAT STAFF HAVE TOLD US…

*As a Program Manager, the DnA Plan is **absolutely critical to my role** and helps me provide value to our business. Without it, **our team would not be as far** in our analytics journey**”***

“**Our data supports **good decision making. It’s that simple**”

“**With **support and in collaboration** with DnA, I was able to build a program around data sharing with an external partner. Internal support was garnered from the business case and from alignment with a Corporate Plan**”

“**Healthy Data Healthy Response has made my work in Public Health **infinitely better**”

“**Awareness of data value** has grown in the organization. We have learned who is **passionate** about **data**”

“**I’ve watched the organization mature in this area over the last decade. There is a **lot more focus on data and analytics** which is great to see. We need to continue to create learning opportunities and allocating resources to advance it**”

“**[it enabled] **culture change**, **siloes breaking down**, and **greater value placed on our DnA resources** by management**”

“**We increased the awareness that **data is everyone’s responsibility**, not just a DAVS Branch responsibility**”

*"Digital Academy courses have **expanded my understanding** of how to better present data and how to **turn that into valuable insights"***

*"The plan has **brought departments together**. It has made it easier to work with business areas [because of the] **trust** we have in the infrastructure and processes in place."*

*"Without the DnA Master Plan, it **would not have been possible** for my team to build our public dashboards for COVID. This investment in **data directly affected our ability to offer transparency** to York Region residents, companies, and organizations"*

*"We have **improved collaboration across the Region"***

*"In Transportation we have used **D8aLinx** for many different use cases… We have used D8aLinx to create a **trusted source of the truth and have improved the quality**"*

*"The **D8aLinx** initiative has **effectively supported the COVID response**. The tools / methods deployed as part of D8aLinx initiative were critical for the HEOC/HDHR project"*

*"By making all dashboards discoverable it can **reduce duplicated effort** with multiple groups making similar dashboards to display the same data"*

*"The Dashboard Catalogue **inspires programs** to make data available through dashboards"*

York Region