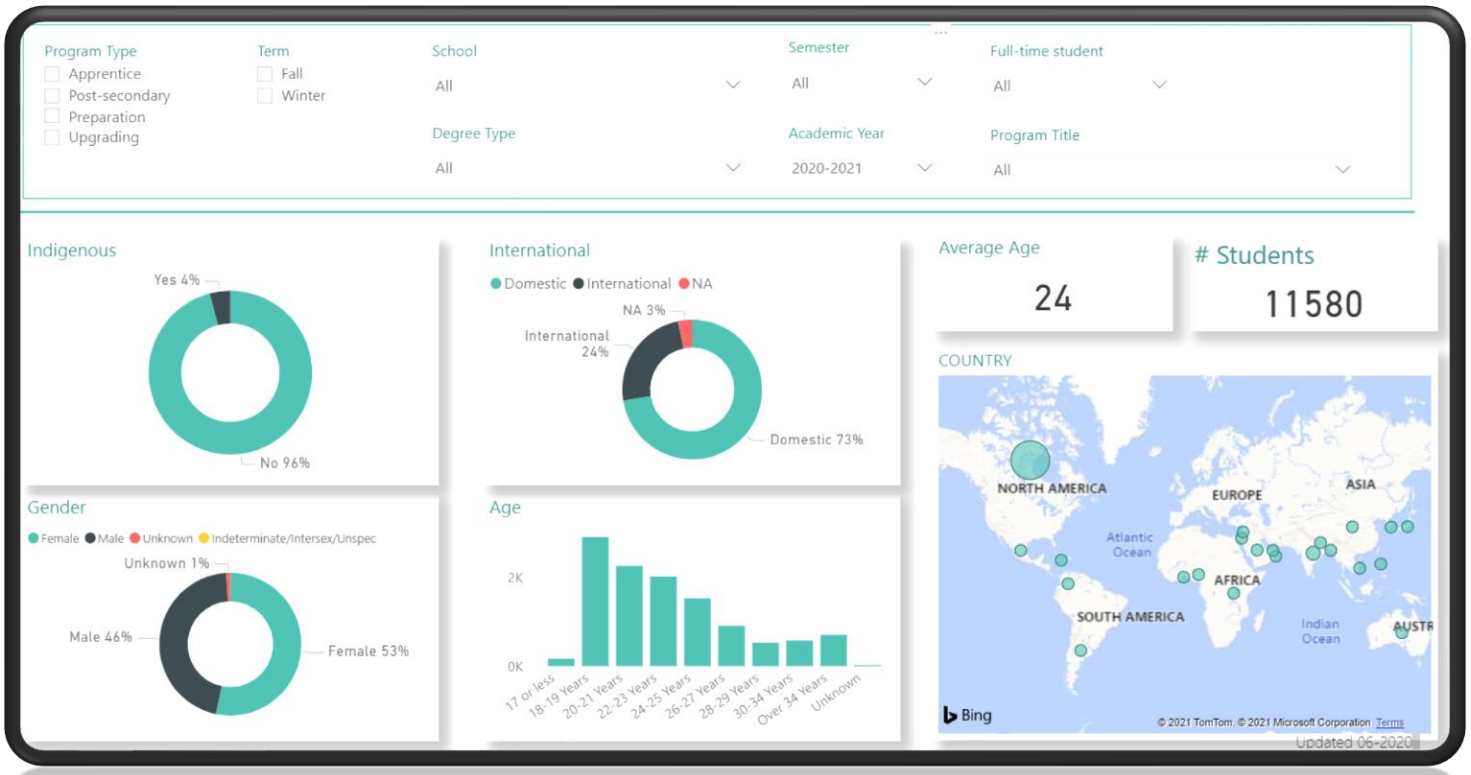

Business Intelligence and Data Analytics Guide

June 2022
Version 2.0

Business Intelligence and Research Services

FLEMING

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EXECUTIVE SUMMARY

This Business Intelligence and Data Analytics Guide (BIDAG) is a dynamic and living document that starts Fleming on a path toward building and increasing the College's data maturity level. This endeavour will depend on the entire organization's willingness and commitment to adopt this BIDAG and its activities into the fabric of everything we do so that we can improve data-driven and evidence-based decisions. As a work-in-progress, we started this guide with Version 1.0 in July 2021 and by June 2022 released a Version 2.0.

Business Intelligence and Research Services

The Business Intelligence and Research Servies (BIRS) Department includes the Institutional Research Office (IRO), the Project Management Office (PMO) and the Workforce and Labour Market Office (WLMO) to empower Fleming Stakeholders with the business intelligence and analytic insights needed to build a better college, better college communities and provide a better student experience.

Post-secondary institutions are in the midst of a data revolution creating a need for high quality data and anallytics. *BIRS* is the intersection between institutional research, data mining, statistical analysis, forcasting, optimization and business insights. Our department conducts in-depth research studies utilizing internal and external data to build a narrative around business intelignece (BI), predictive analytics, prescriptive analytics, data visualizations and infographics.

Decision Support

Fleming's ***Leaders*** are responsible and accountable for driving forward Fleming's culture of evidence-based decision making. A decision support framework describes the steps of support available through *BIRS* that facilitates a data-driven organization. The Workforce Labour Market Advisor and the Chief Business Intelligence Officer are corporate ***Advisors*** to leaders and partners providing insights from the collected internal and external research, data and analytics. The Advisors are supported by BIRS ***Data Science Engineer and Research Analysts*** who work to design/plan/conduct research and analytics, and then develop data visualization reports for dashboards.

Fleming Dashboard Network (FDN)

BI and data analytics (DA) from *BIRS* can be accessed through the Fleming Dashboard Network (FDN).

The *BIRS* department will continue to receive and process surveys, other research and data mining requests through the use of the Institutional Research Request Forms (a work intake system). Research results and reports from approved requests will be posted to the appropriate FDN (Dashboard). Team managers will no longer receive results directly or by email.

Each Senior Management Team (SMT) member has one or more dashboards within the FDN to manage and approve membership access. In addition, SMT members will determine the roles and responsibilities of their dashboard members.

Eventually, it is anticipated that all operational units will utilize MS Power BI to post reports and information throughout the FDN as appropriate. As the main source of data dissemination and access, the **FDN system is the official source for corporate-wide business intelligence and data analytics.** The Data Governance teams will create clear data definitions, quality (validity & reliability) and SMT accountability. The more widespread the FDN becomes, the more individual Power BI licenses will be required. It is anticipated that at some point a **'premium' enterprise license that integrates and expands data capability across the college** will be preferred to individual licenses.

Data Governance

To ensure quality (reliable and valid) BI and data analytics, the College is adopting a best-practice model to data governance. This will require a cultural and structural move away from silos of data ownership to a data stewardship approach. Data is not proprietary and no single department and/or position 'owns' data. This shift will be a critical aspect of democratizing data, business intelligence, analytics and insights. The College owns the data and it will be made available to appropriate positions within the college who require this information to support College strategies, plans and operations. Underpinning the move to greater data access, data stewardship and greater democratization of data is the adherence to privacy best-practices, regulations, and laws. The IT

department is leading a Cross-college Data Governance initiative that starts with moderinizing our PeopleSoft platform and business processes that surround it.

> *"A business insight that is tucked away in a binder or on a worker's desktop is a missed opportunity to empower employees and help them contribute to their organization's success"*
>
> *Kamal Hathi, GM MS Power BI*

BIRS has adopted DataCamp's IPTOP Maturity model. IPTOP stands for **I**nfrastructure, **P**eople, **T**ools, **O**rganization, **P**rocesses and provides a Path to Data Fluency. This model will help guide Fleming's move towards the *Data Fluent* maturity stage. See *Appendix III* for the IPTOP descriptions of each maturity stage.

PREFACE TO VERSION 2.0

This Business Intelligence and Data Analytics Guide (BIDAG) is a dynamic and living document that started Fleming on a path toward building and increasing the College's data maturity level. As a work-in-progress, we started this guide with Version 1.0 in July 2021. Version 2.0 was released in June 2022, a year after the initial release of the document; and in that short period of time there have been some major adjustments and changes. One major change was the addition of a central consolidated ***Fleming Dashboard*** available to all who are members of the Fleming Dashboard Network. The ***Fleming Dashboard*** posts standard data visualization reports of relevance to the entire college. The other dashboards in the network are then utilized for specific business intelligence and analytics relevant to that group only.

Fleming IT is leading a project to review and assess Fleming's Peoplesoft structure and data governance. The subsequent Modernization Roadmap created from the project includes key recommendations to improve the Peoplesoft and data governance infrastructures which will result in improved data quality, reliability and validity. All of which are critical to the quality of the Fleming Dashboard Network initiative.

PREFACE TO PREVIOUS VERSION 1.0

'Data is the new oil' – now a common mantra for Data Analytics these days, but like oil, data "unrefined cannot really be used" (Rodriguez, 2017). This Business Intelligence and Data Analytics Guide (BIDAG) is a dynamic and living document that starts Fleming on a path toward building and increasing the College's data maturity level. This endeavour will depend on the entire organization's willingness and commitment to adopt this BIDAG and its activities into the fabric of everything we do so that we can improve data-driven and evidence-based decisions. As a work-in-progress, we start this guide with Version 1.0 in July 2021. Future versions of this plan will incorporate new learnings and practices that will be explained in each Preface. The Appendices too of the BIDAG will also be expanded and refined in progressive versions.

As the College moves to make the concept of data collection, analytics, dissemination and use more routine, open and transparent, best-practice in data security and regulated privacy legislation will need to be aligned and integrated.

BUSINESS INTELLIGENCE & RESEARCH SERVICES

In March 2021, Fleming established the Business Intelligence and Research Services (*BIRS*) Department reframing the focus of the Institutional Research Office (IRO), the Project Management Office (PMO) and the Workforce and Labour Market Office (WLMO) within the new department. *BIRS'* mission is to empower Fleming stakeholders with the business intelligence and analytic insights they need to build a better college, better college communities, and provide a better student experience. BIRS works collaboratively with all divisions, departments, schools, partners and our communities to collect, compile, develop and disseminate business intelligence and analytics. *BIRS* adopts a Systems Theory approach, recognizing that the College is made up of a cohesive group of interrelated, interdependent parts influenced by its environment, and defined by its structure and purpose (Meadows, 2008). This approach acknowledges that the whole is greater than the sum of its parts.

BIRS works to stimulate reliable, verifiable, open and transparent business intelligence and data analytics (DA) across all facets of the college to support strategic directions, enhance evidence-based decisions, and improve operational activities accordingly. This guide is a key step in democratizing business intelligence for utilization by all appropriate stakeholders.

BIRS Purpose

The College collects a substantial amount of data and information through regular transactional operations, survey information (collected locally, provincially and nationally) and external sources. With the expertise of *BIRS*, we are able to tap into live disparate data systems and sources used across the college and beyond such as Evolve (PeopleSoft), Live Alumni, Razor's Edge, Salesforce, OCAS, Open SIMS, EMSI/Burning Glass, Excel/Access files, etc. *BIRS* is able to blend data sets to analyze and produce data visualizations and infographics based on multiple data inputs. Using MS Power BI, these user-friendly and digestible business intelligence reports are interactive to drill down into more specific analysis, by using self-serve filters (slicers) and sorting mechanisms.

Like many organizations, Fleming has had a common affliction described by Baltzan (2019) as being ***data rich but insight poor***. The creation of the BIRS department provides a critical opportunity for improvement within the College. A College-wide dashboard system disseminates and makes accessible digestible, high quality (reliable and valid) data, analysis and analytics, leading to insightful business intelligence. This College has three **leverage points** described by Meadows (2008) for which a **Fleming Dashboard Network (FDN)** can have a significant positive impact:

1) Information and Data Delays – *The length of time relative to the rates of system changes*. Delays in pertinent data, business intelligence, and analytics are widespread problems. These delays are exacerbated by antiquated paper and PDF file information dissemination methods that are immediately stale-dated after printing, posting or distributing. Without timely, relevant data, College stakeholders respond by making decisions that overshoot, undershoot or miss the target entirely.

2) Information and Data Flows – *The structure of who does and does not have access to information.* This leverage point addresses stakeholder access to the necessary information to make decisions. It also identifies the 'who' and 'how'.

3) Evolving and Self-Organization System Structures – *The power to add, change or evolve system structures.* Making data and information available in a timely way, will reveal issues and problems with current business practices, processes, and data/metric gaps. This understanding will precede necessary business changes to continue adapting and evolving Fleming's system by creating new structures and adapting new business behaviours.

BIRS Methodologies

Business Intelligence is defined as information from multiple sources that can be analyzed to reveal patterns, trends, and relationships to support strategic, evidence-based decision-making (Baltzan, 2019). Using various research and data analytics processes/tools (such as descriptive, predictive and prescriptive analytics), the College's performance can be estimated and enhanced.

Future Direction

An explosion of data analytics tools such as artificial intelligence (AI), machine learning (ML), and natural language processing (NLP) are reshaping business operations and decision-making around the world. Post-secondary institutions are in the midst of a data revolution that will see us engage with greater volumes of data from a variety of internal and external sources, creating a need for high quality data, analytics and competent data governance/stewardship. *BIRS* is the intersection between institutional research, statistical analytics, forcasting, optimization and business insights. Our department conducts in-depth research studies utilizing internal and external, with small and big data, to build a narrative around business intelignece (BI), predictive analytics, prescriptive analytics, data visualizations and infographics.

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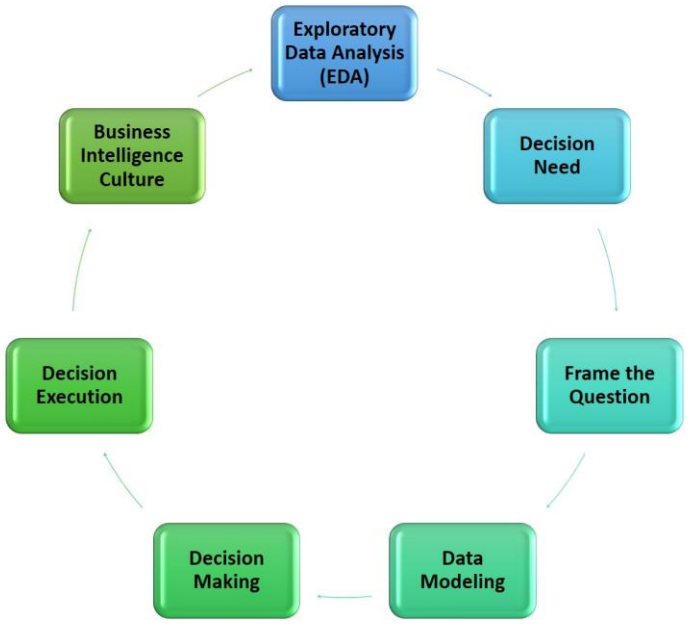
Decision Support

Decision Roles

Fleming's ***Leaders*** are responsible and accountable for driving forward Fleming's culture of evidence-based decision making. The Workforce Labour Market Advisor and the Chief Business Intelligence Officer are corporate ***Advisors*** to leaders and partners providing insights from the collected internal and external research, data and analytics. The Advisors are supported by BIRS ***Data Science Engineer*** **and** ***Research Analytists*** who work to design/plan/conduct research and analytics, and then develop data visualization reports for dashboards.

Decision Support Framework



1. **Exploratory Data Analysis (EDA)** – The interactive reports found on the FDN can be used to understand the 'current state' and find answers to questions. EDA can lead to questions that need to be investigated further through the Decision Support Framework.

2. **Decision Need** - Decisions that need to be made could be:
   a) *market driven* (e.g. student segments, geographic catchment, labour market info, competition)
   b) *introspective* (e.g. program delivery options, ERM, employee capabilities, R&D capabilities)
   c) *change/improvement driven* (data analytics and modelling: optimization analysis, value improvement, Learning-by-Experiment, Learning-by-asking/surveys, historical data mining)
   d) *process- and work-flow/improvement driven* (e.g. Six Sigma, Theory of Constraints, Agile, Lean)

3. **Frame the Question/Problem/Decision -** in terms of:
   a) Purpose and Objectives (see Decision Need)
   b) Context (i.e. organizational structure, systems, risks and culture)
   c) Scope and Constraints
   d) Envisioned future State

4. **Data Modeling** - A model is a representative and simplified version of reality. In a model, key variables can be manipulated to observe the results. They allow us to explore prediction, optimization and 'what-if' scenarios. In building a model, analysts focus on decision variables within identified parameters.

5. **Decision Making** – *BIRS* Advisors support decision makers by providing recommendations from modeling results and insights. It is important that the decision-maker also engage and debate with

key stakeholders to test out options and possible impacts while removing bias, and unfounded beliefs.

6. **Decision Execution** - The work of *BIRS* is to support the execution of the decisions which can include support from the Project Management Office within *BIRS* and/or ongoing reports and dashboards to monitor execution progress and performance of the decision. Communication with all stakeholders is key to successful execution of any project.

7. **Business Intelligence Culture** - The decision support process is complete by circling back to providing new performance and current state reports onto the FDN. This continuous cycle supports Fleming's move to organizational the Data Fluency Maturity Stage (See Appendix III).

FLEMING DASHBOARD NETWORK (FDN)

BIRS utilizes a combination of MS Power BI and MS Teams as the underlying technologies that drive its Dashboard platforms. As an early adopter with expertise in this platform, *BIRS* looks forward to working with all divisions, schools, and departments to help transition and disseminate college data reports to this new platform. Since **July 2021**, all BI and data analytics (DA) residing in *BIRS* has been accessible through the Fleming Dashboard Network (FDN). There are 25 Dashboards in existence to service the specific data/analytics needs of divisions/departments across campus. All standard reports have now been consolidated into a singe ***Fleming Dashboard*** where each report has an appropriate scheduled data-refresh cycle.

The *BIRS* department continues to accept survey, other research and data mining requests through the use of the Institutional Research Request Forms available on the BIRS portal website. Research results and reports from approved requests will be posted to the appropriate FDN (Dashboard). Team managers do not receive results directly or by email.

Dashboard Management

Each Senior Management Team (SMT) member has one or more dashboards within the FDN to manage and approve membership access. In addition, SMT members will determine the roles and responsibilities of their dashboard members. The central ***Fleming Dashboard*** is managed by the Chief Business Intelligence Officer in consultation with appropriate SMT members.

Please NOTE: In all cases dashboard information and reports are confidential to the internal Fleming employee community and are not to be shared with any external individual or group without the permission of an SMT member.

BIRS and other corporate service departments will post up-to-date and relevant reports and information to the Dashboards as required and requested. FDN also provides a platform to disseminate BI and data analytics on SMA3 performance metrics; progress on the Strategic Plan, Academic Plan, Business Plan, Enterprise Risk Management and Workforce and Labour Market insights.

Eventually, it is anticipated that all operational units will utilize MS Power BI to post reports and information throughout the FDN as appropriate. As the main source of data dissemination and access, the **FDN system is the official source for corporate-wide business intelligence and data analytics.** The Data Governance teams, under IT department leadership, will create clear data definitions, leading to data quality (validity & reliability) and SMT accountability.

The MS Power BI software is able to publish data visualization reports in public forums such as the College website. It is anticipated that specific, approved public Fleming reports will soon be available for use by students (prospective and current), communities and partners.

The more widespread the FDN becomes, the more individual Power BI licenses will be required. It is anticipated that at some point a **'premium' enterprise license that integrates and expands data capability across the college** will be preferred to individual licenses. The projected cost of the Power BI premium is $31,037 per year as outlined in *Appendix I*.

Change Management

The rate of change we experience today has been spurred on by new technology and access, our insatiable need for information, and cultural shifts that are changing the business of the post-secondary sector and society as a whole. As an organization, it is vital that we continue to develop a culture of continuous improvement and learning to ensure that we are competitive and not stagnating. As an institution of higher education with access to expertise and operational systems, Fleming is in an excellent position to understand and embrace data and analytics change. Fleming's

2019-2024 Strategic Plan and Academic Plan provides the College with the roadmap and framework to successfully guide us through change towards a progressive future.

Wide-spread BI practices will establish a data driven culture, quantify uncertainty so we can mitigate it and promote evidence-based decision making to drive growth. Transitioning the culture means that Fleming must be adaptable to the changing landscape that is occurring both internally and externally to the college. The data will drive how we make decisions within departments across the college from academics to student supports to corporate services such as human resources, IT and finance. There will also be intersections and opportunities for integration that will make the college more efficient and effective. As more departments access and use the FDN to make decisions and adjust business processes, understanding, interpreting and using MS Teams and Power BI will be a standard competency for all employees. FDN format standards (See Appendix II) have been created for brand compliance dashboards to generate familiarity and recognition for dashboard users.

Workshops and Training

Starting in the Summer of 2022, *BIRS* will begin offering workshops focused on the ***Fleming Dashboard*** and reports. More advanced workshops on specific reports and key findings will also be offered to certain groups throughout all campuses. During these workshops, *BIRS* is interested in hearing from users how they use the data to help improve the dashboard reports already in existing or creating new reports where possible. Those with access to the ***Fleming Dashboard*** will receive an email to sign up for workshops available.

DATA GOVERNANCE AND MATURITY

Data Governance

To ensure quality (reliable and valid) in BI and data analytics, the IT Department is leading Fleming's efforts in data governance. This will require a cultural and structural move away from silos of data ownership to a data stewardship approach. Data is not proprietary and no single department and/or position 'owns' data. This shift will be a critical aspect of democratizing data, business intelligence, analytics and insights. The College owns the data and it will be made available to appropriate positions within the college who require this information to support College strategies, plans and operations. Underpinning the move to greater data access, data stewardship and greater democratization of data is the adherence to privacy best-practices, regulations, and laws.

Data Maturity

There are many data maturity frameworks in existence to describe an organization's ability to utilize, optimize and benefit from its data structure. *BIRS* has adopted DataCamp's IPTOP Maturity model. IPTOP stands for **I**nfrastructure, **P**eople, **T**ools, **O**rganization, **P**rocesses and provides a Path to Data Fluency. This model will help guide Fleming's move towards the *Data Fluent* maturity stage (Vaildyanathan & Nehme, 2021). See *Appendix III* for the IPTOP descriptions of each maturity stage.

APPENDIX I - Power BI Premium Cost Estimate

Power BI (Education Rate)	Per Unit Cost	# of Users	Monthly Total Cost	Notes:
Power BI Pro Monthly fee (per user / per mth)	$2.90	10	$29.00	as per Paul M.
Power BI Premium (1 P1 Node) (Node / mth)	$2,557.40	500	$2,557.40	(Total Users up to 2384 on 1 Node) (as per Newcomp)
Power BI Report Server included with Premium			$-	
Monthly Subtotal			**$2,586.40**	
Yearly Total			$31,036.80	
Plus Tax?				
Online Cost Calculator				
https://powerbi.microsoft.com/en-us/calculator/				

APPENDIX II – Dashboard Format Standards

Design Type = Classic

Font colour See Fleming Brand Font Colours

Title – Top left

IRO logo - Top right

Line under title - See Fleming Brand Font Colours

Report date – Top right under IRO Logo

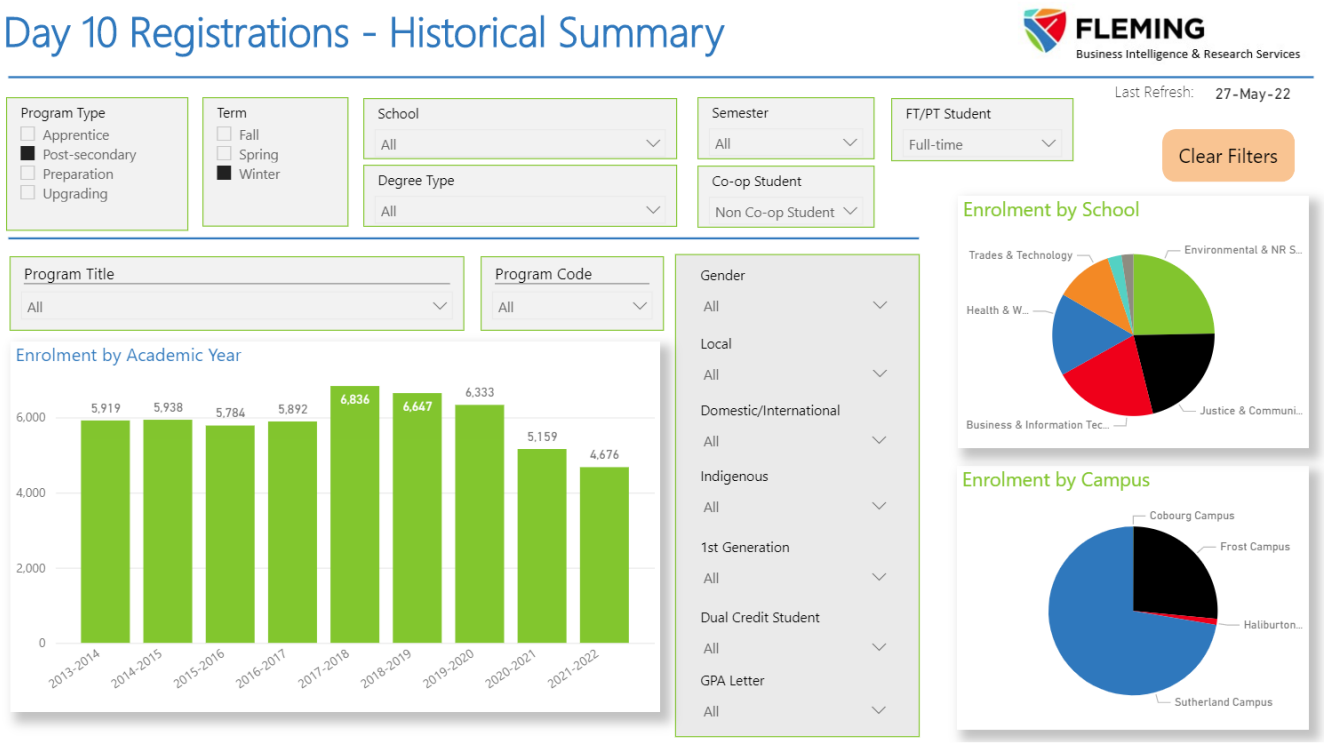
Filters – Fleming Brand Colours, font size 10, light grey background or boarder with Fleming Brand Colour

Graphs – Fleming Brand Colour, font size 12 with shadow boarder

ReadMe tab - sources data and other relevant information in the report

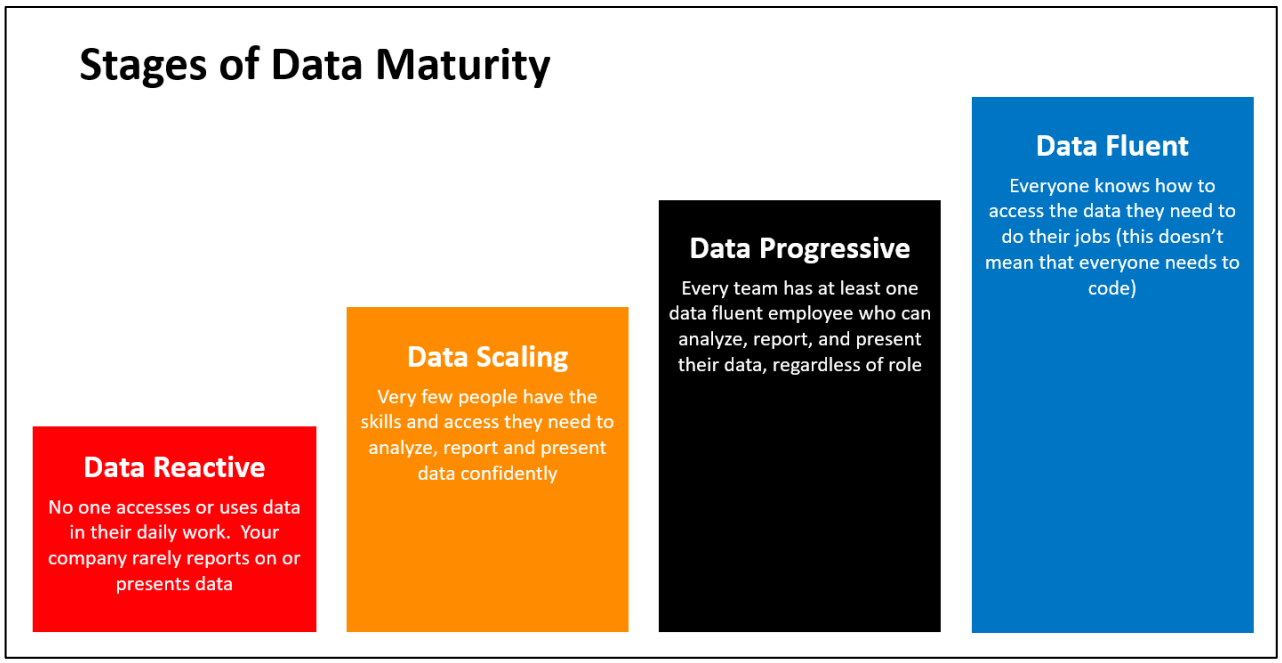
- Articulates the Research Question the data report is answering

Centre fields in tables when possible

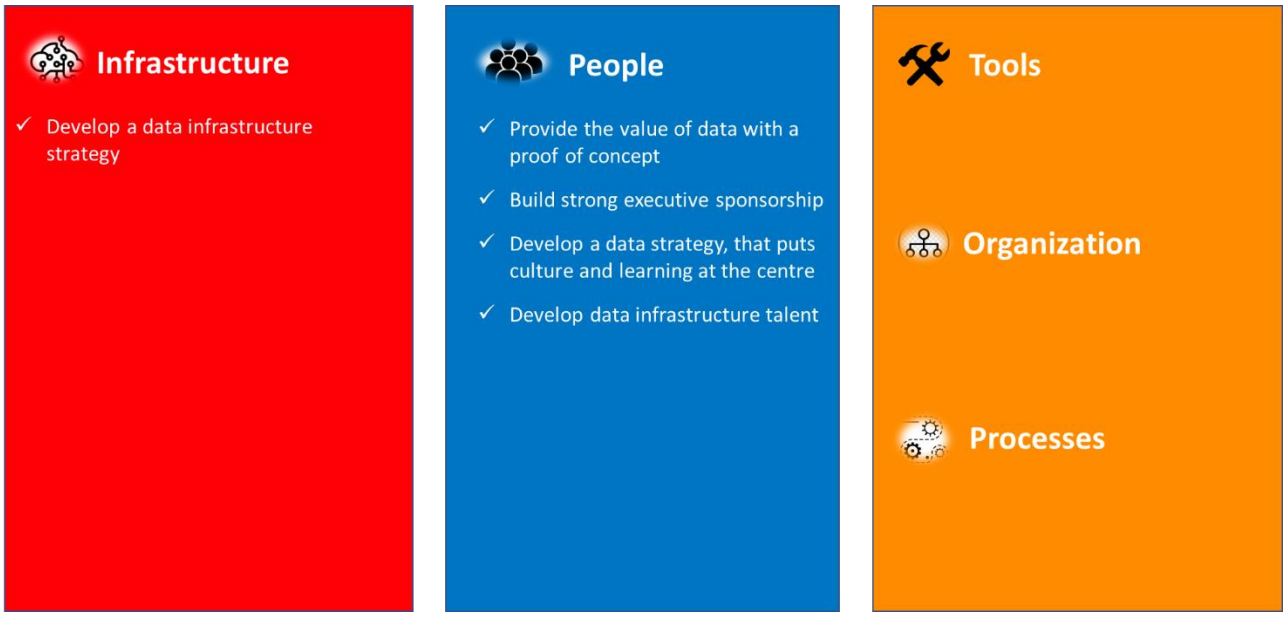


- Start each report with a high-level summary page
- Include a Tab for a PDF version of the Survey or other instrument/instructions
- Add relevant filters
- Try and incorporate top 10 and bottom 10 where possible (or a sort button)
- Limit charts, tables and figures to 4 per tab.

APPENDIX III – Data Maturity Model



Data Scaling IPTOP



Data Progressive IPTOP

Infrastructure

- ✓ Migrate your data to a centralized data storage solution
- ✓ Establish data governance and quality mechanisms and policies
- ✓ Define data access structure for high-impact teams

People

- ✓ Reward change agents and data leaders
- ✓ Define and promote data culture with metrics, data-driven reporting, learning sessions and transparency
- ✓ Set the stage for organization-wide data upskilling

Tools

- ✓ Provide access to inclusive, modern tooling
- ✓ Align tooling with infrastructure

Organization

- ✓ Define the structure of your data science organizational model, choosing between centralized vs embedded

Processes

- ✓ Define data processes between data teams and business units

Date Fluency IPTOP

Infrastructure

- ✓ Invest in data discoverability, and democratize data access
- ✓ Strengthen data quality initiatives, and enable data trust throughout the organization
- ✓ Move from experimentation to operationalization

People

- ✓ Roll out organization-wide data skilling fit for all data personas
- ✓ Access, track and reward skill development
- ✓ Set the stage for innovation with data

Tools

- ✓ Develop frameworks to democratize data and lower barrier to entry to working with tools

Organization

- ✓ Develop a hybrid model of embedded and centralized, to drive data strategy and expand value

Processes

- ✓ Develop scalable data processes throughout the organization by centralizing shared insights, and promoting collaboration

GLOSSARY

Business Intelligence (BI) Business intelligence (BI) combines data analytics, data mining, data visualization, data tools and infrastructure, and best practices to help organizations. Information from multiple sources can be analyzed to reveal patterns, trends, and relationships to support strategic, evidence-based decision-making.

Data Analytics (DA) A data management solution and business intelligence subset, referring to the use of methodologies such as data mining, predictive analytics, and statistical analysis in order to analyze and transform data into useful information, identify and anticipate trends and outcomes, and ultimately make smarter data-driven business decisions.

Descriptive Analytics Can tell us what is happening now and what happened in the past to get us to this state.

Predictive Analytics Can tell us what will probably happen in the future.

Prescriptive Analytics Can tell what we should be doing to create better (optimized) outcomes and benefits.

Stakeholders Individuals or groups that have an interest in an organization and can either affect or be affected by the business. The stakeholders include students, employees, suppliers, partners, communities, governments, associations etc.

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