



Canadian Food  
Inspection Agency

Agence canadienne  
d'inspection des aliments

# CFIA – Cloud Adoption Strategy and Architecture



RDIMS #: 12692754

Date: 7/3/2020

Canada

# Purpose

- To seek ARC approval of the Cloud Adoption Strategy and Architecture
- The strategy has three main elements
  - Enterprise Application Architecture
  - Dynamics 365 Power BI Reporting Architecture
  - Placeholder to an Enterprise Data Platform

# Introduction

- The Agency continues to move forward in cloud opportunities and climb the maturity scale for supporting our workloads in that environment.
- CFIA has the same challenges faced by many Canadian Government departments and agencies; the need to modernize infrastructure, deliver new applications and experiences and increase their ability to respond quickly to change.
- CFIA will strategically plan, grow, execute and, maintain the adoption of cloud to implement a modern, digital-first approach and bring more digital tools and services to users
- CFIA will strategize business patterns for cloud adoption that include development of a diversified cloud portfolio

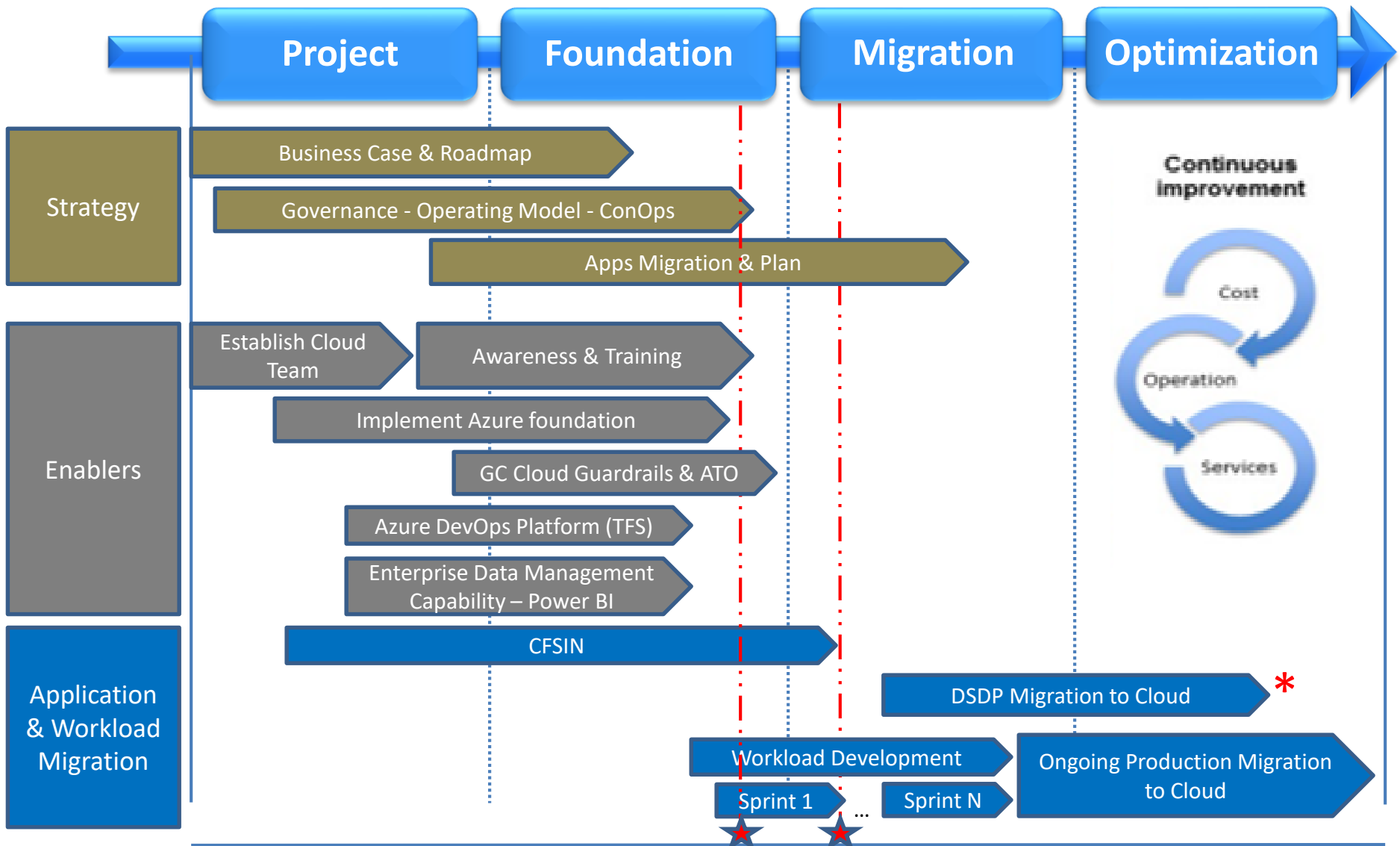
# CFIA Context/Drivers

- The CFIA has been deploying services in the Azure Cloud since 2017, primarily used by our Science Branch to host laboratory instrument data sets
- The Agency's first strategic investment in Cloud based services will be in support of the CFSIN
  - Working in partnership with the National Research Council, CFSIN will deploy a Cloud based Artificial Intelligence platform that will scan Canadian media publications for indicators of food safety risks.
  - The CFSIN platform supports collaboration, data sharing, analytics, an inventory of all Canadian laboratory facilities, and a framework to coordinate Federal, Provincial and Territories (FPT) food safety authorities during a food safety event using a combination of Dynamics 365, Office 365 and Power BI SaaS capabilities.
- The Digital Service Delivery Platform (DSDP) provides a single, integrated e-Services platform for the CFIA
  - Considerable efforts have been invested to establish a common inspection framework that supports Food Safety, Plant Protection and Animal Welfare activities. This architecture is reflected in the design of DSDP and provides an opportunity to retire a portfolio of separate, high risks application
  - DSDP is hosted by Public Service and Procurement Canada (PS-PC) as part of GC Case. PS-PC has developed a GC EARB approved roadmap to migrate GC Case to cloud services. The CFIA will continue to partner with PS-PC to migrate DSDP in step with GC Case cloud implementation
- Data Driven Organization
  - The Agency is a data driven organisation, and will benefit from modern and innovative approaches to managing and exploiting data.
- Workload Migration
  - Migration of workloads out of legacy Data Centre to Enterprise Data Centre or Cloud service based on total cost of ownership considerations
- Other GC Drivers
  - Align to TBS Cloud First Adoption Strategic Plan

# Cloud Adoption Principles

- CFIA will rationalize their Application Portfolio and Workload management to drive cloud adoption
- The rationalization process will leverage a Cloud Adoption Maturity model to assess the need for and usage of cloud services supported by the following cloud adoption principles:
  - **Cloud First** - When investing in new projects or application renewal efforts, CFIA will use GC's "cloud-first" adoption strategy as their preferred option for delivering IT services.
  - **Strategy and Projects** - Deliver on the Strategy, enable projects across the enterprise; including pathfinders and early adopters
  - **Client-Outcome Focused** - Decisions for moving to Cloud and selecting the right services should be based on the outcome and business value to the client\end-user.
  - **Security – Fit to Purpose** - Adopt a structured risk-management approach align to GC security guidance. Enable agility, monitoring and control, "trust and verify" model that safeguards Canadians' data and privacy
  - **Modern, relevant applications** - Agility powered by DevOps and Automation, continuous delivery and continuous integration
  - **Enterprise Data Management** - Manage data for the enterprise; design end-to-end data services to meet client/user data and information needs.
  - **Collaboration** - Cloud promotes collaboration across CFIA and other GC departments. Different levels of government often share business lines such as health care and policing. By collaborating, one level of government may inherit the solutions of another level.

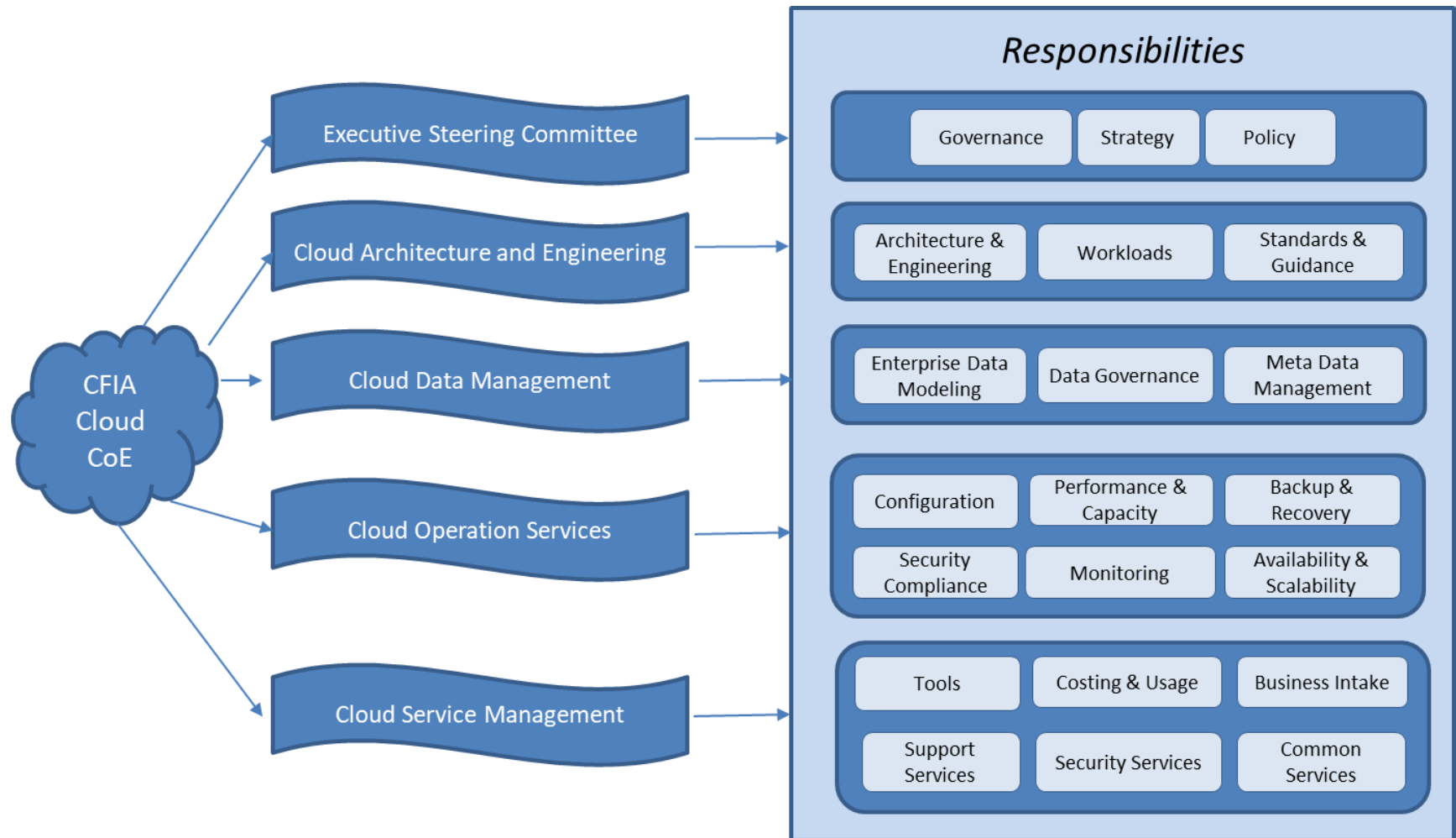
# CFIA Cloud Adoption Maturity Model



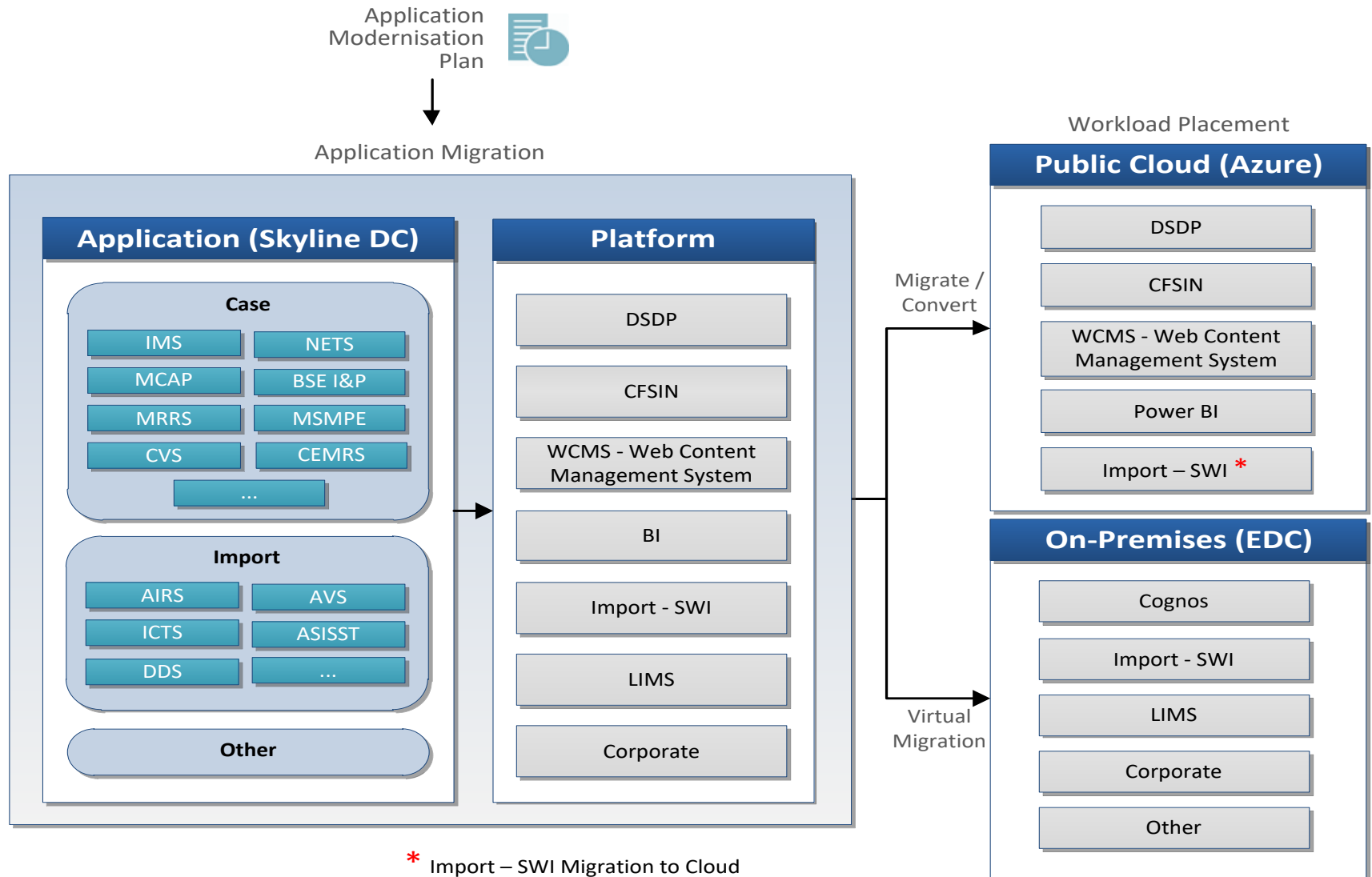
\* DSDP migration to Azure and D365 in alignment with GCcase roadmap

2020/02 2020/06

# ConOps - High-Level Structure & Responsibilities



# Hybrid Cloud Workload Placement Approach



TBD



# Cloud Architecture



# Cloud Architecture Approach


- Incorporate Cloud artifacts and strategy in Enterprise Architecture
- Incorporate Cloud design principles into Solution Architecture patterns and standards
- We will govern workloads through Architecture and Engineering Group
- Implement cloud security architectures that address deployment models, service models, and allocation of security controls for the different models
- Drive and support Business Transformation activities such as Inspections Architecture Framework describing the core inspection activities of the Agency, move from paper based processes to digital services, define and map CFIA Business Capability Model
- Incorporate enterprise data management requirements
- Leverage existing GC capabilities and initiatives
  - Microsoft 365 (Teams, SharePoint, Power BI)
  - GCCase roadmap is focused on migration to Dynamics 365 Online (SaaS)
  - CFIA Environmental Scanning Tool (eScan)
    - Secure Internet-based “early warning” system that gathers preliminary reports of public health significance on a near “real-time” basis, 24 hours a day, 7 days a week
  - Laboratories Canada
    - IM/IT solutions that support easier and more efficient data management, analysis, and sharing
    - On-demand/self serving cloud services for science needs
    - Cloud computing as a platform for genomic data analysis and collaboration


# Target Cloud Platform Overview

CFIA Azure Tenant (136gc)

## Azure SaaS

-  **Microsoft Office 365**
-  **Teams**  
- FPT Collaboration
-  **Sharepoint**  
- CFSIN Landing Page  
- File Sharing

-  **Microsoft Power BI**  
*Premium Services*  
- Reports / Dashboards  
- Shared Datasets

-  **Azure Translation Service**  
- English / French Text Translation


-  **Azure DevOps**  
*Workload Mgmt*  
- Continuous Integration and Delivery  
- Automated Deployments

-  **Microsoft Dynamics 365**  
*FPT Services*  
- FPT Registration  
- Event Management  
- Lab Profiles


- Digital Services (DSDP)*  
- Party / Individual Profiles  
- Inspections  
- Tasking  
- Permissions  
- Exports  
- Invoicing / Payments


- Other LOB Services*  
- Inspector Designations  
- Ministerial Exemptions  
- Etc.


## Azure PaaS

-  **Azure App Service**  
*Public-facing Web Apps*  
- Inspection.gc.ca web site  
- My CFIA Portal  
- Etc.





- Internal-facing Web Apps*  
- CFIA Business Services

-  **Azure Integration Services**  
- Power Automate  
- Azure LogicApps  
- Azure Service Bus  
- Azure Event Grid


-  **Azure SQL DB**  
- FPT Lab Sample Data  
- Reference Data  
- Dynamics 365 Sync-Export  
- AEM Product Metadata

-  **Azure Data Lake**  
*Incl. Supporting Services*  
[Future]

## Azure IaaS

-  **Virtual Machines**
-  **MySQL DB Server**  
- Environmental Scanning Data
-  **MySQL DB Server**  
- Aberration Detection Data
-  **Adobe Experience Manager**  
- COTS Product  
- CFIA Forms  
Form Filling / PDF Rendering


## Azure Supporting Services


-  **Azure O365 AD**  
- User / Group Mgmt  
- Azure B2B (FPT Users)  
- Federated Login


-  **Security Center**

-  **Azure Data Gateway**

-  **Web Application Gateway / Firewall**

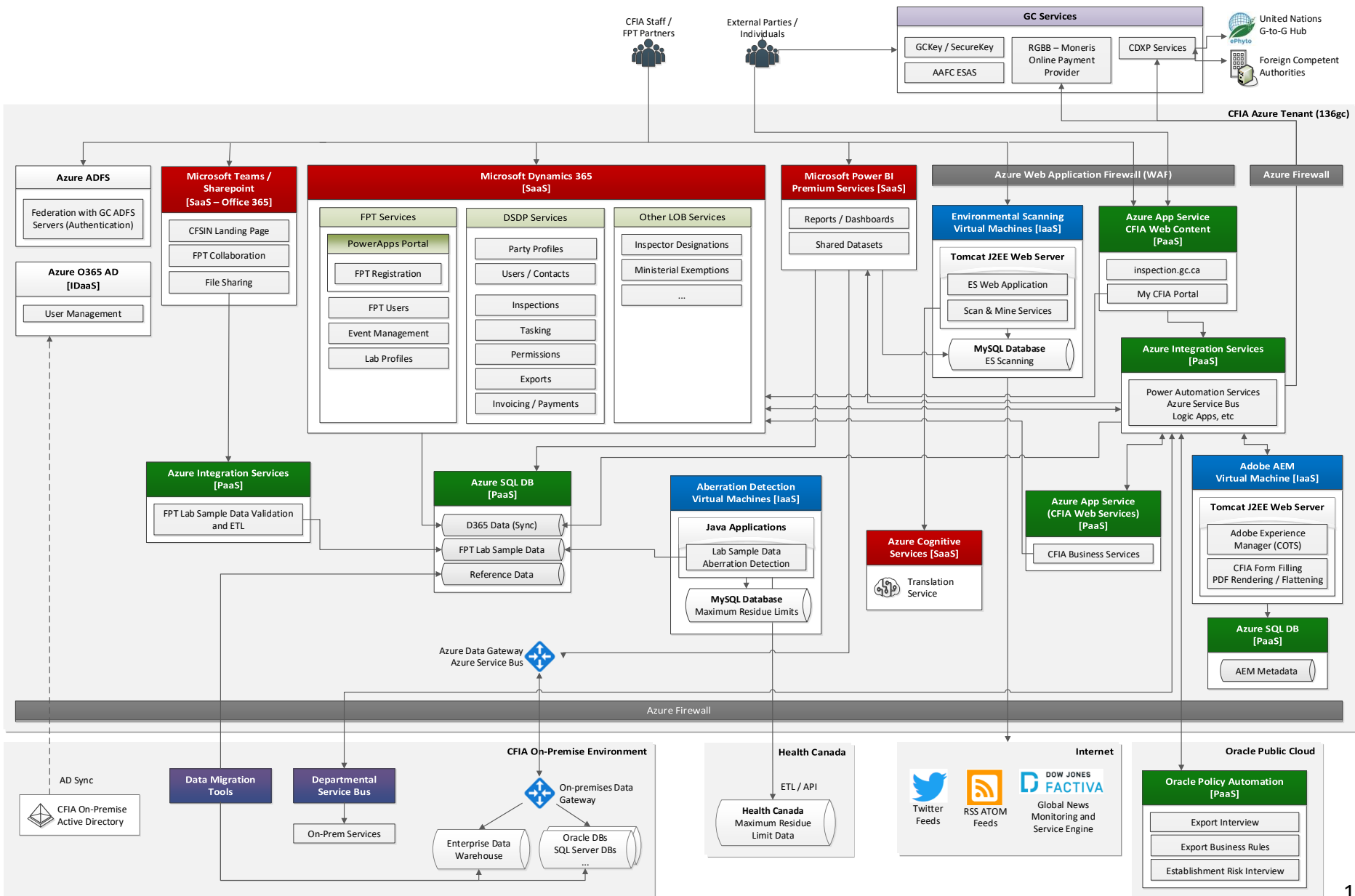
-  **Azure Log Analytics / Monitoring**

-  **Azure Firewall**

-  **Azure KeyVault**

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# Target Cloud Application Architecture



# Target Cloud Solution Overview

## **GCcase Cloud [Dynamics 365 SaaS]**

- Centralized Client Management
- Centralized Case Management including activities, tasks and workflows (i.e. support for Digital Services)
- Custom Line of Business (LOB) application functionality
- Dashboards and medium complexity reporting

## **Microsoft 365 Software / Power BI**

- Collaboration and File Sharing
- BI Analytics

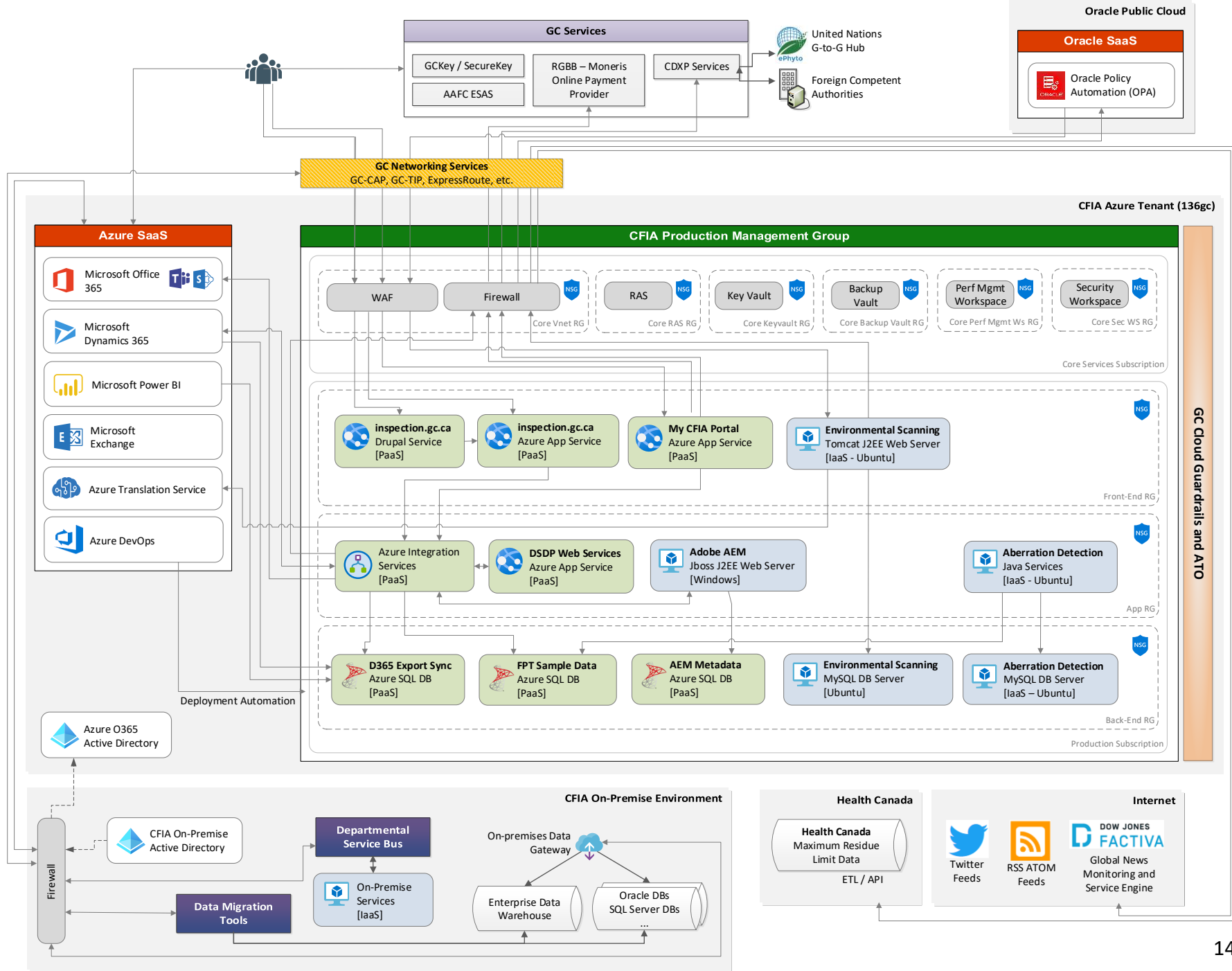
## **Additional Cloud-based Software**

- CFIA internet Web Site
- Public-facing “My CFIA” Portal (Digital Services front-end that integrates with Dynamics 365)
- Forms Management (Adobe Experience Manager)
- Business Rules Engine (Oracle Policy Automation)
- Azure Integration Services (Cloud / Departmental Service Bus / CDXP Integrations)
- NRC-developed CFSIN components (Aberration Detection and Environmental Scanning)

## **Government of Canada Services**

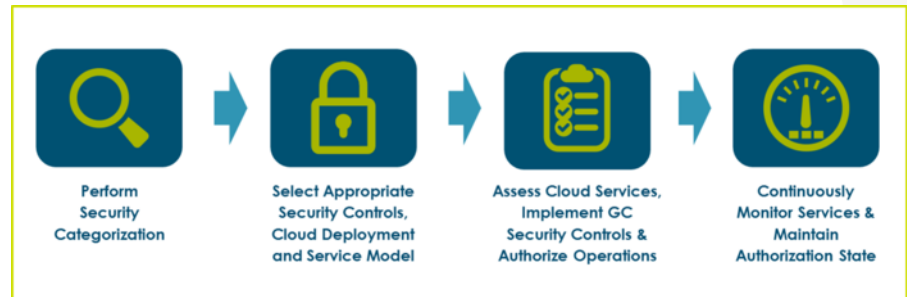
- GCKey/SecureKey Concierge integrated with AAFC ESAS for secure authentication
- PSPC’s Receiver General Buy Button (RBB) for online payment processing
- CDXP for system integration with OGDs and Foreign Competent Authorities
- CRA Business Number Service to support Business Validation (via Departmental Service Bus)

# Target Cloud Technical Architecture



# Cloud Security Overview

- Aligned with GC Cloud Security Risk Management Approach for Adopting Cloud
- High watermark security category for target cloud services is Protected B, Medium Integrity, Medium Availability
- CFIA has developed a Security Control Profile for Cloud Services based on the GC Security Control Profile for GC IT Services (PB/M/M)
- Adherence to GC Cloud Strategy, Policies and Guidance (TBS, SSC, CCCS)
- CFIA continues to work with SSC, CCCS and Microsoft Professional Services to secure and monitor cloud workloads, including implementation of:
  - GC Cloud Guardrails / O365 Guardrails
  - Azure Accelerators
  - Ground-to-Cloud connectivity
  - GC Design Patterns



GC Cloud Security Risk Management Framework

# Security Category of CFIA Cloud Workloads

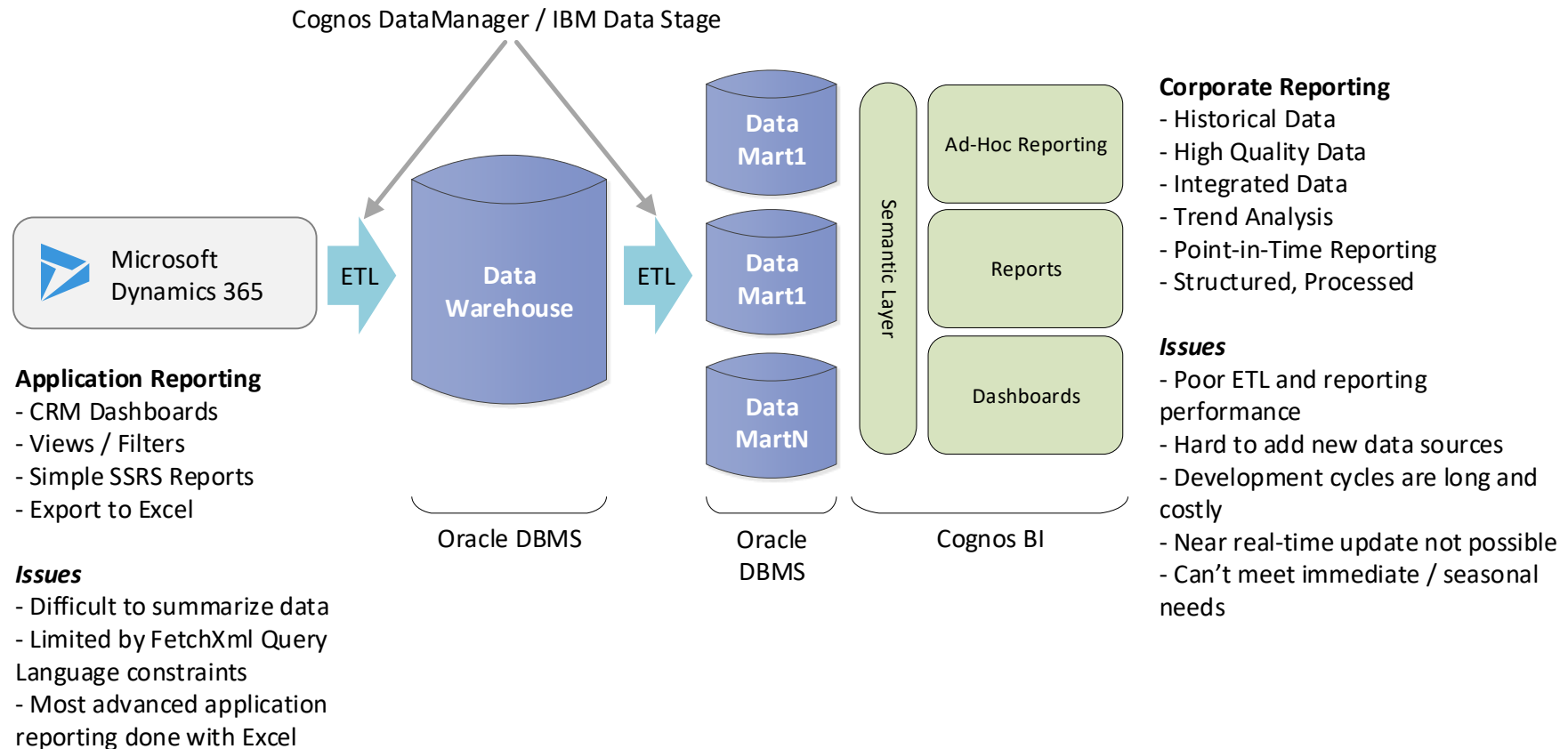
Business Activities	Security Category		
	Confidentiality	Integrity	Availability
Collaboration	Protected B	Low	Low
Event Management	Protected B	Medium	Medium
FPT Lab Mapping	Unclassified	Low	Low
Environmental Scanning	Protected B	Low	Low
CFSIN Intelligence <sup>1</sup>	Protected B	Medium	Low
FPT Portal	Protected B	Medium	Medium
Digital Service Delivery Platform	Protected B	Medium	Medium
Export Certification	Protected B	Medium	Medium
<b>High Watermark</b>	<b>Protected B</b>	<b>Medium</b>	<b>Medium</b>

## Notes

- 1) Not all information within CFSIN Intelligence is Protected B. Aberration Detection components can be implemented such that it does not require access to Protected B information.

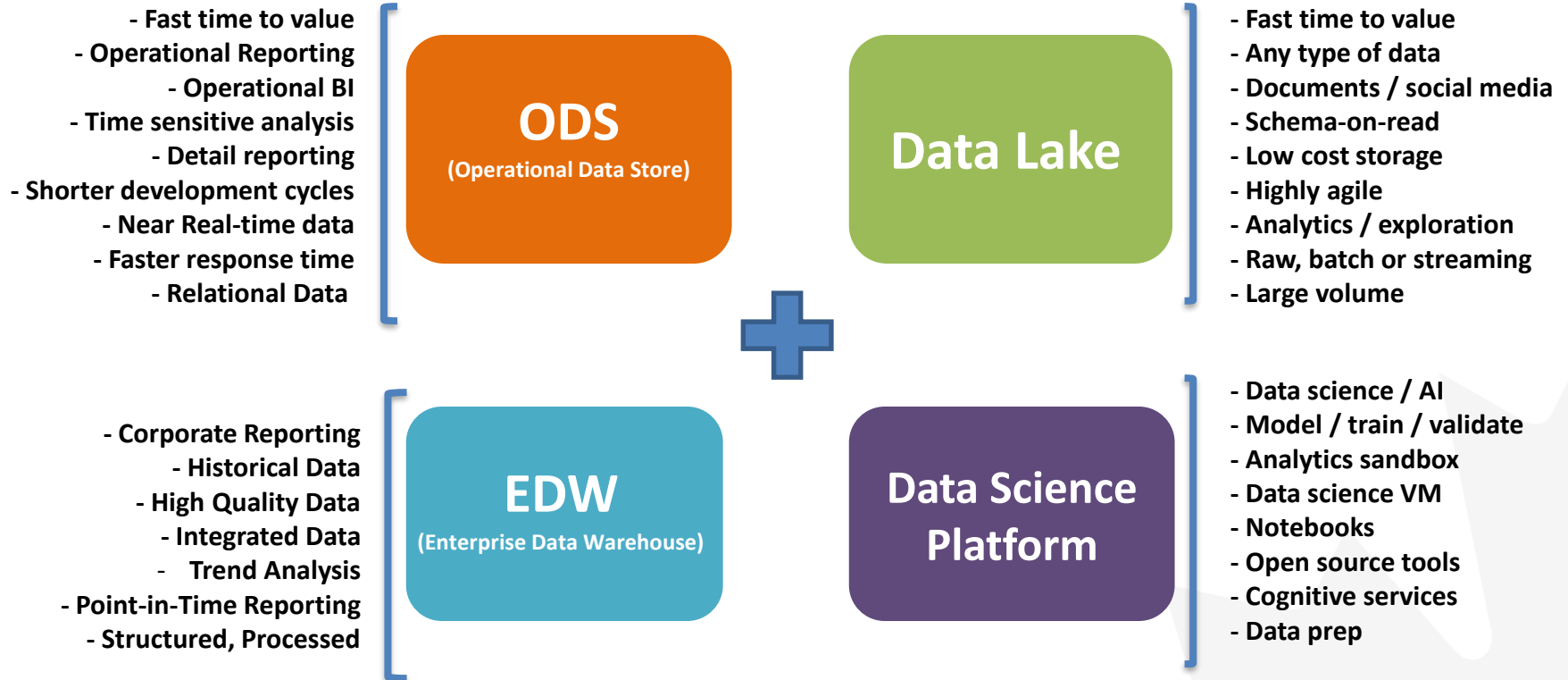


# Current State of Dynamics 365 Reporting



# Enterprise Data Platform (EDP)

## *Corporate Reporting Future-State*



**Foundation: ODS + DL + EDW + DSP**

# Expanding the Dynamics 365 *Application* Reporting Architecture



Microsoft  
Dynamics 365



Microsoft Power BI

- Limited to 6 panels on dashboard
- Best suited to basic day-to-day operational analysis
- Data is contextualized to the user
- User requires D365 licence

- Advanced analysis and visualizations
- Both granular and high-level data aggregation
- Trending
- Deep integration with Microsoft Common Data Service (D365 Online, Office 365, Power Apps)
- User licence NOT required when published to Power BI Premium

# Microsoft Power BI Overview

Microsoft Power BI is a data and analytics reporting tool that helps organizations bring together disparate data sets into reporting dashboards

## Power BI Components

- A Windows desktop application called **Power BI Desktop** (Data mashups, visual dashboards, etc.)
- A Windows desktop application called **Power BI Report Builder** (Paginated Reports – SSRS style reports).
- An online SaaS (Software as a Service) service called the **Power BI service**.
- Power BI **mobile apps** for Windows, iOS, and Android devices.

## Licensing Overview (2 Types)

### Power BI Pro (Report and Shared Dataset Publishers)

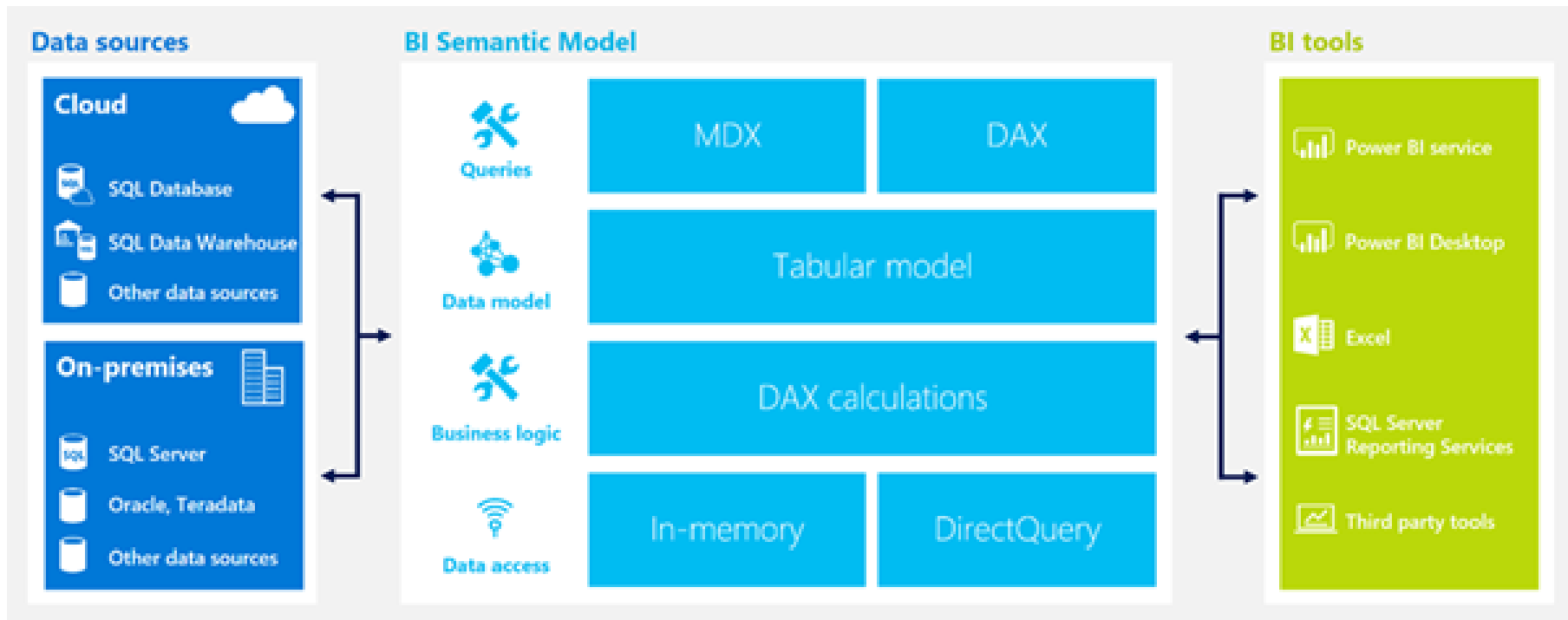
- Self-service BI in the cloud
- Collaboration, publishing, sharing, and ad hoc analysis
- Work in Power BI Desktop or Power BI Service

### Power BI Premium (Report Consumers)

- Any user can consume content without requiring a Power BI Pro license
- Dedicated cloud compute and storage resources - scalable
- Incremental and more frequent data refreshes
- Advanced administration and deployment controls

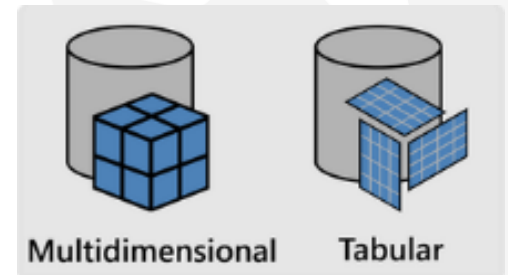


# Microsoft Power BI Semantic Model



MDX and DAX are expression based languages designed to query a SSAS Cube

- MDX – Multi-dimensional expressions used to query multi-dimensional SSAS models
- DAX – Data analysis expressions used for tabular data models



# Microsoft Power BI Data Connectivity Modes

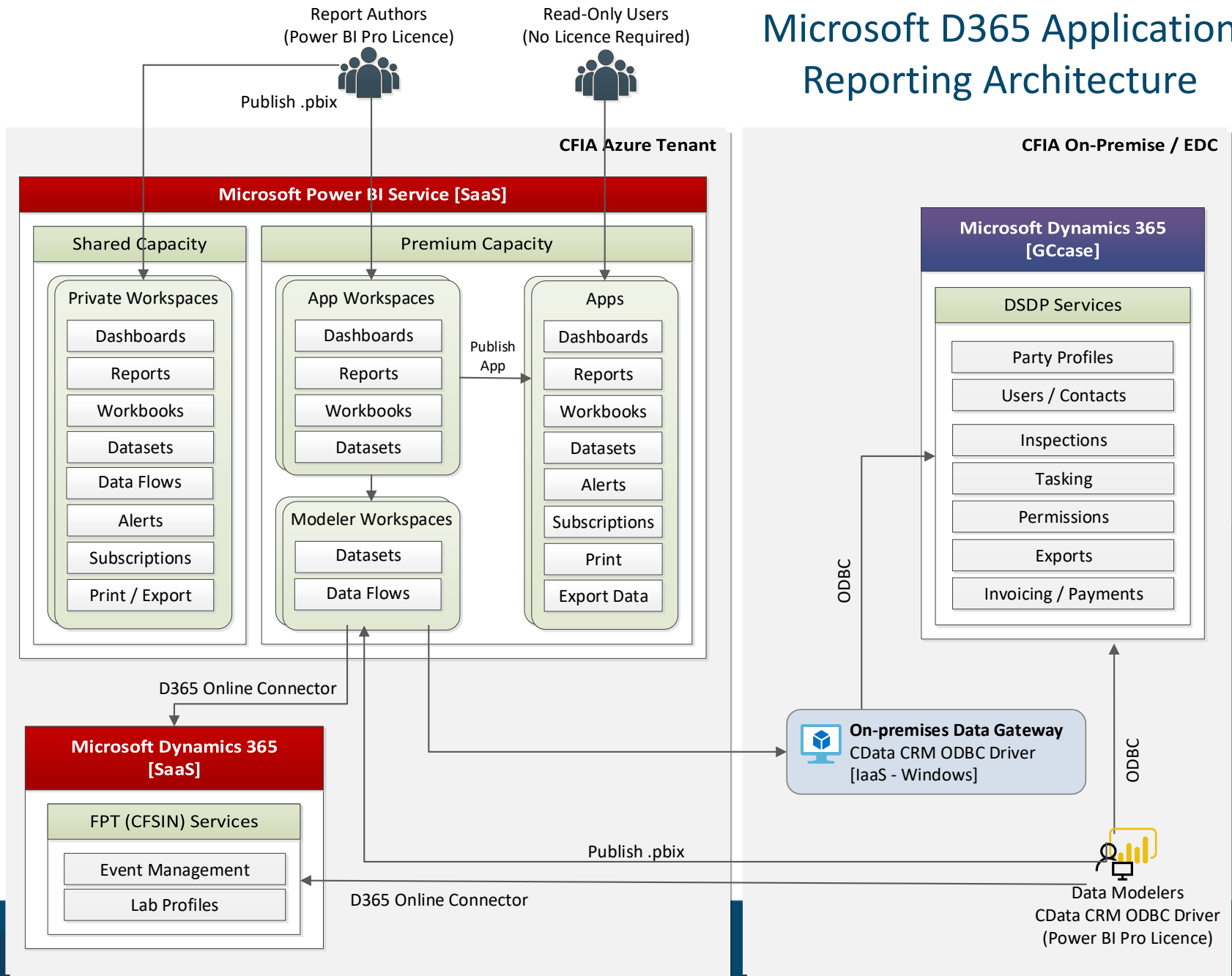
## **Import Connection** – Import data into Power BI cache

- Highly recommended when the data size is less than 1 GB and the data changes infrequently.
- Import data with scheduled refresh to get the latest data.
- High-performance query engine (i.e. SQL Server Analysis Services).

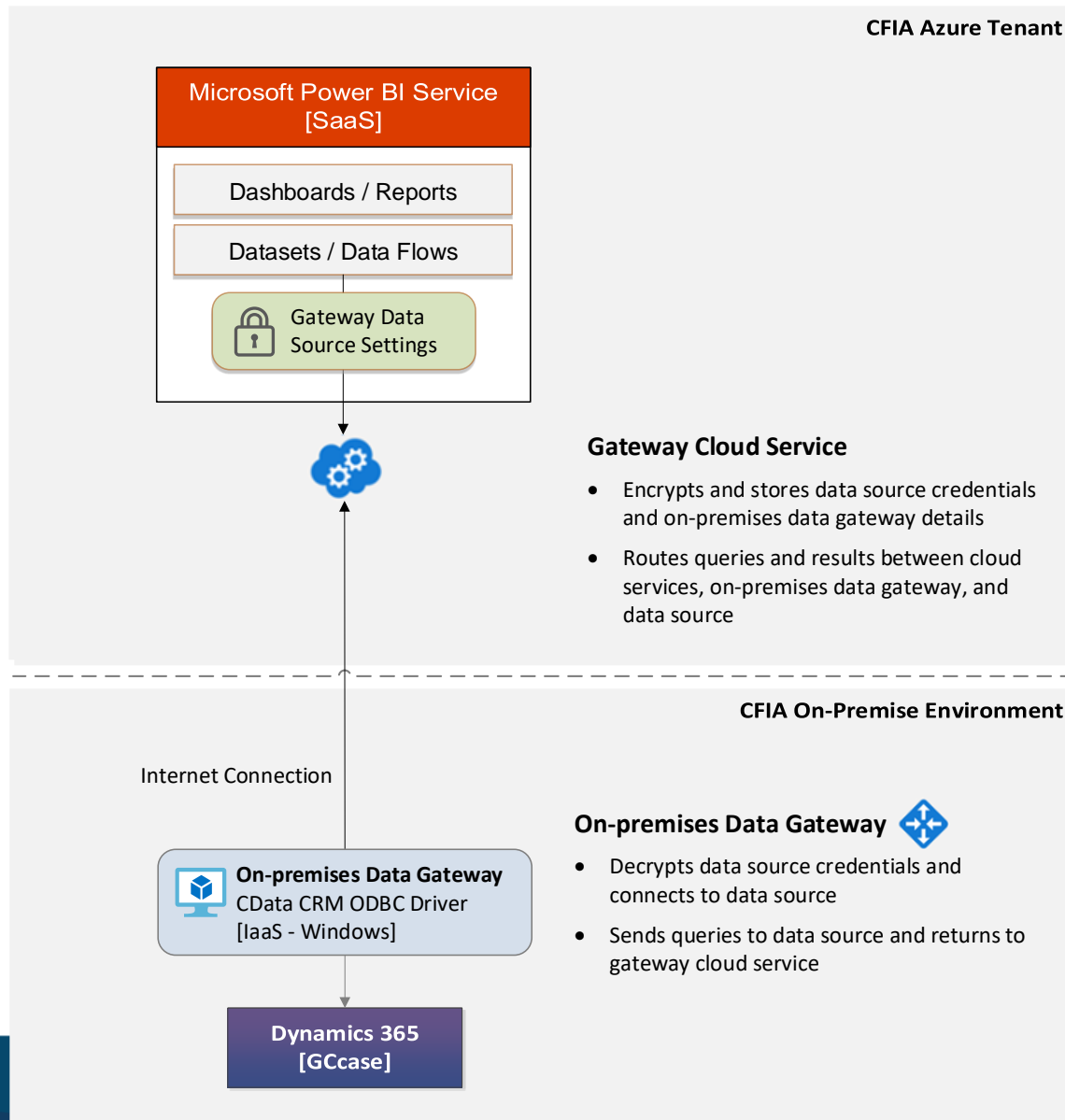
## **DirectQuery** – Connect directly to data

- Real-time or near real-time BI solutions when the data is changing frequently, and data volume is very large.
- No data imported into Power BI. Power BI sends queries to the underlying data source upon building visual/interacting with visuals.
- Each query is restricted to return less than or equal to 1 Million rows.

# Microsoft D365 Application Reporting Architecture



# Azure On-Premises Data Gateway





# Appendices

# Software Development Life Cycle Model

## **Agile Development / DevOps Delivery Model**

- Backlog of user stories (requirements) are combined based on capacity to make a sprint
- Sprints lasts 4 weeks and contain user stories / requirements for multiple projects, enhancements, bug fixes and maintenance
- Releases are planned monthly

## **Accenture Estimation Tool**

- Proven tool to develop high-level plans and effort estimates for Agile-based projects

## **Azure DevOps Platform (TFS)**

- Azure DevOps is used for continuous integration and continuous delivery
- Builds and deploys are automated where possible

# GCcase Cloud roadmap

## Moving to SaaS

