Report for

FL Department of Financial Services

Final – Florida PALM Data Warehouse Assessment

November 30, 2022
Engagement: 330078717

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1.0 Executive Summary

In accordance with the 2022-23 General Appropriations Act, the Florida Department of Financial Services procured services for an independent assessment for an information warehouse (herein referred to as data warehouse or DW) solution that retains the current historical reporting functionality and data provided by the FLAIR Information Warehouse (IW) and inclusive of Florida Planning, Accounting, and Ledger Management (PALM) data. Through a Request for Quote procurement, Gartner was selected to complete the assessment of the Information Warehouse, identify recommendations for DW and Business Intelligence (BI) solutions, and validate the technical and functional requirements needed.

1.1 Summary of Approach

As the PALM implementation moves forward to replace FLAIR, the Department must retain historical data and the ability to analyze data across historical data stores, the modernized PALM system, and other integrated data sources (external data sources accessed through APIs) with features such as trend analysis.

Gartner assessed solution options to meet its target Florida PALM data warehouse (DW) and business intelligence (BI) needs based on existing data, data structures, integrations, current/legacy information warehouse capabilities and uses, and known Florida PALM requirements.

Gartner's Approach:

1. Gartner worked with the Department to kick off the project, establish a mutual understanding of project goals, and establish a vision for the target Florida PALM data warehouse and desired outcomes.
2. Through **Discovery and Assessment**, Gartner conducted interviews with Department stakeholders and reviewed available documentation and artifacts to establish a baseline understanding of the current environment and future requirements. A requirements analysis was performed, use cases were defined, and requirements were elaborated. Subsequent analyses were based on these requirements and use cases. This step included:
    - Definition and/or elaboration of technical and functional requirements necessary for development of the DW solution and associated business intelligence (BI) solution.
    - Analysis of the existing FLAIR IW, including the structure of the data and uses (e.g., reporting, integration with other systems and sub-systems) of the FLAIR IW.
    - Analysis of Florida PALM data and uses (e.g., reporting, integration with other systems and sub-systems).
3. Gartner performed an **Options Analysis** by establishing an evaluation framework based on priority use cases and requirement gaps, identifying candidate solution options, and performing a qualitative and comparative analysis of DW and BI solutions that align with the Department's needs. Gartner assets such as research insights and data were used in the identification and evaluation of options. Four DW options and four BI options were identified through an evaluation of market leading solutions aligned with FL DFS' critical capabilities and use cases. This step included:

- Identification and analysis of information warehousing solutions that can store, integrate and transform data from multiple sources, where the data is structured differently, in a manner to provide a user-friendly and scalable solution.
- Identification and analysis of BI reporting and integration solutions that allows for end-users to use the proposed information warehousing solution in a manner that supports using combined data for trending, forecasting, and other analytical reporting needs.

4. Gartner drafted **Recommendations** to identify the top three combined solution options and reviewed them with the Department. The top three solution options were combinations of DW and BI solutions that offered unique value propositions to the Department. One favored low change impact, another favored self-service usability, and another presented a best of breed option with market-leading products. See Sections 1.3 and 7.0 for further analysis.
    - The analysis factored in criteria important to DFS, such as the ability of the solution to use combined legacy accounting and operational data and the Florida PALM data in the same reports, ease of use, and change impact and ease of deployment.

1.2 Systems, Key Documents Reviewed and Stakeholders Interviewed

Understanding the functionality provided by FLAIR Information Warehouse involved a) reviewing documentation shared by FL DFS with Gartner, b) interviewing key stakeholders from FL DFS and representatives from other agencies, c) understanding target requirements for the new DW during the interview sessions, and d) leveraging Gartner research materials to understand current market trends. In addition, insights into the current PALM project and its operational database and operational reporting systems provided key insights to determining the target Florida PALM DW system.

In the discovery process, Gartner interviewed 12 stakeholders and reviewed more than 20 documents. Information gathered focused on FLAIR current state, desired PALM requirements, prior strategy and planning documents, as well as system selection best practices via Critical Capabilities mapping.

Gartner reviewed formal PALM documents related to data and integration strategy, governance, architecture, requirements, design, data structures, and reporting. We used this information to establish an understanding of the current state and desired future state. We then conducted interviews with the PALM project team, DFS Office of Information Technology, and four representative state departments to verify and improve our understanding.

See Section 5.0 for details.

1.3 Recommended Solution Options

Gartner's assessment resulted in the following three solution options, in priority order. These options take into account themes that surfaced in our Discovery phase, including **self-service**, **tool standardization**, **organizational change management**, and **performance scalability** as discussed in Section 5.0.

	#1: Oracle-Oracle	#2: Oracle-Domo	#3: Teradata-Tableau
Description	A combination of Oracle Autonomous Data Warehouse (ADW) and Oracle Analytics Cloud (OAC) is **the most logical choice** to meet PALM requirements given its future architecture needs	A combination of Oracle Autonomous Data Warehouse (ADW) and Domo presents a user-friendly option but requires **more integration effort**	A combination of **Teradata and Salesforce Tableau** offers a **best-of-breed option** that is highly capable, but with most integration complexity
Data Migration	This option **eliminates data movement out of Oracle environment**, eases contract management while meeting DFS' functional needs	**Some data will migrate out of Oracle environment** to enable high-performant reporting	**All data from PALM and the FLAIR IW will migrate out of the Oracle environment** to Teradata's environment to support reporting
Implementation Effort	**Least development effort** needed to build reports since analytical data models can be purchased from Oracle	**More development effort** involved in customizing reports to consume Oracle analytical models	**Most development effort** involved in mapping PALM operational data model (Oracle) to Teradata Vantage data model
Minimum Requirements	Meets minimum requirements	Meets minimum requirements	Meets minimum requirements
Key Change Impacts	Minimum. Operational data stores are in Oracle. FL DFS resources (internal and external) are familiar with Oracle database and reporting platforms.	Average. Operational data store and data warehouse still remain on Oracle. Need to train users to work with Domo.	Highest. Operational data store will remain in Oracle, but the data warehouse will migrate to Teradata. Need to train users to work with Teradata and Tableau.
Key Timeline Impacts	Minimum. Data integration jobs to move data from PeopleSoft to Oracle ADW are the quickest to implement. OAC reports have native options to upgrade, though some configuration changes will be required.	Average. Data integration jobs to move data from PeopleSoft to Oracle ADW are the quickest to implement. Need to schedule/test processes to move data to Domo for rapid reporting. Reports need to be re-written in Domo.	Average. Data integration jobs to move data from PeopleSoft to Teradata data models will significantly impact the timeline. Reports need to be re-written in Tableau.

2.0 Background

As the PALM implementation moves forward to replace FLAIR, FL DFS must retain historical data and the ability to analyze data across historical data stores, the modernized PALM system, and other integrated data sources with features such as trend analysis while also providing a user-friendly experience. Another objective is to review and document the FL DFS data ecosystem and provide a comprehensive current-state view of data sources integrated with the FLAIR Information Warehouse (IW). DFS must assess solution options to meet its target Florida PALM data warehouse (DW) and business intelligence (BI) needs based on existing data, data structures, integrations, current/legacy information warehouse capabilities and uses, and known Florida PALM requirements. To accomplish this, DFS sought an independent, objective, and experienced partner with market research and insights into leading practices, especially in public sector organizations, to assess and recommend the top three combinations of DW and BI solution options.

Gartner was selected as the vendor to perform the analysis and make the DW and BI solution recommendations. As part of the independent and objective assessment, Gartner interviewed over a dozen FL stakeholders to understand the State's perception of current systems, desired capabilities and outcomes for the target Florida PALM DW implementation, as well as other logistical and reporting requirements. Gartner also reviewed a wide body of documentation provided by the State, covering topics from data architecture and reporting strategy to FLAIR system documentation and PALM DW requirements. Further, Gartner reviewed materials within its own extensive body of research content.

Taking into consideration FL's current use of Oracle PeopleSoft and miscellaneous Microsoft products, the technical and functional requirements gleaned from the State's documentation, the facts and opinions ascertained during the stakeholder interviews, as well as its own deep knowledge of technology and public sector organization best practices, Gartner custom-tuned several of its Critical Capabilities tools in order to find three best-fit recommendations for Florida PALM's DW and BI needs. These recommendations were reviewed with DFS leadership during a collaborative workshop and are captured within this document.

3.0 DW Solutions Considered

One of the first major considerations around selecting a Data Warehouse solution is determining which deployment best suits the organization's needs: on-premises, cloud-based, or a hybrid of the two. It is worth noting that while the state of Florida has a "cloud-first" policy for state agencies per Section 282.206 per the 2019 Florida Statutes, on-premises and hybrid solutions were also considered in case FL DFS requirements mapped more effectively to a non-cloud solution. These considerations were captured in the Gartner Critical Capabilities referenced throughout this document. Gartner defines the cloud database management system (DBMS) market as being that for products from vendors that supply fully provider-managed public or private cloud software systems that manage data in cloud storage. Data is stored in a cloud storage tier, and may use multiple data models — relational, nonrelational (document, key-value, wide-column, graph), geospatial, time series and others.

Cloud DBMS Capabilities include:

- Core capabilities are that vendors fully supply provider-managed public or private cloud software systems that manage data on cloud storage
- Data is stored in a cloud storage tier (such as a cloud object store, distributed data store or other proprietary cloud storage infrastructure)
- Optionally, they may cater to multiple data models and data types -- relational, nonrelational (document, key value, wide column, graph), geospatial, time series and others
- Cloud DBMS is largely used in four use cases: Data Warehouse, Logical Data Warehouse, Data Lake and Operational Intelligence

3.1 Critical Capabilities

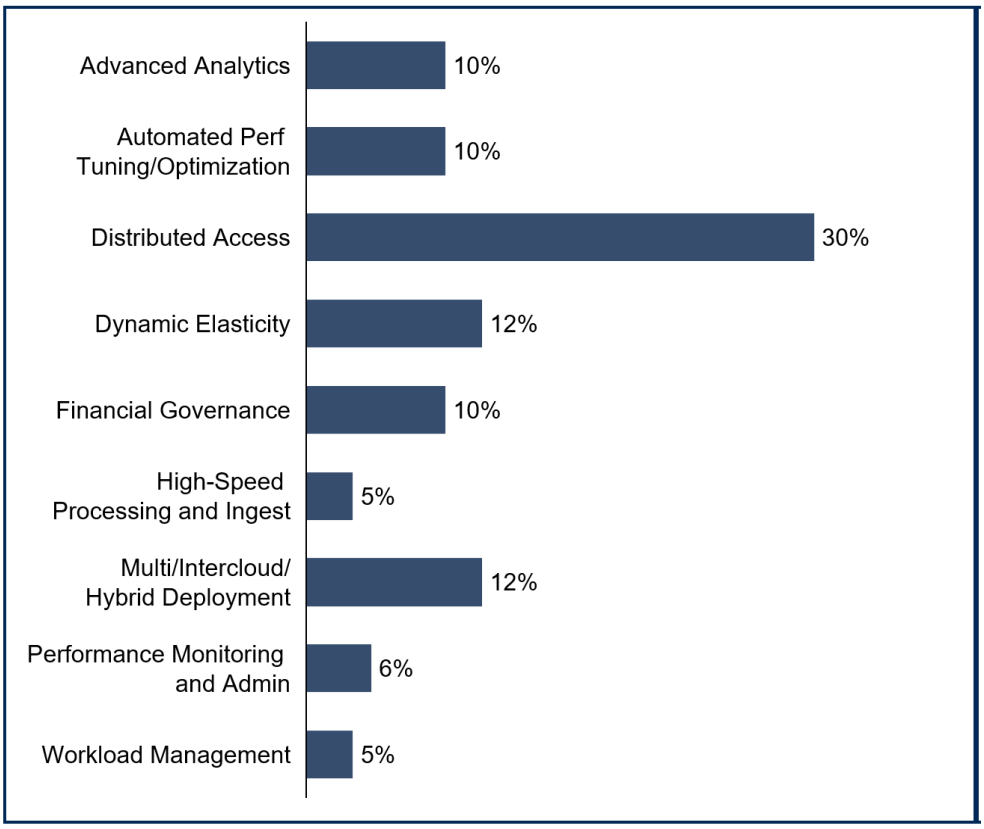
Identifying and shortlisting cloud database management systems begins by identifying critical capabilities associated with the platform and the appropriate weights associated with those capabilities. The weights were carefully chosen based on document reviews, stakeholder interviews and Gartner experience. The critical capabilities for cloud database management tools are as follows:

Critical Capability	Definition
Advanced Analytics	The product's ability to perform advanced analytic operations within the database platform as a service (dbPaaS). We evaluated what functionality is offered in the current version of the product and what functionality is used by customers. In addition, the depth and variety of available artificial intelligence/machine learning (AI/ML) algorithms is taken into consideration.
Automated Performance Tuning/Optimization	The ability to optimize performance for queries, transactions and workloads to meet performance service level agreements (SLAs). This can include the availability of performance-enhancing features.
Distributed Access	The ability to access data outside of the internal storage of a database management system. This includes products that can optimize access to outside storage through sharing processing or reducing data transfer.
Dynamic Elasticity	The ability to easily scale both up and down based on policy in response to changing workloads or user specifications, to deliver

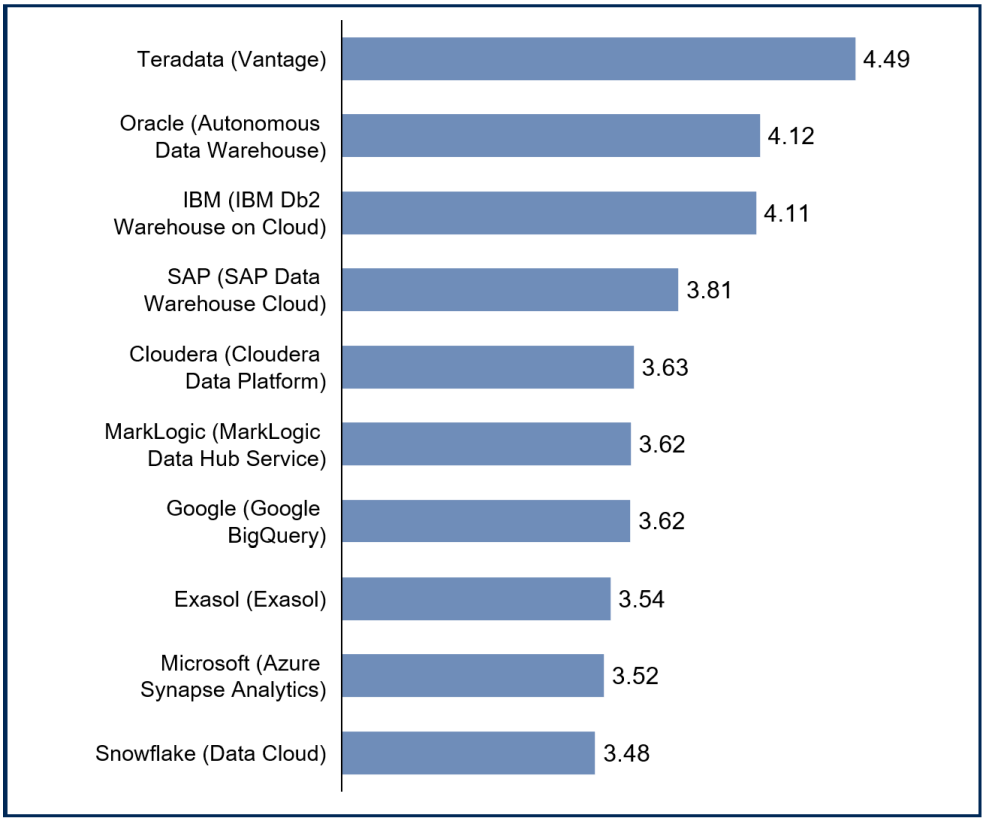
Critical Capability	Definition
	predictable cost and performance against SLAs when confronted with workload variability.
Financial Governance	The ability to forecast, budget usage, and monitor and control costs by throttling, workload or user prioritization or other means. It can include governing types and numbers of resources used, and recommending and implementing less costly storage strategies. Tools for modeling costs and blended pricing models facilitate this capability.
High-Speed Processing and Ingest	The ability to continuously process and load data from multiple endpoints and in different formats (including in-stream computations), and to durably write and make data quickly available.
Multi/Intercloud/Hybrid Deployment	The ability to deploy and operate analytic and operational activities across one or more cloud environments and on-premises.
Performance Monitoring and Administration	This capability includes resource utilization, database activity monitoring, role-based activities, security alerts and intelligent advisors in distributed, multicloud and hybrid deployments.
Workload Management	The ability to perform different types and sizes of workloads simultaneously while enforcing or extending policy-based resource limits; handle varying and conflicting workloads while optimizing response times; and prioritize the workloads to meet policy-defined service levels.

3.2 Weighted Critical Capabilities

Custom weights were assigned to the critical capabilities identified above in collaboration with DFS stakeholders. These served as evaluation criteria to identify the initial pool of options from Gartner's "Critical Capabilities for Cloud Database Management" tools.



Based on the assigned weights, Gartner identified the initial ranked list of solution options in the marketplace.



3.3 Candidate Data Warehouse (DW) Options

Considering the DW solution options that align with the weighted Critical Capabilities, Gartner included the top three options in the short-list for DW solution options and included Microsoft's Azure Synapse Analytics as a fourth option.

While Microsoft's Azure Synapse Analytics ranked lower than SAP, Cloudera, MarkLogic, and Google in the weighted Critical Capabilities rankings, it remains a Leader in Gartner's Magic Quadrant for this class of tools. It was included due to the State's existing agreement with Microsoft for Azure Cloud, Azure SQL Server, and PowerBI Service. Detailed analysis and approach for each of the four solutions is covered in Appendix A — Data Warehouse Options.

The result is a short-list of 4 DW options:

- **Teradata (Vantage)**
- **Oracle (Autonomous Data Warehouse)**
- **IBM (IBM Db2 Warehouse on Cloud)**
- **Microsoft (Azure Synapse Analytics)**

3.4 Pros and Cons of Each DW Option

DW Option	Pros	Cons
Teradata (Vantage)	▪ Teradata has many years of experience using its DBMS and QueryGrid technology to bring to bear on data fabric requirements including mature distributed data access, advanced optimizer technology and robust workload management ▪ Teradata offers a variety of resources that can be combined in an easy-to-use system and deployed in a variety of architecture ▪ Teradata's Vantage can support very large complex workloads and large concurrent user bases for operational reliability and high throughput	▪ Teradata should be considered by organizations wanting a generic analytical cloud DBMS as it does not offer an operational database ▪ Migration to Teradata is difficult due to complexity of moving data from databases to Teradata's own industry models ▪ Teradata is perceived as a high-cost, "premium" option, though its move to the cloud and its new "pay for what you use" pricing model has made it viable
Oracle (Autonomous Data Warehouse)	▪ Oracle's hybrid environment for sharing data enables cloud migrations and disaster recovery and supports both analytical data warehousing and transaction processing databases ▪ Oracle Cloud is a good choice for enterprises that use Oracle as a standard provider, where they can apply skills developed over many years to use cases in the cloud with a familiar environment ▪ Oracle cloud infrastructure utilizes advanced algorithms to tune performance and availability, including zero-downtime patching and upgrading	▪ While Oracle Database is generally portable to other cloud service providers (CSPs), e.g., migrating an instance of Oracle Database to AWS or Google Cloud Platform, it is not yet certified to run on all major CSPs and is cost-optimized for Oracle Cloud ▪ Oracle's on-prem is perceived as 'expensive' though its new cloud business model is more in line with industry standards, and provides features like the self-driving Autonomous Database, an Always Free tier, bring your own license (BYOL), and dynamic elasticity
IBM (IBM Db2 Warehouse on Cloud)	▪ IBM's Cloud Pak for Data represents a cohesive ecosystem with a broad range of data management capabilities for DBMS, data integration, analytics, data science, metadata and governance, as well as support for third-party offerings and tools ▪ IBM Watson Knowledge Catalog is included in Cloud Pak for Data and can provide governance for all data assets under management spanning multiple clouds ▪ IBM is focused on infusing AI and ML capabilities throughout the Cloud Pak for Data platform. Db2 on Cloud and Db2 Warehouse on Cloud already have significant levels of automation	▪ IBM's vision is unified behind Cloud Pak for Data, but peer reviews indicate fragmented sales and marketing teams translates to lackluster customer support service ▪ Fully managed "as a service" operations are currently only available in IBM Cloud, or via IBM Cloud Satellite for selected offerings ▪ Gartner's client inquiry service has reported issues with implementations of Cloud Pak for Data when deploying on non-IBM public cloud infrastructure

DW Option	Pros	Cons
Microsoft (Azure Synapse Analytics)	▪ Azure represents a natural extension of familiar Microsoft ecosystem and a low-risk migration path to cloud, with a comprehensive set of cloud offerings and a strong user and developer community ▪ Strong data ecosystem vision with Azure Synapse Analytics, along with easy integration with other Azure offerings is a major selling point, and the ecosystem is open to third-party software offerings ▪ Microsoft has embraced a multi-model strategy for many of its data management offerings, which can simplify deployment, as reflected in Azure Synapse for analytics, and Azure Cosmos DB for nonrelational operational DBMSs; the two can be used together for high-performance augmented transactions, with minimal data movement or redundancy	▪ Key components of Microsoft's cloud ecosystem are still under construction and industry data models are not yet fully developed ▪ Microsoft's overall pricing model is complex and challenging, and enterprises must carefully assess the total costs of Azure offerings ▪ Microsoft's portfolio of cloud and on-premises DBMSs is comprehensive, but deployment options for public cloud, private cloud and traditional on-premises are inconsistent and vary on a per-product basis

4.0 BI Solutions Considered

Analytics and business intelligence (ABI) platforms enable less technical users, including business users, to model, analyze, explore, share, and manage data, and collaborate and share findings, enabled by IT and augmented by artificial intelligence (AI). ABI platforms may optionally include the ability to create, modify or enrich a semantic model including business rules. In addition, ABI platforms enable self-service and enhance the overall user experience.

ABI capabilities include:

1. **Analytics initiatives must focus on value first:** Understanding business priorities and then aligning analytics work with these objectives, widening the breadth of capabilities but narrowing the focus to the specific decisions to be made
2. **Ecosystems bring cohesion and consistency:** In response to increasingly complex requirements from the market, analytics and business intelligence, managers must upskill and combine design, systems and ecosystems thinking to produce sustainable competitive advantage
3. **Governance will extend to the creation, management and sharing of smarter analytics content:** Managing and governing analytics is becoming increasingly important as analytics becomes more accessible, more embedded in business processes and more dispersed across the organization

4.1 Critical Capabilities

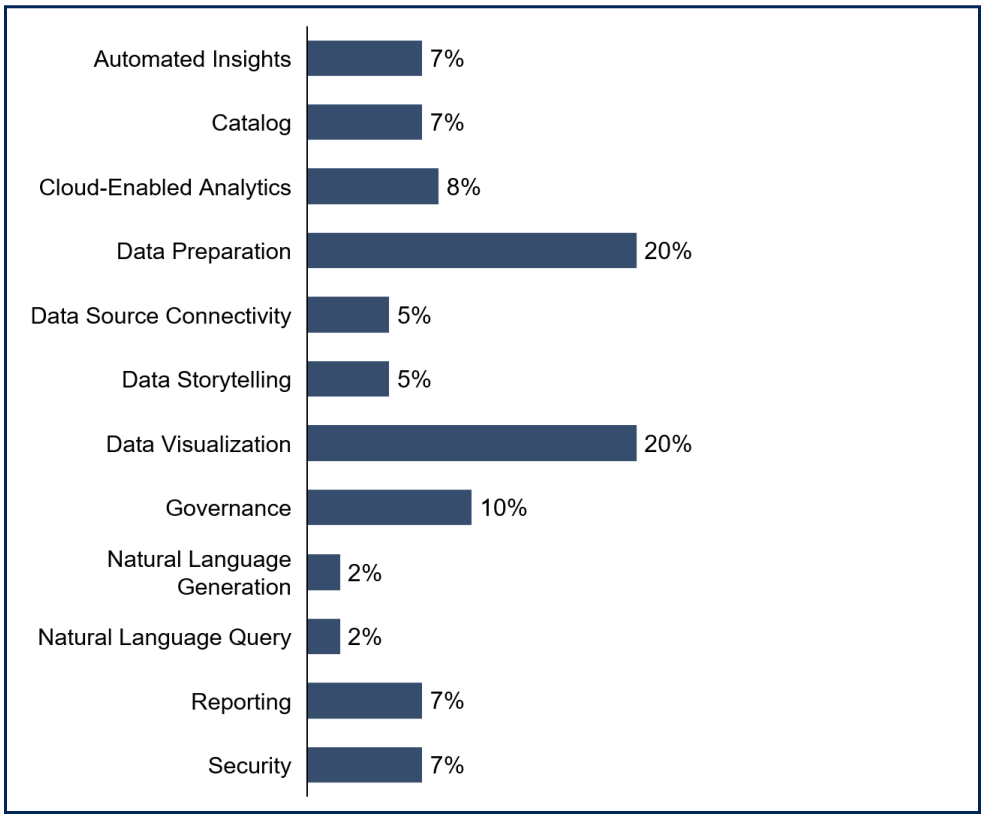
Identifying and shortlisting Analytics and Business Intelligence (ABI) tools begins by identifying critical capabilities associated with the platform and the appropriate weights associated with those capabilities. The weights were carefully chosen based on document reviews, stakeholder interviews and Gartner experience. The critical capabilities for ABI tools are as follows:

Critical Capability	Definition
Automated Insights	A core attribute of augmented analytics, this is the ability to apply machine learning techniques to automatically generate insights for end users (for example, by identifying the most important attributes in a dataset).
Catalog	The ability to display analytic content to make it easy to find and consume. The catalog is searchable and makes recommendations to users.
Cloud-Enabled Analytics	The ability to support building, deploying and managing analytics and analytic applications in the cloud, based on data both in the cloud and on-premises, and across multi-cloud deployments.
Data Preparation	Support for drag-and-drop, user-driven combination of data from different sources, and the creation of analytic models (such as user-defined measures, sets, groups and hierarchies).
Data Source Connectivity	Capabilities that enable users to connect to, and ingest, structured data contained in various types of storage platforms, both on-premises and in the cloud.
Data Storytelling	The ability to combine interactive data visualization with narrative techniques in order to package and deliver insights in a compelling, easily understood form for presentation to decision makers.
Data Visualization	Support for highly interactive dashboards and exploration of data through the manipulation of chart images. Included are an array of

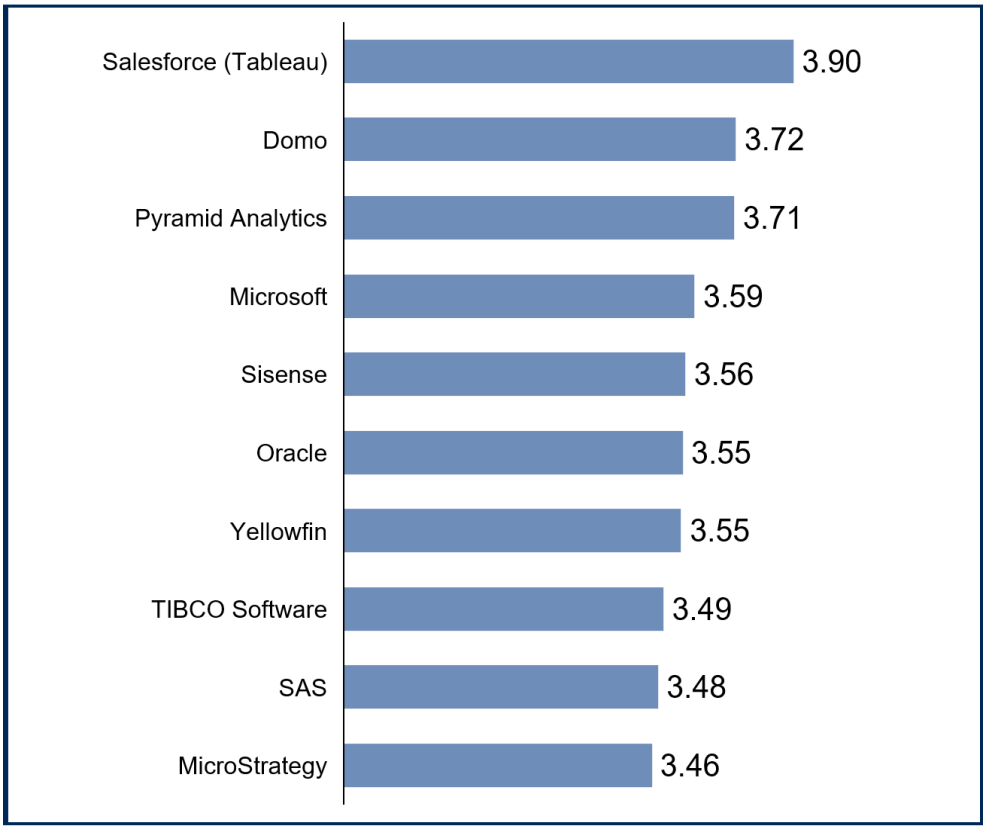
Critical Capability	Definition
	visualization options that go beyond those of pie, bar and line charts, such as heat and tree maps, geographic maps, scatter plots, and other special-purpose visuals.
Governance	Capabilities that track usage and manage how information is shared and promoted.
Natural Language Query	This capability enables users to ask questions of the data using terms that are either typed into a search box or spoken.
Natural Language Generation	The automatic creation of linguistically rich descriptions of insights found in data. Within the analytics context, as the user interacts with data, the narrative changes dynamically to explain key findings or the meaning of charts or dashboards.
Reporting	This capability provides pixel-perfect, paginated reports that can be scheduled and bursted to a large user community.
Security	Capabilities that enable platform security, administering of users, auditing of platform access and authentication.

4.2 Weighted Critical Capabilities

Custom weights were assigned (in collaboration with DFS stakeholders) to the critical capabilities identified above as input to Gartner's "Critical Capabilities for Analytics and Business Intelligence Platforms" tool:



Based on the assigned weights, Gartner identified the initial ranked list of solution options in the marketplace.



4.3 Candidate Analytics and Business Intelligence (ABI) Options

Considering the ABI solution options that align with the weighted Critical Capabilities, Gartner included a mix of top-ranked options in the short-list for BI solution options. Two higher-ranked candidates were eliminated from further analysis. Detailed analysis and approach for each of the four solutions is covered in Appendix B — Business Intelligence Options.

- Pyramid Analytics was eliminated from consideration due to the need for deep technical knowledge, lack of availability of 3rd party integration tools and because it is suited better for on-premises deployments or AWS and Azure options. Other integration options exist but not for Oracle (SAP, snowflake etc..)
- Sisense was eliminated from consideration due to its product immaturity (experiencing very frequent major and minor releases), lack of availability of third-party resources, such as integrators and service providers, and reported problems scaling for performance.

The result is a short-list of 4 ABI options:

- **Salesforce (Tableau)**
- **Domo**
- **Microsoft (Power BI)**
- **Oracle (Oracle Analytics Cloud)**

4.4 Pros and Cons of Each ABI Option

ABI Option	Pros	Cons
Salesforce (Tableau)	▪ Tableau Prep Builder allows business users to combine, shape, and clean data for analysis using drag and drop functionality ▪ Tableau Cloud has integrated data catalog. Tableau Cloud also offers granular security (row-level) and dramatically improves collaboration ▪ Data visualization (especially customized of data visualizations) is one of the strong points of Tableau along with strong user community	▪ Self-service is difficult with complex datasets or with datasets requiring complex computations, and users may require help from IT or analytics team ▪ For Hybrid deployment, need to acquire both Tableau Server and Tableau Cloud, which are licensed separately ▪ From data governance perspective, it does not support per-user object-level security (OLS) for the masking of columns ▪ Advanced analytics not built in - Users must leverage advanced analytics (clustering, regression, etc.) via third-party tools (e.g., Python, Einstein)
Domo	▪ Can support very large datasets - Domo ETL can support 100 million rows during data ingestion ▪ Domo's strongest use case is visual self-service analytics - Domo offers strong interactivity, geographic mapping and support for third-party libraries ▪ Domo's data preparation capability, Magic ETL, offers a simple, visual way to build data pipelines ▪ Domo's introduced Sandbox, an integrated development environment to implement a DevOps approach to analytic content development	▪ Domo's full functionality and specifically rapid processing require purchase of Domo's data storage to periodically refresh data ▪ Domo's weakest use case is augmented analytics. Domo needs to mature its automatic forecasting, clustering and explainable AI features. ▪ Domo is a relatively new vendor, but rapidly growing entrant in ABI space, with new cloud-based capabilities
Microsoft (Power BI)	▪ Power BI deepened its integration within the Microsoft stack, including Azure Synapse, Teams, Dynamics, Azure Purview and Office 365 ▪ Microsoft Power BI's strongest use case is visual self-service analytics. Power BI automatically analyzes the dimensionality of the data and its distribution to infer the best-fit data visualization ▪ For automated insights, Power BI provides key driver analysis, outlier detection and automatic forecasting ▪ Power BI deepened its integration within the Microsoft stack, including Azure Synapse, Teams, Dynamics, Azure Purview and Office 365	▪ Power BI Cloud requires Microsoft Azure deployment - Power BI is a native cloud, multitenant, multiapp SaaS service built on Microsoft Azure ▪ Limited data catalog experience and need to buy Azure Purview. Individual metadata objects cannot be shared across reports without reuse of the entire dataset ▪ Data Governance such as sensitivity labels, alerting of behaviors that violate governance rules require purchase of additional Microsoft products ▪ Power BI has large database storage format option, though visualization speed is affected with large datasets, and often experience glitches, lags and bugs

ABI Option	Pros	Cons
Oracle (Oracle Analytics Cloud)	▪ Oracle Analytics Cloud has prebuilt content for many of Oracle's successful enterprise applications ▪ Oracle Analytics Cloud provides speed for very large datasets through its parallel processing with data processing engine ▪ Oracle scores highly in visual self-service analytics for both data preparation and data visualization. Oracle continues to improve on conversational user experiences, user-friendliness, and automated data storytelling features ▪ Oracle expanded its machine learning (ML) capabilities – it now includes smart recommendations, data repair, and semantic enrichments among others	▪ Oracle scores just below average for governance and security. For governance, Oracle needs to improve its version control and multi-developer support ▪ Oracle rated Variable in support/account management and pricing structure, largely due to the different approaches Oracle takes between cloud versus on-premises customers of its analytic platforms, leading to differences in customer experience for customers using cloud and on-premises products

5.0 Inventory of Documents, Systems Reviewed and Stakeholders Interviewed

In the discovery process, Gartner interviewed 12 stakeholders and reviewed more than 20 documents. Information gathered focused on FLAIR current state, desired PALM requirements, prior strategy and planning documents, as well as system selection best practices via Critical Capabilities mapping. Inventory of these utilized resources is in the tables below.

Stakeholders interviewed:

Organization	Interviewee	Role
DFS Florida PALM Project	Jimmy Cox	Project Director
	Jennifer Reeves	Reporting Architect
	Jason Shiver	Technical Architect
	Nitin Koka	Data Migration and Conversion Specialist
DFS Office of Information Technology	Stacey Pollock	Strategic Planning Coordinator
	Arlene Porta	IT Business Consultant Manager
	Dan Leonard	Systems Programming Consultant
Department of Business and Professional Regulation	John Mounts	Accounting Systems Analyst
Department of Economic Opportunity	Lisa Simpson	Revenue Program Administrator, Bureau of Financial Management
Department of Health	Robert Herron	Director, Division of Administration
Department of Transportation	Lisa Evans	FL PALM–Work Program Integration Manager
	Mark Rissinger	Business System Administration Manager

Documents and Assets Reviewed:

FL DFS Documents Reviewed
D38 Reporting Strategy
D41 Technical Architecture Strategy
D42 Data Architecture Strategy
D47 Data Conversion and Migration Strategy
D59 Interface and Integration Strategy
D104 Data Management Plan
D459 Requirements Traceability Matrix
Florida PALM Requirements IW Assessment
ID20 Reporting Analysis Approach
FLAIR System Documentation • FLAIR website • North Highland FLAIR Study • IW Tools List • IW Availability • Warehouse Interfaces • Warehouse Batch Flow Description
ISDS14 PreDDI Reporting Analysis
Legacy Report Mapping
Solution Expectations
WP318 Data Governance Plan
Florida PALM Website: • Pathfinder • Approach documents • Reports Catalog • Chart of Accounts • Chart of Accounts Design Structure Overview • Data Dictionary

Gartner Assets Leveraged
Critical Capabilities research for Data Integration Tools, Analytics and Business Intelligence Platforms, Cloud Database Management Systems for Operational Use Cases, and Cloud Database Management Systems for Analytical Use Cases
Magic Quadrant research
Peer Insights data
Vendor Ratings research
Other Gartner assets and intellectual property

Gartner then synthesized this discovery into four themes that guided mapping of specific use cases derived from functional and technical requirements to critical capabilities. These themes were: **self-service**, **tool standardization**, **organizational change management**, and **performance scalability**.

For **self-service**, stakeholder interviews revealed the importance of users being able to perform basic analysis, visualization, and reporting without relying on outside technical or other support and without significant training. More advanced users should likewise be able to perform more advanced analysis and actions with similar training, but also have access to learning resources for deeper self-guided education. Access restrictions should be straightforward to implement and effective at the database, table, or even row-level, so that e.g., sensitive data can only be accessed by users with appropriate privileges.

For **tool standardization**, the Data Warehouse Solution must connect and ingest data from a variety of sources, but also expose data for consumption, as identified in both stakeholder interviews and the PALM Requirements documentation. The data to be stored is mostly structured, but some sources do contain unstructured data. Relevant data currently resides in a mix of systems, from on-premises to in the cloud, and from Oracle, IBM Db2 to SQL-based. Also of significant note is the requirement to preserve access to historical data. The Solution must integrate with third party tools in both these on-prem and cloud-base environments.

For **organizational change management**, discovery highlighted the importance of making training and documentation readily available and accessible. The ability for users to search on their own to determine where a certain type of data is stored or what values in a particular table column mean would help increase work efficiency. Given the wide variety of data to be integrated, a means of creating, scheduling, and managing processing jobs that extract, transform, and load data into target systems and tables is of utmost importance. Multiple comprehensive mapping documents are needed. For extract sources, ownership, data lineage, metadata, and other governance considerations should be clearly shown. Transformations for each data pipeline should be clearly documented and explained. Load target tables should be similarly documented, along with intended use cases and user audience.

Finally, for **performance scalability**, FLAIR Information Warehouse remains remarkably performant in its current configuration for standard queries. Stakeholders voiced frustration, however, with slow performance of the mainframe and some long-running, operational queries that are scheduled to run off-hours and sometimes exceed their allotted time windows. With an ever-growing number of users and uses, any IW Solution must accommodate a variety of concurrent workloads from a significant number of users without degraded performance, maintain an audit trail (e.g., track usage), and efficiently manage access control.

6.0 Minimum Requirements and Use Cases

To analyze the functional and technical needs of DFS and the PALM project, Gartner collaborated with DFS to define “Use Cases.” These use cases summarized, organized, and abstracted critical capabilities and functional and technical requirements into easily understood and relatable scenarios. Successful execution of a use case implies successful execution of the associated functional and technical requirements. Use case descriptions can be found in Appendix C — Use Cases and Roles.

The following table lists the use cases and associated critical capabilities that are mapped to those use cases.

Use Cases	Critical Capabilities
Comprehensive and user-friendly Access Management	Security, Performance Monitoring and Admin
Ensure Data Warehouse performance meets business user needs	Automated Perf Tuning/Optimization, Dynamic Elasticity
Tool provides capability to conduct various types of data analysis while enhancing end-user experience	Reporting
A&BI platform has the capability to drill down on multiple dimensions, filter on parameters and perform free-text search	Reporting, Advanced Analytics
Data Warehouse can connect and ingest data from various sources natively but can also expose data for consumption	Data Preparation, High-Speed Processing and Ingest, Distributed Access
Data Warehouse must integrate with third party tools in both on-prem and cloud environments	Data Source Connectivity, Multi/Intercloud/Hybrid Deployment
Successful Migration to the new Information Warehouse needs to Powered by Training and Documentation	Not Applicable
Data platform should provide means to display and interact with data as well as produce graphics and visualizations	Data Visualization, Natural Language Generation, Data Storytelling
Data platform needs tools to create, schedule, and manage processing jobs that extract, transform, and load data	Data Preparation, High Speed Processing and Ingest
Data platform should include ability to track usage and manage how data is accessed, validated, and archived	Financial Governance, Performance Monitoring and Admin, Workload Management
Data platform needs resources for documenting housed data, such as metadata management, ERDs, and a data dictionary	Catalog, Advanced Analytics
Data platform can monitor specified sources and send alerts or automate tasks based upon preset condition triggers	Automated Insights
Cloud-based analytics tools integrate legacy resources, and workloads run independently and scale automatically	Cloud-Enabled Analytics

7.0 Top Three Recommended Solution Options

Gartner was asked to identify and prioritize the top 3 choices of DW solutions and ABI tools from the shortlisted vendors above. Gartner considered the individual merits of each solution but also the combination that will be best suited to meet FL DFS' needs. Gartner's assessment resulted in the following three solution options, in priority order. For each option, the overall project timeline is provided in **Section 8.0** and change management is described in **Section 8.2 Phase 1, Steps 4 and 5**.

7.1 Option #1 – Oracle ADW with Oracle Analytics

Oracle is the primary database for PALM operational data in Oracle Cloud Infrastructure (OCI). Oracle Autonomous Data Warehouse (ADW) for the DW tool and Oracle Analytics Cloud (OAC) for the ABI tool will ensure DFS can rapidly build reports, enable self-service, scale for performance as needed and leverage visualizations to provide a seamless user-experience. Pros and Cons for this combination are:

Pros	Cons
▪ Consolidation of data from a wide variety of Oracle data sources and import of Oracle models into the OAC Platform—including procurement, operations, and finance etc. is faster leading to rapid development cycles ▪ As FL DFS is an Oracle shop, OAC writes directly into ADW and automation features in OAC significantly reducing operational costs ▪ Oracle Autonomous Data Warehouse can potentially be ported to Azure using Oracle's database service for integration with the State of Florida's other datasets ▪ As the vendors for both Cloud DBMS and ABI (Oracle) are the same, faster approvals for new vendors that are onboarded onto OCI, thereby reducing timelines for implementation & integration of platforms	▪ Using Oracle products poses a Vendor lock-in for FL DFS. DFS would become highly dependent on the Oracle ecosystem and any changes in pricing may lead to unavoidable high overhead or recurring costs throughout the implementation phase ▪ OAC favoring contracts for Oracle Analytics Cloud using OCPU (processing / compute-based units), no user restrictions on the platform. In the short term, this can be a cheaper solution, but as analytical models become complex, price increases based on OCPU usage needs to be monitored

Change Management Impact (Minimum):
(See Section 8.2, Phase 1, Step 5 for Change Management Plan)

- Operational data stores are in Oracle
- FL DFS resources (internal and external) are familiar with Oracle database and reporting platforms

Project Timeline Impact (Minimum):
(See Section 8.0 for proposed project plan and timeline)

- Data integration jobs to move data from PeopleSoft to Oracle ADW are the quickest to implement
- OAC reports have native options to upgrade, though some configuration changes will be required

7.2 Option #2 – Oracle with Domo

Oracle Autonomous Data Warehouse (ADW) service combined with Domo business intelligence comes as the second-best recommended solution. Domo's rapid report delivery, along with excellent visualizations, self-service and high-performance make this combination a compelling combination to consider. Pros and Cons for this combination are:

Pros	Cons
▪ Domo can integrate and write back to Oracle databases using Domo's connectors. Third-party connectors are also available for Domo & Oracle Database to simplify integration via visual interfaces instead of coding and additional third-party features such as automation of tasks, hybrid integrations, user logging, etc. The ecosystem for Domo & Oracle is vast to enable easier data consumption. ▪ Rapid data ingestion into Domo using proprietary Database connector (provided by Oracle) results in rapid generation of custom and ad-hoc reports; a key data usage pattern at DFS ▪ Higher security as Domo doesn't allow unauthorized IPs to access the Domos platform. If an IP address not approved, it will lock access. This security measure ensures that the data remains safe. Since data traverses out of DFS ecosystem in the case of Domo, securing data assets is critical and provides that capability.	▪ Need to buy Domo's storage - Domo's live cache layer enables lightning-fast queries ▪ Perpetual data transfer costs might be involved for transferring data to Domo's temporary storage ▪ Domo is a relatively new vendor and long-term stability, viability and connectivity to Oracle needs to be seen ▪ The need to manually whitelist IP addresses to the database server requires ongoing manual effort, especially for growing user pools

Change Management Impact (Average):
(See Section 8.2, Phase 1, Step 5 for Change Management Plan)

- Operational data store and data warehouse still remain on Oracle, reducing change management impact
- Need to retrain end-users to work with Domo, a new but intuitive interface for accessing reports

Project Timeline Impact (Average):
(See Section 8.0 for proposed project plan and timeline)

- Data integration jobs to move data from PeopleSoft to Oracle ADW are the quickest to implement
- Need to schedule/test processes to move data to Domo for rapid-reporting impacting project timeline(s)
- Existing reports need to be re-written in Domo, impacting project timelines

7.3 Option #3 – Teradata with Tableau

Teradata and Tableau emerged as the best product individually in DW and ABI categories, respectively. Teradata's massive data processing capability in addition to Tableau's leading reporting capability means that DFS must consider this combination before finalizing a product. Visualizations, self-service along with performance are hallmarks of this combination as well. Pros and Cons of this combination are:

Pros	Cons
▪ Teradata's massive data processing capability alongside "intelligence embedded within Tableau" ensures rapid response to ad-hoc queries generated by users ▪ Tableau Server is integrated out-of-the-box with Teradata Vantage; DFS can leverage the free 30-day experience, which reduces time to prototype for users and does not require additional licenses from IT team to purchase Tableau Server ▪ Teradata Database can run on Azure IaaS which state of Florida runs on, and work with Tableau as well on Azure hosted Teradata	▪ Integration of Tableau and Teradata is a problem for some users. They face errors version compatibility errors when publishing to server or refreshing a workbook that was using Teradata DB as data source ▪ Complex ETL to transfer data from PALM Oracle model to Teradata Vantage model ▪ Potential large data egress and networking costs involved for data transfer from Oracle PALM to Teradata Vantage – on a daily on-going basis ▪ Out of the box operational reports are not possible for Teradata, as it doesn't have ODS facilities – but Tableau integration can help create reports though with more manual efforts

Change Management Impact (Highest):
(See Section 8.2, Phase 1, Step 5 for Change Management Plan)

- Operational data store will remain in Oracle but the data warehouse will migrate to Teradata, significantly increasing the change management impact
- Need to retrain end-users to work with Teradata, a powerful but completely new data warehousing platform
- Need to retrain at least some users to work with Tableau

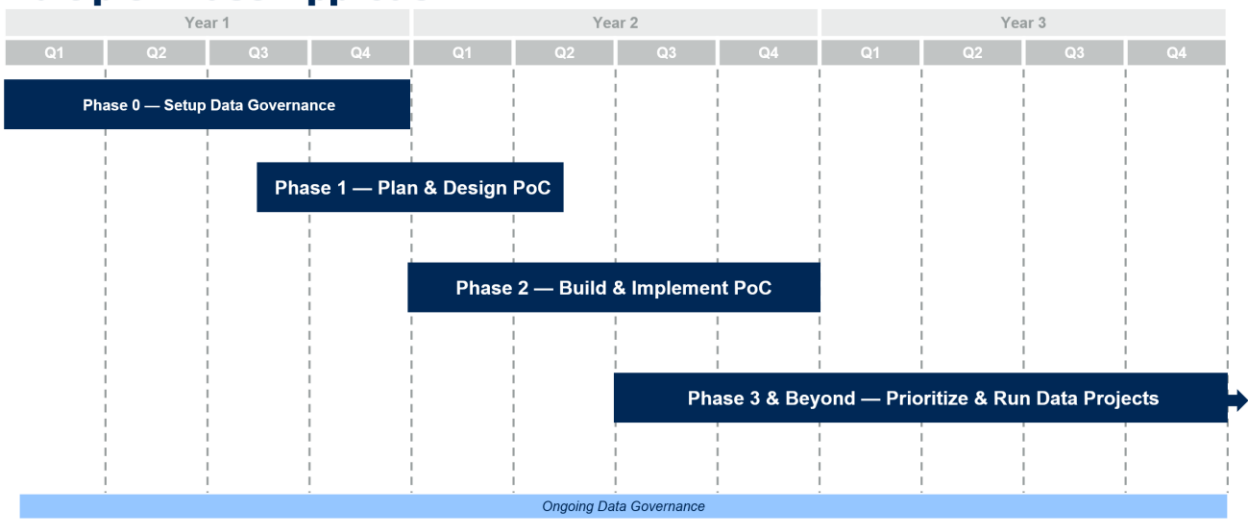
Project Timeline Impact (Average):
(See Section 8.0 for proposed project plan and timeline)

- Data integration jobs to move data from PeopleSoft to Teradata data models will significantly impact the timeline
- Existing reports need to be re-written in Tableau impacting project timelines

8.0 Time Sequenced Initiatives

Procuring a Data Warehouse solution along with ABI tool is a starting point for implementing and realizing use cases. A holistic set of activities need to be executed in addition to installing the Data Warehouse and ABI solution. Below is the project plan and timeline to implement each option followed by detailed explanation of each of the activity.

FL DFS Data and Analytics (D&A) Implementation Roadmap — Multiple Phase Approach



Explanation for each of the phases is as follows:

D&A Implementation Roadmap — Activities and Outcomes

Phase 0 – Setup Data Governance

1. Mature D&A Operating Model
2. Establish & Operationalize Data Governance Groups

Outcomes

- Data Governance Groups is fully operational
- D&A Operating model is approved

Phase 1 – Plan & Design PoC

1. Prioritize and Design PoC Use Case
2. Design Detailed D&A Architecture
3. Procure PoC D&A Tools & Technology
4. Create D&A Communications Plan
5. Set up OCM Team and Change Plan

Outcomes

- Data Insights Group is established
- PoC Use Case Design is complete
- Detailed D&A Architecture with data model and tools and technologies is finalized
- Communication Plan is defined
- OCM Team and Change Plan is established

Phase 2 — Build & Implement PoC

1. Create D&A PoC Environment
2. Build & Implement PoC Use Case
3. Execute OCM Plan for PoC Use Case
4. Create and Pilot Data Literacy Plan

Outcomes

- D&A Environment is up and running
- PoC Use Case Implemented in production
- Initial End User Training as part of OCM around PoC Use Case is completed
- Data Literacy Plan and Pilot is completed

Phase 3 & Beyond – Prioritize & Run Data Projects

1. Build & Implement Use Cases
2. Execute OCM Plan for Use Cases in First Data Project
3. Execute Data Literacy Plan
4. Plan, Design and Implement Product Backlog over Multiple Data Projects

Outcomes

- First Data Project's Use Cases are implemented in Production
- OCM Plan for First Data Project is executed
- End Users are fully trained
- Data Literacy Learning Plans are in place and getting executed on regular basis
- Product Backlog implemented over time

In the subsequent pages, we will see summaries for each of the activities described under Phases 0 through 3.

8.1 Phase 0 – Set up Data Governance

FL DFS has a hub and spoke model (unofficially implied) where DFS' data is consumed by various agencies. First set of activities should focus on formalizing the operating model. In parallel, DFS data governance group must be established to provide support during the implementation of solution. See Appendix C — Use Cases and Roles for description

Phase 0 Step 1: Mature D&A Operating Model

Overview

- This initiative focuses on maturing the existing operating model (decentralized) to a more relevant type (Executor or Federated) Operating Model
- This initiative continues to address the most critical gaps in Data Management (DM) skills and capacity at state of Florida to achieve the objectives of the D&A needs and the initiatives remaining in the Roadmap

Business Benefits/Supported Goals

- Improves the likelihood that the initiatives will be achieved within the timeframes laid out on the roadmap
- Brings appropriate skills and capacity to the Data Management program in order to meet the needs of DFS and other agencies

Primary Owner(s)

D&A Strategy Lead, CDO

Estimated Core Work Effort

9-12 months and ongoing management

Dependencies

N/A

Key Risk	Risk Description	Mitigation Strategy
Delay in onboarding qualified candidates	Internal processes within state of FL delays on-boarding of qualified candidates	▪ Begin development of job descriptions and sourcing strategy as soon as possible ▪ Explore how responsibilities for current roles can be adjusted to meet current skill gaps
Employee Retention	Repetitive and monotonous roles at the State can lead to qualified employees leaving their current jobs/roles	▪ Begin cross pollination of skills and knowledge to reduce the impact of knowledge lost ▪ Document all key artifacts to enable proper Knowledge transfer

Key Activities	Description
1. Refine key Data Management roles and teams under DFS	❑ Refine staffing needs for Data Management based on the operating model roles, existing FL DFS roles, the roadmap of initiatives and expected business demand ❑ Continue to recruit and staff prioritized roles that do not exist or flag for supply from a potential implementation partner (for the new platform/solutions)
2. Refine the Data Management organizational structure and refine DM Charter	❑ Refine the Data Management organizational reporting structure ❑ Update Data Management Charter to include additional components based on identified needs (add/remove sections)
3. Define Data Management catalog	❑ Define a Catalog of D&A solutions including descriptions, dependencies, SLAs, effort (and cost estimations if applicable) ❑ Additions and deletions should be reviewed, approved, and communicated by the Data Management Leader.
4. Refine Data Management service delivery model (Optional)	❑ *If applicable, define the Data Management service delivery model.*

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Phase 0 Step 2: Establish & Operationalize Data Governance Groups

Overview

- This initiative focuses on designing and implementing the appropriate Data Management Governing Committee (DMGC) and its ways of working with the other agencies/governing committees.
- This initiative also establishes the Terms of Reference for Data Governance, ensuring clear scope of responsibilities and decision requirements for the Data Management governing bodies

Business Benefits/Outcomes

- Enables FL DFS to ensure that impactful investments are made, data policies and controls are implemented, high data literacy exists, and the benefits of treating data as an enterprise asset are communicated
- Documents the measurable benefits of the use of data across the organization and particularly at the enterprise level.
- Implements adaptive data governance and policies based on the importance and sensitivity of the data assets in question

Primary Owner(s)

Data Governance Lead, CDO

Estimated Core Work Effort

6 months, with ongoing management

Dependencies

- Phase 0 Step 1: Mature D&A Operating Model

Key Risk	Risk Description	Mitigation Strategy
Lack of organizational commitment	Due to the decentralized operating model at state of Florida, there is a lack of an "executive champion" to advocate for Data Governance	▪ Leverage an executive level "champion" to advocate for Data Management. ▪ Ensure there is a clear purpose and scope for governance groups with the appropriate decision makers who have a vested interest in data management ▪ Establish organizational mandate for a data-driven culture

Key Activities	Description
1. Design Data Management governing bodies	❑ Establish Charter and terms of reference for each of the governing bodies. ❑ Identify and recruit membership. ❑ Begin holding governance discussions/meetings (e.g., begin developing and approving key governance artifacts/make key governance decisions). ❑ Establish a mechanism for feedback on how governance groups are operating and continuously improve.
2. Identify and deploy stewardship roles	❑ Define domains and subdomains. ❑ Identify lead (and data stewards) by data domain and subdomain. ❑ Develop role descriptions and incentives with help of HR. ❑ Update the Data Governance charter to reflect Steward membership. ❑ Develop Stewardship playbook highlighting responsibilities, processes, resources, etc. ❑ Train and deploy data stewards.
3. Define Data Management Value and Quality KPIs	❑ Identify points of organizational value that DMGC needs to monitor (e.g., strategic goals). ❑ Define KPI metrics based on focused areas. ❑ Socialize and communicate proposed metrics with key leaders.
4. Define Data Governance artifacts and processes	❑ Prioritize and create the Governance artifacts that are needed to achieve goals ❑ Prioritize and create the data governance processes for data consumption

8.2 Phase 1 – Plan & Design Proof of Concept (PoC)

A Data Governance group will be responsible for successful implementation and adoption of DW and ABI solution. The approach to successful implementation will begin with establishing use cases and executing a PoC.

Phase 1 Step 1: Prioritize and Design PoC Use Case

Overview

- This initiative identifies the criteria needed to evaluate the costs and benefits of data management use cases for execution in the Proof of Concept – while these use cases can derive from already defined 13 use cases, there needs to be customization to define appropriate use cases
- As well, this initiative selects the Use Case(s) that will be executed in the proof of concept and puts in the effort to fully articulate those chosen Use Cases

Business Benefits/Outcomes

- Ensures that the most impactful Use Cases are chosen for the Proof of Concept, the success of which is pivotal for continuing with investments in Data Management capabilities at FL DFS
- Ensures that the requirements of the Use Case(s) are well understood to assist in planning, Proof of Concept design, and implementation discussions.

Primary Owner(s)

D&A CoE, D&A Strategy Lead

Estimated Core Work Effort

9 months

Dependencies

- Phase 0 Step 1: Mature D&A Operating Model
- Phase 0 Step 2: Establish & Operationalize Data Governance Groups

Key Risk	Risk Description	Mitigation Strategy
PoC Use Case not impactful	Selected Use Cases for the PoC do not address key pain points in the Current State or do not demonstrate objectives for Data Management sufficiently	▪ Articulate Use Cases more clearly and contextually with various stakeholders and obtain their buy-in before finalizing on the use cases ▪ Ensure that the Vision, Strategy and Objectives for Data Management at FL DFS and the State of FL serve as inputs to the Use Case evaluation criteria

Key Activities	Description
1. Develop Proof of Concept Use Case Evaluation Criteria	❑ Identify the characteristics of a data management use case that determine its: ▪ **Ease of Implementation or Complexity**: e.g., existing or new source system data required, business term standard definitions required, external datasets required, new integration methods required, data quality issues to be resolved, assistance needed from resources outside Data Management, etc. ▪ **Business Impact**: particularly as the foundation for continuing with Data Management roadmap (e.g., enterprise data warehouse, source system data transformations and ingestion, business intelligence platform, speed to business insight, self-service, help tell our story)
2. Develop Data Management Use Case Template	❑ Update existing or create new Use Case template for the detailed articulation of the data management uses cases, including the ability to capture information on Ease of Implementation and Business Impact
3. Create PoC Use Cases using new template	❑ Work with the business to populate the use case template at an appropriate level of detail
4. Develop Evaluation tool	❑ Complete the evaluation tool to measure the Ease of Implementation and Business Value of each documented Data Management use case ❑ Attach weightings to elements as required
5. Confirm Proof of Concept Priorities	❑ Based on scores, confirm the top one or two uses cases for enablement in the proof of concept ❑ Secure participation in the Proof of Concept from the business owner of the use case

Once Use Cases have been identified, DFS will have to determine the appropriate Data Warehouse components that will need to be stood up.

Phase 1 Step 2: Design Detailed D&A Architecture

Overview

- This initiative focuses on confirming how FL DFS will solution the technologies and capabilities required by the high priority Use Cases(s) identified in Phase 1 Step 1
- Solution answers will include a mix of FL DFS existing and desired technologies (meta-data, master data tools etc.), vendor preferences, and whether the solution will reside on-premises or in the cloud

Business Benefits/Outcomes

- Confirms the technology scope of the prioritized use cases and beyond
- Provides the foundation for determining which technologies and capabilities should be sought from an implementation partner

Primary Owner(s)

Data Architect, EA Managers

Estimated Core Work Effort

9 months

Dependencies

- Phase 1 Step 1: Prioritize and Design PoC Use Case

Key Risk	Risk Description	Mitigation Strategy
Over complicating Legacy Data Management (DM) technology	DFS is using FLAIR IW system currently; there will be a tendency to repurpose FLAIR IW to meet future DW needs that can lead to a complicated DW environment	▪ Existing data management tools and technology may appear economically prudent, but may not be scalable or have the ability to meet the next set of production use cases efficiently or effectively ▪ Keep scalability, other architectural principles and future use cases in mind when determining architectural components

Key Activities	Description
1. Establish Data Management architectural vision, principles and approach	❑ Establish architectural imperatives that will be adhered to for the prioritized use cases and beyond
2. Illustrate required PoC components in the Target DM Reference Architecture	❑ Review the Proof-of-Concept prioritized use cases ❑ Identify the Data Management components required to enable them, the desired solution (i.e., existing, new) and the acquisition strategy (i.e., buy, rent, on-premises, cloud)

Successful validation of architectural components will entail procurement of D&A tools & technology. If, DW and ABI solution has not been procured by now, this is a good time to complete the procurement. Subsequent steps cannot be complete until Phase 1 Step 3 is done.

Phase 1 Step 3: Procure PoC D&A Tools & Technology

Overview

- This initiative determines how the identified tools required for conducting the Proof of Concept will be evaluated, and acquired
- The objective for the Proof of Concept is to deliver observable business value, the tangible achievement of as many Data Management objectives as possible

Business Benefits/Outcomes

- Documents and gains approval for selected D&A tools and technologies for future use case needs and paves the path for a successful delivery of the overall D&A platform

Primary Owner(s)

Solutions Architect, Technical Managers

Estimated Core Work Effort

3 months

Dependencies

- Phase 1 Step 2: Design Detailed D&A Architecture

Key Risk	Risk Description	Mitigation Strategy
Unsuccessful Proof of Concept due to poor selection of tools and technologies	Attempt to showcase PoC with existing DFS tools or tools with limited functionality may result in unsuccessful PoC	▪ Use the list of tools and platforms selected during the current phase of work and request a demo before down selecting ▪ Conduct reference checks on PoC tool finalists using peer groups or forums

Key Activities	Description
1. Identify Options for Tool Selection	❑ Options could include In-house research, RFI only, RFI followed by RFP, and Proof of Concept
2. Evaluate Pros and Cons of Selection Options	❑ Articulate the costs, benefits, risks and mitigation strategies for the various Selection options
3. Document Selection Options and Obtain Approval	❑ Package the Options in a document to obtain the necessary technology and business user approvals on the down-selected combination

Implementation of D&A Tool and Technology and the use cases will need to be communicated in a systematic, clear way to increase adoption. Creation of a D&A Communications Plan is crucial to accomplish this outcome.

Phase 1 Step 4: Create D&A Communications Plan

Overview

- This initiative focuses on establishing and operationalizing a communication plan to make the enterprise aware of the plans, objectives, services and value that Data Management offers.
- Benefiting from data requires users to change the way they do their jobs. A clear and consistent message should be developed to raise FL DFS's understanding of the opportunities, success stories and benefits gained from using data.

Business Benefits/Outcomes

- Informs FL DFS D&A program changes, new services/capabilities and how Data Management is structured
- Strengthens Data Management program buy-in from FL DFS stakeholders.
- Improves business transparency into what Data Management has in store today and what is planned

Primary Owner(s)

Change Management Analyst, Executive Committee

Estimated Core Work Effort

3-6 months plus ongoing management

Dependencies

- Phase 0 Step 2: Establish & Operationalize Data Governance Groups

Execution Guidance and Assumptions

- The communications plan should include the following:
  - Key Messages
  - Audiences and their Key Issues
  - Messages by Audience including benefits/value, metrics, etc.
  - Channels used to communicate
  - Action plans (e.g., milestones, action items, responsibilities)
  - Feedback loops to capture the effectiveness of communication.

Key Risk	Risk Description	Mitigation Strategy
Alignment with broader State of FL goals	Communication can be misinterpreted if not coordinated with agency-wide activities	▪ Data Management communication plan should be aligned with the State of FL communications, and actions relating to data and analytics should be coordinated and aligned with agency-wide activities

Key Activities	Description
1. Identify target audiences and preferred communication methods	❑ Identify stakeholder segments (may be done through personas) to receive communications from Data Management (e.g., board of directors, executive team, midlevel management, user community). ❑ Understand impact to stakeholders from new operating model ❑ Determine the communication approach and methods by which target stakeholders will prefer to receive communications (e.g., email, conference call, in-person meeting).
2. Create communication plan and deliver communications	❑ Develop the communications plan. ❑ Tailor marketing, education, and communication materials to the respective stakeholder groups and communicate as needed.
3. Iteratively improve communication	❑ Receive feedback from FL DFS stakeholders on communications. ❑ Iteratively improve future communication details, style and frequency that are preferred and required.

Governance group (or committee) needs to approve the communication plan. Post approval, it is crucial to setup an OCM team and a change plan. Selected use case must have some components of change that need to be actively managed by the OCM team.

Phase 1 Step 5: Setup OCM Team and Change Plan

Overview

- This initiative focuses on establishing and operationalizing an Organization Change Management (OCM) team to get DFS and its consumers ready from the impacts of the various data projects
- Benefiting from data requires users to change the way they do their jobs. A clear and consistent OCM plan should be developed to raise FL DFS's understanding of the change impacts. The plan should incorporate the change impacts like user guide modifications, training and knowledge transfer

Business Benefits/Outcomes

- Strengthens Data Management program buy-in from FL DFS stakeholders.
- Improves business transparency into what Data Management has in store today and what is planned
- Prepares the team in advance of the changes being implemented
- Drives the workforce to be more adaptive to culture changes

Primary Owner(s)

Change Management Analyst, Executive Committee

Estimated Core Work Effort

3-6 months plus ongoing management

Dependencies

- Phase 0 Step 2: Establish & Operationalize Data Governance Groups

Execution Guidance and Assumptions

- The OCM plan should include the following:
  - Change Management Impacts
  - User Guide Changes
  - Training
  - Knowledge Transfer
- Show continuous executive support for new operating model

Key Risk	Risk Description	Mitigation Strategy
State of Florida agencies' alignment, adoption and culture change	OCM Team and Plan should be thoroughly vetted and approved by key stakeholders to ensure adoption	▪ OCM activities relating to data and analytics should be coordinated and aligned with the Data Management communication plan. ▪ Impacted stakeholders should be well informed during the entire process to drive buy in and acceptance

Key Activities	Description
1. Identify the business changes due to the PoC and data projects use cases	❑ Identify the business changes and stakeholders impacted ❑ Establish OCM Team ❑ Schedule change management meetings to discuss the changes needed to implement the PoC and data projects ❑ Create a change management timeline with detailed activities
2. Create Training Plan	❑ Develop the training plan, including for new technologies that may be incorporated ❑ Tailor learning paths to the respective stakeholder groups and communicate as needed. ❑ Receive feedback from FL DFS stakeholders on training ❑ Iteratively improve future training details, style and frequency that are preferred and required
3. Create Knowledge Transfer Plan	❑ Develop the knowledge transfer plan to educate various resources (internal and external) on key data-related activities and processes ❑ Receive feedback from FL DFS stakeholders on knowledge transfer. ❑ Iteratively improve future knowledge transfer details, style and frequency that are preferred and required

8.3 Phase 2 – Build & Implement Proof of Concept (PoC)

With all the foundational components in place, DFS can start executing on the PoC. First step would be to create the D&A PoC environment.

Phase 2 Step 1: Create the D&A PoC Environment

Overview
- This initiative creates the needed PoC environment (Development, Test and Production) to build and implement the use cases

Business Benefits/Outcomes
- Future State D&A PoC environment is established

Primary Owner(s)
Technical Managers, Technical Directors

Estimated Core Work Effort
1-2 months

Dependencies
- Phase 1 Step 2: Design Detailed D&A Architecture
- Phase 1 Step 3: Procure PoC D&A Tools & Technology

Execution Guidance and Assumptions
- Ensure appropriate sourcing methods are in place to procure the needed tools and technologies for the PoC D&A environment
- This environment is usually a subset of final production environment

Key Activities	Description
1. Procure additional D&A PoC tools and technologies	❑ Develop sourcing strategies to procure the necessary new tools (in addition to DW solutions and ABI platform) such as metadata platform, master data tool, data quality tool etc.. ❑ Procure any additional licenses for existing tools or use trial license for PoC purposes
2. Install, configure and smoke test the PoC environment	❑ Conduct System and User Acceptance Testing ❑ Move test PoC Environment into production PoC environment ❑ Create appropriate documentation like Batch Run Book etc.

Key Risk	Risk Description	Mitigation Strategy
Lack of proper sourcing methods causing delays in PoC	Procurement team is not involved, or the process takes too long at DFS to source technology tools/platforms	▪ Engage the procurement team as early in the process to access the sourcing needs to acquire any new tools and technologies ▪ Look for alternative similar tools and technologies that are easier to procure in case a particular tool of choice is hard to procure

Using the identified tools and technologies, build and implement the use cases.

Phase 2 Step 2: Build & Implement PoC Use Case

Overview
- This initiative evaluates the selected tools and partner (if applicable) for a longer-term commitment based on the success of a short-term Proof of Concept for one or two prioritized use cases
- One of the key outcomes of a successful Proof of Concept is the ability to move the in-scope use case(s) directly into production, and organizational commitment to continue with the Data Management roadmap

Business Benefits/Outcomes
- Reduces cost and risk of long-term contracting with a partner and tools prior to the successful, implementable demonstration of skills, capabilities and relationship management
- Accelerates speed to business value by relying at least partially on experts who have implemented similar use cases with other organizations on the chosen technologies
- Serves as an excellent vehicle for knowledge transfer to FL DFS resources

Primary Owner(s)
D&A CoE, D&A Strategy Lead

Estimated Core Work Effort
12 months

Dependencies
- Phase 1 Step 1: Prioritize and Design PoC Use Case
- Phase 1 Step 2: Design Detailed D&A Architecture
- Phase 1 Step 3: Finalize PoC D&A Tools and Technologies

Execution Guidance and Assumptions
- Assume that the prioritized PoC use cases will involve integrated reporting requirements and thus the need for an Data Warehouse/ODS
- Involve business users to provide feedback, guidance, evangelism and evaluation

Key Activities	Description
1. Build PoC Use Cases	❑ Develop technical design for the data integration needs ❑ Develop technical design for the data storage needs ❑ Develop technical design for the visualization needs ❑ Code and test the integration jobs ❑ Deploy the database model to the data storage tools ❑ Code and test the visualization needs ❑ Identify PoC KPIs that will be used to assess business impact
2. Implement PoC	❑ Conduct System and User Acceptance Testing ❑ Move test PoC into production ❑ Create appropriate documentation like Batch Run Book etc.
3. Evaluate Proof of Concept Success	❑ Review the success criteria and Business-IT feedback to evaluate the proof of concept ❑ Document the rationale for continuing with the D&A approach for future data projects, or moving forward with a different option

Key Risk	Risk Description	Mitigation Strategy
Cost of an Unsuccessful Proof of Concept	Decentralized operating model at the State of Florida could mean agencies are not fully engaged during PoC implementation and do not provide early feedback	▪ Keep all parties fully engaged during the entire PoC and use agile methodologies to drive early feedbacks ▪ Strive for a partner to put "skin in the game" as an indication of probability of success in the proof of concept and over the long-term ▪ Take advantage of independent and expert advice on proof-of-concept finalists

Execute on OCM to inform and manage the changes resulting from implemented use cases across DFS and the agencies.

Phase 2 Step 3: Execute OCM Plan for PoC Use Case

Overview
- This initiative focuses on executing the organization change management plan for the PoC use case by providing the necessary training and procedure updates to the impacted stakeholders and end users.

Business Benefits/Outcomes
- Strengthens Data Management program buy-in from FL DFS stakeholders.
- Improves business transparency into what Data Management has in store today and what is planned
- Prepares the team in advance of the changes being implemented
- Drives the workforce to be more adaptive to culture changes

Primary Owner(s)
Executive Committee, Change Management Analyst

Estimated Core Work Effort
3-6 months plus ongoing management

Dependencies
- Phase 1 Step 9: Setup OCM Team and Change Plan
- Phase 2 Step 3: Build & Implement PoC Use Case

Execution Guidance and Assumptions
- The OCM plan should focus on the training needs based on the PoC use case

Key Risk	Risk Description	Mitigation Strategy
State of Florida agencies' adoption and culture change	Executing OCM results in push back against new methodologies and approaches	▪ Impacted stakeholders should be well informed during the entire process to drive buy in and acceptance ▪ Executive support for new operating model needs to be continuously promoted

Key Activities	Description
1. Implement the business changes due to the PoC	❑ Implement the necessary business changes due to the PoC
2. Conduct Training for PoC use case	❑ Deliver the training plan for the PoC ❑ Receive feedback from FL DFS stakeholders on training ❑ Iteratively improve future training details, style and frequency that are preferred and required
3. Conduct Knowledge Transfer for PoC Use Case	❑ Conduct knowledge transfer for PoC so success can be replicated for other Use Cases ❑ Receive feedback from FL DFS stakeholders on knowledge transfer ❑ Iteratively improve future knowledge transfer details, style and frequency that are preferred and required

Data Literacy plan is part of data governance where a persona-based literacy plan to educate various users on how to interact and consume data is established. At a minimum, a Data Literacy plan should contain information on the program's lead, methods to measure success, and content that needs to be curated per persona.

A key element to understanding and working with data involves a data literacy plan where a plan to educate various stakeholders in the understanding of data is established.

Phase 2 Step 4: Create and Pilot Data Literacy Plan

Overview
- This initiative focuses on establishing a formalized data literacy program to drive a data driven culture across the State of Florida
- It establishes the Data Management Community of Practice and a standard collaboration platform for data users and producers to share insights and best practices further advancing data literacy

Business Benefits/Outcomes
- Establishes a user classification and persona driven data literacy and training program for Data Management stakeholders.
- Builds up a knowledge repository over time accelerating Data Management initiatives and sustainment with decentralized groups
- Fosters a user community with a desire to advance FL DFS's data and analytics capabilities.

Primary Owner(s)
Training Analyst, Data Literacy & Training Lead

Estimated Core Work Effort
6 months, plus ongoing continuous management

Dependencies
- Phase 0 Step 2: Establish & Operationalize Data Governance Groups

Key Risk	Risk Description	Mitigation Strategy
Training participation	State of FL users do not participate in data literacy programs	▪ Executive leadership should mandate data literacy training for any roles that uses data in decision making.
Resource capacity and expertise	Existing resources do not have the capacity required to execute on data literacy initiatives	▪ Literacy Training development takes a significant amount of effort and strategic expertise. Data Management may look to a third party for support and/or prioritize metrics over existing initiatives.

Key Activities	Description
1. Data literacy training design	❑ Identify and staff Data Literacy Lead ❑ Develop user personas for designing the data literacy initiatives around ❑ Develop training structure, content, and cadence based on user personas ❑ Run a pilot program with a small group to understand what works and fine-tune the training processes, scaling when appropriate.
2. Continuous baselining and benchmarking data literacy	❑ Define data literacy KPIs ❑ Baseline and benchmark data literacy before and after first training initiative ❑ Continue to evaluate training effectiveness and re-baseline as data literacy improves
3. Compile collaboration platform requirements	❑ Capture the core collaboration requirements . ❑ Select the right knowledge management/collaboration tooling through a hands-on evaluation process. ❑ Implement and deploy collaboration tool(s).
4. Establish the Data Management Community of Practice	❑ Define vision, purpose, guidelines, logistics, etc. for the Data Management Community of Practice ❑ Market and establish Data Management Community of Practice membership. ❑ Establish mechanism for feedback and continuously evolve the community.

8.4 Phase 3 – Prioritize & Run Data Projects

As data literacy plans are established DFS must identify and implement the next set of use cases (also called Data Projects).

Phase 3 Step 1: Build & Implement Use Cases (First Data Project)

Overview
- This initiative builds and implements the use cases as part of the first data project following the successful completion of the PoC

Business Benefits/Outcomes
- Accelerates speed to business value
- Shows first proof of the impact of the new operating model (designed in Phase 0) and can enhance buy-in from FL DFS stakeholders

Primary Owner(s)
D&A CoE, D&A Strategy Lead

Estimated Core Work Effort
12 months

Dependencies
- Phase 2 Step 2: Build & Implement PoC Use Case

Execution Guidance and Assumptions
- Use lessons learned from PoC phases
- Assume that the prioritized first data project use cases will involve integrated reporting requirements and thus the need for a Data Warehouse/ABI
- Involve business users to provide feedback, guidance, evangelism and evaluation

Key Risk	Risk Description	Mitigation Strategy
Delayed implementation	Build and Implementation taking too long or not accepted by business community	▪ Keep all parties fully engaged during the entire process and use agile methodologies to drive early feedbacks

Key Activities	Description
1. Build Use Cases	❑ Develop technical design for the data integration needs ❑ Develop technical design for the data storage needs ❑ Develop technical design for the visualization needs ❑ Design the conceptual, logical and physical data model changes ❑ Code and test the integration jobs ❑ Deploy the database model changes to the data storage ❑ Code and test the visualization needs
2. Implement Use Cases	❑ Conduct System and User Acceptance Testing ❑ Move Use Cases into production ❑ Create appropriate documentation like Batch Run Book etc.
3. Evaluate Use Case Success	❑ Review the success criteria and Business-IT feedback to evaluate the use cases

Post implementing the First Data Project, execution on OCM and Data Literacy begins:

Phase 3 Step 2: Execute OCM Plan for Use Cases in First Data Project

Overview
- This initiative focuses on executing the organization change management plan for the first data project use case(s) by providing the necessary training and procedure updates to the impacted stakeholders and end users.

Business Benefits/Outcomes
- Strengthens Data Management program buy-in from FL DFS stakeholders.
- Improves business transparency into what Data Management has in store today and what is planned
- Prepares the team in advance of the changes being implemented
- Drives the workforce to be more adaptive to culture changes

Primary Owner(s)
Executive Committee, Change Management Analyst

Estimated Core Work Effort
2-3 months per Data Project (set of use cases)

Dependencies
- Phase 3 Step 1: Build & Implement Use Cases (First Data Project)

Execution Guidance and Assumptions
- The OCM plan should focus on the training needs based on the use case

Key Risk	Risk Description	Mitigation Strategy
Enterprise adoption and culture change	Executing OCM results in push back against new methodologies and approaches	▪ Impacted stakeholders should be well informed during the entire process to drive buy in and acceptance ▪ Executive support for new operating model needs to be continuously promoted

Key Activities	Description
1. Implement the business changes due to the use case	❑ Implement the necessary business changes due to the use case
2. Conduct Training for use case	❑ Deliver the training plan for the use case ❑ Receive feedback from FL DFS stakeholders on training. ❑ Iteratively improve future training details, style and frequency that are preferred and required
3. Conduct Knowledge Transfer for Use Case	❑ Conduct knowledge transfer for use case. ❑ Receive feedback from FL DFS stakeholders on knowledge transfer. ❑ Iteratively improve future knowledge transfer details, style and frequency that are preferred and required

Phase 3 Step 3: Execute Data Literacy Plan

Overview
- This initiative focuses on execution steps of a complete data literacy program to drive a data driven culture across FL DFS.
- This initiative builds on the successes achieved in the Pilot Data Literacy Plan

Business Benefits/Outcomes
- Establishes a user classification and persona driven data literacy and training program for Data Management stakeholders.
- Builds up a knowledge repository over time accelerating Data Management initiatives and sustainment with decentralized groups
- Fosters a user community with a desire to advance FL DFS's data and analytics capabilities.

Primary Owner(s)
Training Analyst, Data Literacy & Training Lead

Estimated Core Work Effort
Ongoing continuous management

Dependencies
- Phase 2 Step 5: Create and Pilot Data Literacy Plan

Execution Guidance and Assumptions
- Business users may be familiar with different data "dialects" depending on their function and seniority; consideration should be given when executing data literacy training

Key Risk	Risk Description	Mitigation Strategy
Training participation	Impacted Stakeholders do not participate in training	▪ Executive leadership should mandate data literacy training for any roles that uses data in decision making.
Resource Capacity and expertise	Existing resources do not have the capacity required to execute on data literacy initiatives	▪ Literacy Training development takes a significant amount of effort and strategic expertise. There is concern that existing resources do not have the capacity required to execute. Data Management may look to a third party for support and/or prioritize metrics over existing initiatives.

Key Activities	Description
1. Ongoing Data literacy training design	❑ Identify and staff Data Literacy team as needed ❑ Refine user personas for designing the data literacy initiatives ❑ Refine training structure, content, and cadence based on user personas. ❑ Scale the data literacy program based on PoC results (Pilot Data Literacy Plan)
2. Continuous baselining and benchmarking data literacy	❑ Calculate and monitor data literacy KPIs ❑ Continue with baselining and benchmarking data literacy before and after first training initiative. ❑ Continue to evaluate training effectiveness and re-baseline as data literacy improves.

An outcome of executing on data projects, OCM and Data Literacy is identifying new needs (use cases) that were not identifying before or reprioritizing existing data projects. Phase 3 activities are on-going:

Phase 3 Step 4: Plan, Design and Implement Product Backlog over Multiple Data Projects

Overview
- This initiative creates a "data project factory" where multiple use cases get prioritized and added to the product backlog and assigned to various data projects. As part of each data project a set of use cases are built, implemented and realize their value

Business Benefits/Outcomes
- Provides speed to business value
- Provides a future pipeline of data projects and business benefits

Primary Owner(s)
D&A CoE, D&A Strategy Lead

Estimated Core Work Effort
18 months for the first list of prioritized use cases

Dependencies
- Phase 3 Step 1: Build & Implement Use Cases (First Data Project)
- Phase 3 Step 2: Execute OCM Plan for Use Cases in First Data Project

Key Risk	Risk Description	Mitigation Strategy
Slow implementation of data projects	Build and Implementation taking too long or not accepted by business community	▪ Keep all parties fully engaged during the entire process and use agile methodologies to drive early feedbacks ▪ Identify "quick-win" projects to show momentum and prioritize implementation using agile methodologies

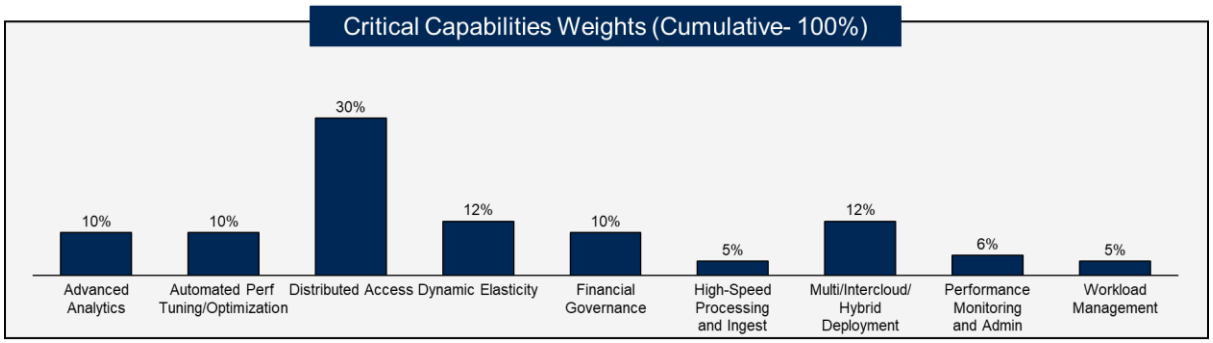
Key Activities	Description
1. Build and Prioritize Use Cases	❑ Develop technical design for the data integration needs ❑ Develop technical design for the data storage needs ❑ Develop technical design for the visualization needs ❑ Design the conceptual, logical and physical data model changes ❑ Code and test the integration jobs ❑ Deploy the database model changes to the data storage ❑ Code and test the visualization needs
2. Implement Use Cases	❑ Conduct System and User Acceptance Testing ❑ Move Use Cases into production ❑ Create appropriate documentation like Batch Run Book etc.
3. Evaluate Use Case Success	❑ Review the success criteria and Business-IT feedback to evaluate the use cases

9.0 Appendix

Appendix A — Data Warehouse Options

This section highlights the detailed analysis of each of the DW solution options

Critical Capabilities and the weights allotted to meet DFS' needs



With high percentages allotted to Distributed Access, Dynamic Elasticity, and multi/hybrid/intercloud deployment, FL DFS's priority lies in operational analytics and logical data warehousing throughout the organization for smoother workflows. With performance tuning and optimization and financial governance, FL DFS's requires their backend platform to ensure proper data management

Leveraging the output of critical capabilities along with Magic Quadrant for Cloud DBMS 2022, we find the "leaders" that are part of the solution landscape for FL DFS

- The magic quadrant is dominated by vendors who are Leaders in the cloud DBMS markets
- There is white space at the top and to the right of the Magic Quadrant 2021, signaling that there is still immense room for improvement
- The ability to offer multicloud, intercloud and hybrid is well-advanced, but not all vendors can do all three, nor do they do them equally well
- Microsoft, Oracle, Teradata and IBM all identified as leaders in the magic quadrant were shortlisted for further analysis

Teradata

Figure 1. Teradata Information

About	Teradata is a Leader in this Magic Quadrant. It focuses on analytical use cases. Teradata Vantage provides a unified set of analytics capabilities, such as graph processing, ML and text processing in the Teradata database
Value Creation	▪ Teradata Vantage is delivered in a consistent manner across multiple public clouds, Teradata's own cloud service and on-premises ▪ Teradata Vantage is successfully established as a cloud based analytical system and is available on AWS, GCP and Microsoft Azure
Functionality	▪ Teradata Vantage supports SQL query with spatial and temporal support, JSON, a wide ▪ variety of ML algorithms and graph processing within the Teradata Hybrid Multi-Cloud Ecosystem, which supports the LDW use case
Scale	▪ Teradata's operations are geographically diversified. Its customers tend to be large and from all industries ▪ It continues to invest in its hybrid multicloud ecosystem, which integrates many different styles of database designs and analytics on a common platform
Cost	▪ Teradata has been perceived as a high-cost, "premium" option. However, its move to the cloud and its new "pay for what you use" pricing model together with the transparency of cloud billing, should enable it to make its cost-to-performance benefits more apparent

Figure 2. Teradata performs better than market average in all the relevant critical capabilities and is an aspiring vendor

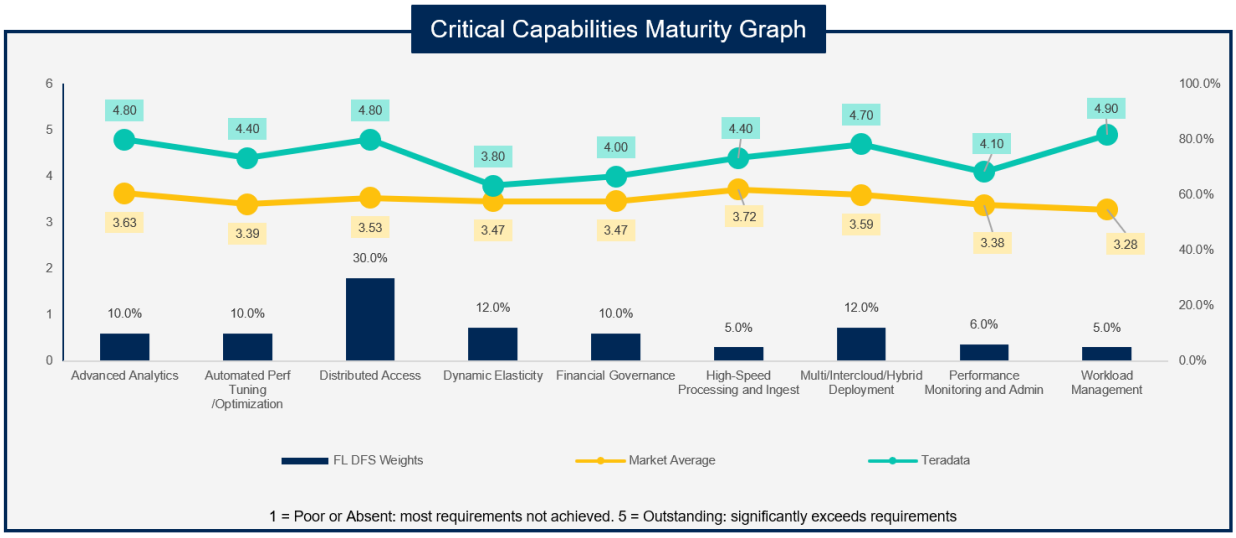


Figure 3. Teradata fits well among all FL DFS relevant Capabilities with Workload Management and Distributed Access as strengths

Teradata Critical capabilities Score							
Workload Management	Distributed Access	Advanced Analytics	Multi/Inter/Hybrid Deployment	Automated Perf Tuning	High Speed processing	Perf Monitoring	Financial Governance
4.90 / 5	4.80 / 5	4.80 / 5	4.70 / 5	4.40 / 5	4.40 / 5	4.10 / 5	4.00 / 5

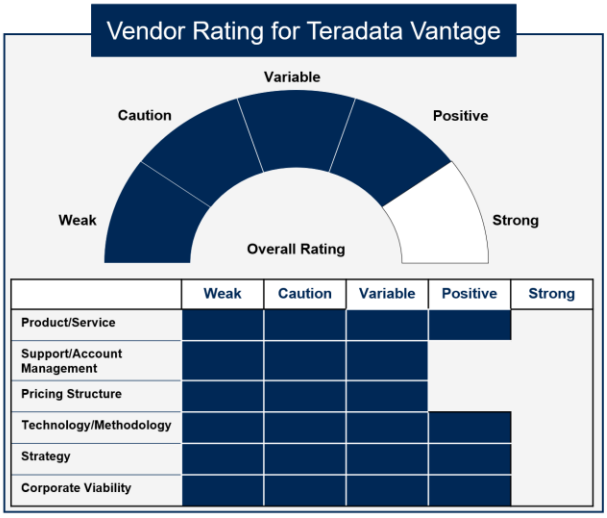
Products Portfolio

Teradata
- Vantage

Product Consideration as per FL DFS's Requirement

- Teradata Vantage was the top-rated solution for all four use cases, with a score of 4.39 or higher for as per Gartner Capabilities. It achieved its highest score for the logical data warehouse use case, reflective of the depth of its distributed access capabilities. Vantage also scored very well in the data warehouse use case, based on its traditional strengths in this area
- Teradata Vantage will require significant lift and shift from existing Oracle databases and industry models of Oracle are not easily shifted to Teradata
- Teradata Enterprise Analytics Applications eliminates the complexity of enterprise application integration - Oracle E-Business Suite (EBS), Oracle PeopleSoft—delivering near real-time access to integrated data from ERP and other enterprise applications, as well as greater transparency and visibility into business and customer insights, so users can quickly adapt to market changes

Figure 4. Vendor rating



Observations

- Teradata Vantage is successfully established as a cloud based analytical system and is available on AWS, GCP and Microsoft Azure
- It includes mature distributed data access, advanced optimizer technology and robust workload management and performs well in operational intelligence.
- It is difficult to migrate data from Teradata to other systems, barring it from receiving its strong product rating
- Teradata is positioned in the minds of customers as a premium product. Incorporating customer friendly pricing models can attract more users. Potential customers should request a proof of concept to properly understand Teradata's price/performance

Figure 5. Customer Sentiment for Teradata

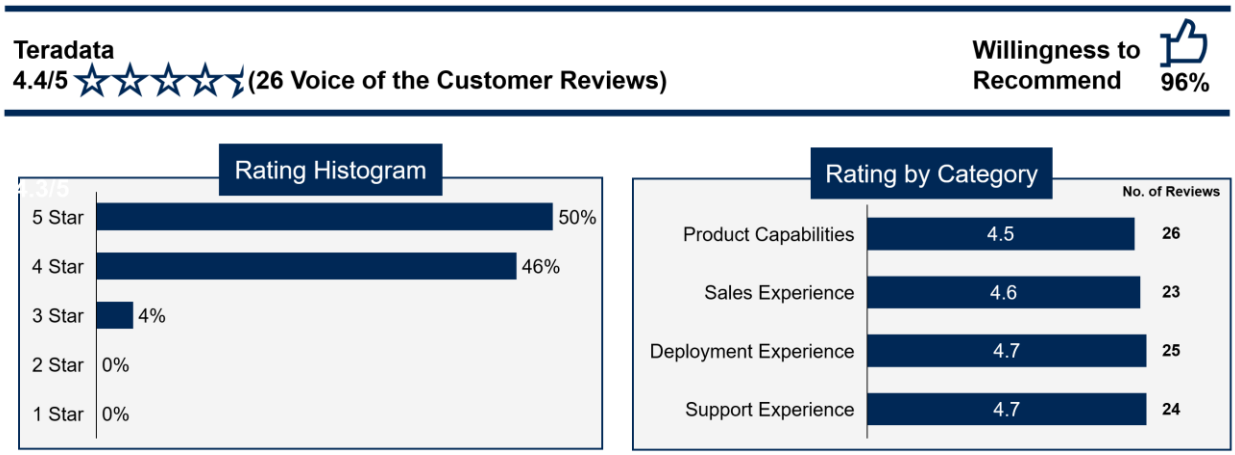


Figure 6. Gartner Peer Review and Rating for Teradata

Vendor	Reasons for Satisfaction	Reasons for Dissatisfaction	Quotes
Total peer reviews: 424 **Rating: 4.4 / 5** **Products: Teradata Vantage**	Like the most about the product/service: – Highly scalable and good workload management – Handle more sophisticated queries – Clean UI	Dislike the most about the product/service: – Premium pricing – Documentation required – Migrating data outside the system is a challenge – Maintenance, management on-premises solution is difficult and time-consuming	*"Teradata Vantage has great Massively Parallel Processing functionality, this feature makes Teradata perform the most complex queries as quickly as possible"-* ***For Teradata Vantage*** *"Teradata Vantage is a customizable and adaptable tool. It can support almost all data formats and accept data from multiple sources"-* ***For Teradata Vantage***

Figure 7. Strengths, Cautions, Opportunities and Threats

Oracle Autonomous DB

Figure 8. Oracle Information

About

Oracle is a Leader in the Magic Quadrant. Oracle Autonomous Database (including the Autonomous Transaction Processing and Autonomous Data Warehouse services) are available in Oracle Cloud Infrastructure (OCI) and on the Oracle Exadata CloudCustomer (ExaCC) private cloud

Value Creation

- Oracle also offers Autonomous JSON Database, Oracle MySQL Database Service, Oracle NoSQL Database and Oracle Big Data Service
- Oracle allows automated security patching, upgrades and other patches with zero downtime, automated index maintenance, and enhanced optimization using ML

Functionality

- Oracle's cloud offering offers a level of automatic management that includes performance tuning. ADW scores well as per Gartner Capabilities for automated performance tuning and optimization and dynamic elasticity

Scale

- Oracle Dedicated Region CloudCustomer private cloud runs all Oracle cloud services in the customer's data center
- Oracle's operations are geographically diversified. The vendor has clients from all industries and of all sizes

Cost

- Oracle's on-premises products are often perceived to be expensive and difficult to manage, and customers continue to raise concerns about contract negotiations. But there are instances where Oracle has eased licenses and customers should carefully evaluate proposals to maximize value

Figure 9. Oracle (ADW) is better than peers for most capabilities, exceedingly well in Automated Perf Tuning/ Optimization

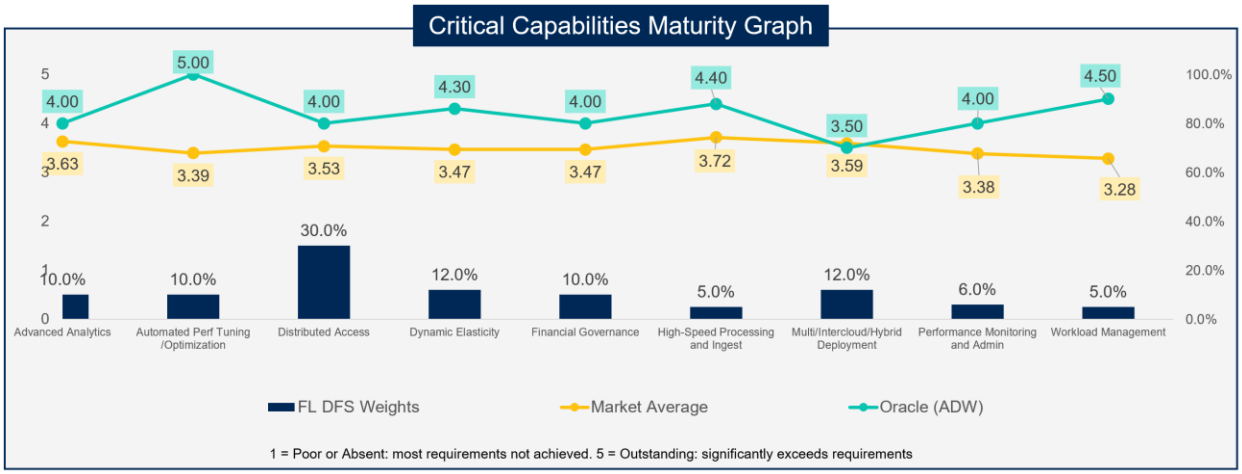


Figure 10. Oracle (ADW) critical capabilities score

Automated Perf Tuning	Workload Management	High Speed Processing	Dynamic Elasticity	Performance Monitoring	Financial Governance	Distributed Access	Advanced Analytics
5.00 / 5	4.50 / 5	4.40 / 5	4.30 / 5	4.00 / 5	4.00 / 5	4.00 / 5	4.00 / 5

Products Portfolio

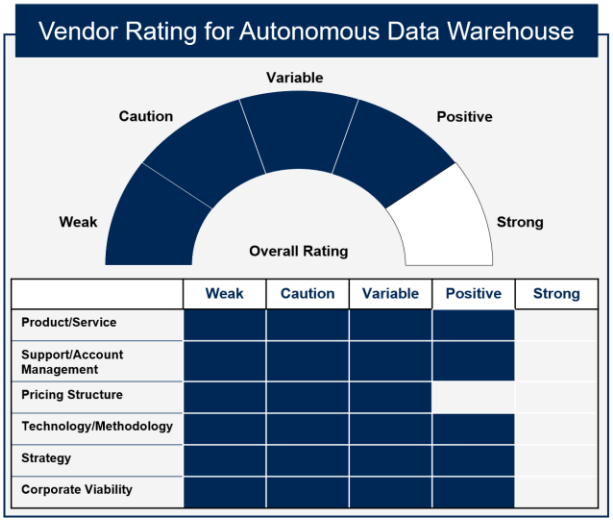
Oracle

- Oracle Autonomous Data Warehouse

Product Consideration as per FL DFS's Requirement

- ADW scores well above average for its dynamic elasticity, considerably helped by its ownership of the cloud environment it runs in. It has exceptional Automated Perf Tuning and leads with automated security patching, upgrades and other patches with zero downtime, automated index maintenance, and enhanced optimization using ML
- Its multi-cloud, intercloud and hybrid deployment score falls slightly below average because while Oracle Database is generally portable to other clouds, Autonomous Data Warehouse runs only on OCI (Oracle Cloud Infrastructure)
- Oracle Interconnect for Microsoft Azure provides organizations with a simple migration path to a multicloud environment that includes Oracle Database capabilities such as Oracle Exadata Database Service, Autonomous Database, and MySQL Heatwave to ensure seamless interoperability

Figure 11. Vendor rating



Observations

- Oracle is a Leader in the Magic Quadrant. It is well-regarded for its capabilities and performance. Oracle offers a complete set of DBMS products for operational and analytical use cases, anchored by its flagships, Oracle Database and Oracle Autonomous Database
- With Oracle Autonomous Database's free tier being adopted by customers new to Oracle that value a self-driving enterprise DBMS, Oracle is gaining recognition as an enterprise cloud provider
- Recent technical enhancements allow customers to have Oracle Database and Oracle Autonomous Database running in the same environment, which is more economical and efficient than running two databases in two environments

Figure 12. Customer Sentiment for Oracle (ADW)

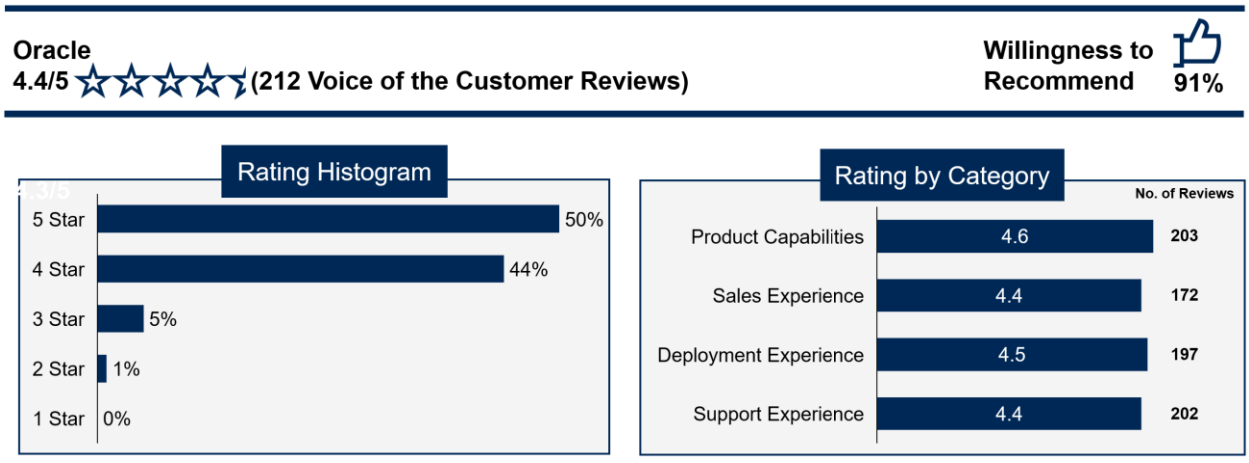


Figure 13. Gartner Peer Review and Rating for ADW

Vendor	Reasons for Satisfaction	Reasons for Dissatisfaction	Quotes
Total peer reviews: 1061 **Rating: 4.4 / 5** **Products: Oracle Autonomous Data Warehouse**	Like the most about the product/service: – Integration with Oracle ecosystem – Scalability across the cloud – Secure, reliable, dependable – Ease of deployment	Dislike the most about the product/service: – Initial cost of implementation – Can require technical skills due to complexity	*"The Oracle database is well-suited for storing large amounts of data, as Ive demonstrated by writing data. Enabling and purchasing additional package licenses is an efficient method of ensuring data security and traceability.."* ***For Oracle ADW*** *"The scalability is beyond expectations. Oracle probably has the most secure solution of all competitors on the market. The Oracle support is also very fast at responding to our tickets."* ***For Oracle ADW***

Figure 14. Strengths, Cautions, Opportunities and Threats

Strengths

- **Augmented DBMS Technology**: The Oracle Autonomous Database uses AI and ML assisted tuning and leverages Oracle's cloud infrastructure, including zero-downtime patching and upgrading
- **Hybrid Cloud:** Oracle has a complete hybrid environment for sharing data and enabling migrations to the cloud. It supports on-premises deployments and ExaCC with disaster recovery in the cloud via Exadata Cloud Service (ExaCS). ExaCC supports both Autonomous Data Warehouse and Autonomous Transaction Processing
- **Richness of Portfolio:** Oracle Cloud is a good choice for enterprises that use Oracle as a standard provider, where they can apply skills developed over many years to use cases in the cloud

Cautions

- **OCI-Centric DBMS Strategy**: Only Oracle's own DBMS services have been available as managed services on OCI; Oracle will offer a PostgreSQL managed service in 2022. While Oracle Database is generally portable to other clouds, Oracle Database clients will pay for twice as many virtual CPUs when running on other clouds
- **Carefully reviewing contract negotiations:** Oracle's on-premises products are often perceived to be expensive and difficult to manage, and customers continue to raise concerns about contract negotiations
- **Cloud Transition Focus:** Oracle was very slow to offer a true dbPaaS managed service. This has caused enterprises to use other dbPaaS offerings from CSPs and ISVs

Opportunities

- **Premium Price Perception:** Oracle has made progress in these areas as it moves to a new business model on the cloud with pay-as-you-go pricing, the self-driving Autonomous Database, an Always Free tier, bring your own license (BYOL) and dynamic elasticity. In addition, free Oracle Cloud Lift Services will help customers migrate to OCI, and a Support Rewards program offers rewards for spending on OCI services

Threats

- **Transitioning to Oracle:** According to Gartner's numbers, Oracle's share of the dbPaaS market for 2020 ($875.9 million out of $26.2 billion) was flat at 3.3%. Non-Oracle customers should carefully evaluate near-term cloud migration choices
- **Not supported by major CSPs:** Oracle Real Application Clusters (RAC) is not supported on other clouds, and Oracle Database is not yet certified to run on all major CSPs

IBM DB2 on Cloud

Figure 15. IBM DB2 on Cloud Information

About	IBM is a Leader in the Magic Quadrant. Its offerings coalesce around Cloud Pak for Data, a unified integration layer for containerized DBMS services built on Red Hat OpenShift. Cloud Pak for Data serves as a platform for many other IBM data management offerings, including IBM Db2 on Cloud, IBM Db2 Warehouse on Cloud, etc plus managed services for third-party offerings
Value Creation	▪ IBM provides mature data virtualization capabilities through IBM Data Federation, which is packaged as part of Cloud Pak for Data ▪ IBM's vision is to bring full automation to the Cloud Pak for Data platform, building on a data fabric foundation
Functionality	▪ IBM Cloud Database family provides a variety of managed data technologies, including PostgreSQL, MongoDB, Elasticsearch, Redis, RabbitMQ, DataStax, EnterpriseDB and etcd . IBM Db2 can also run on IBM Cloud, AWS and Microsoft without Cloud Pak for Data
Scale	▪ IBM operates globally, and in all industries and organization sizes. IBM invests broadly in leading data management technologies. It addresses both operational and analytical use cases
Cost	▪ IBM has straightforward pricing plans for db2 Warehouse on Cloud as per the required. One may opt for Flex One, Flex, Flex Performance, Flex for AWS, and Flex Performance for AWS plans

Figure 16. IBM (db2 Warehouse) is better than peer average for most capabilities, leading in Distributed Access

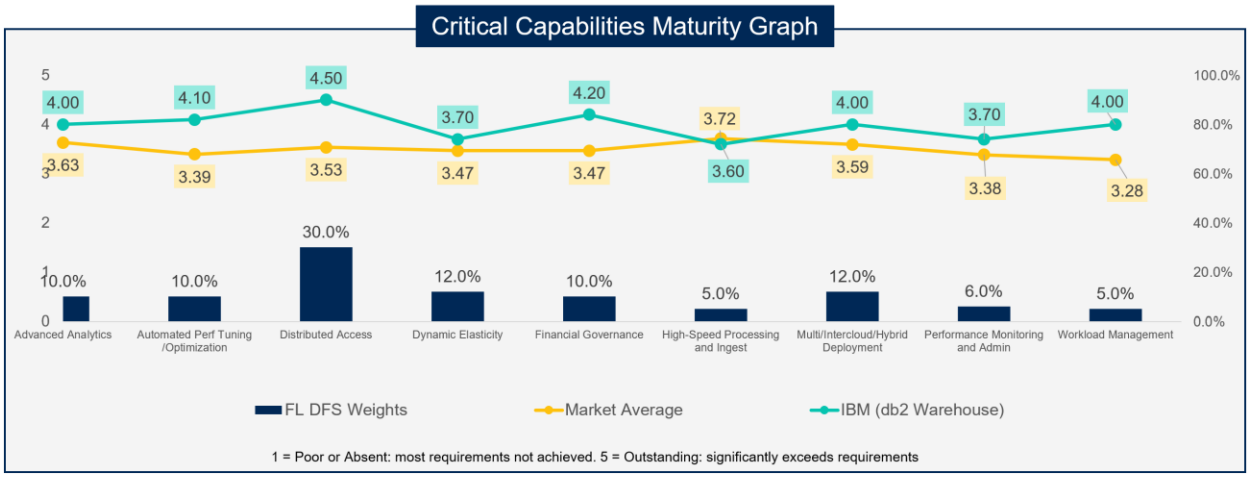


Figure 17. IBM (db2 Warehouse) critical capabilities score

Distributed Access	Financial Governance	Automated Perf Tuning	Workload Management	Multi/Inter/Hybrid Deployment	Advanced Analytics	Performance Monitoring	Dynamic Elasticity
4.50 / 5	4.20 / 5	4.10 / 5	4.00 / 5	4.00 / 5	4.00 / 5	3.70 / 5	3.70 / 5

Products Portfolio

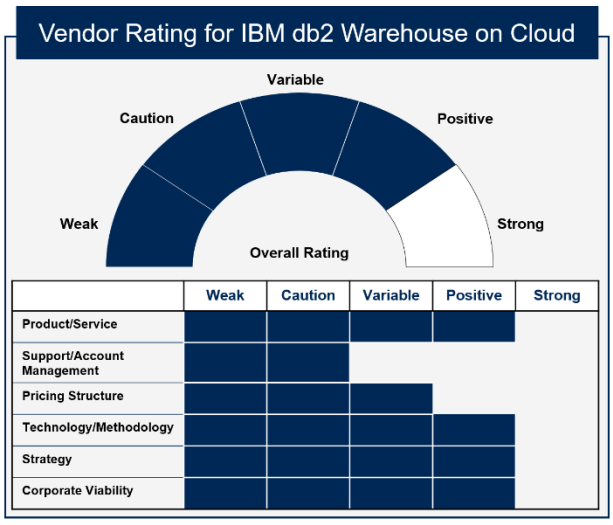
IBM

- Db2 Warehouse on Cloud

Product Consideration as per FL DFS's Requirement

- IBM has high scores as per Gartner's Capabilities for distributed access, automated performance tuning and optimization, and multicloud, intercloud and hybrid cloud deployment. Cloud Pak for Data, can be deployed on the end user's cloud of choice or on-premises, providing continuity for hybrid use-case requirements
- IBM Db2 can run on IBM Cloud, AWS and Microsoft independent of Cloud Pak (a unified integration layer for containerized DBMS services)S for Data due to its multicloud deployment capabilities
- Db2 is also one of the IBM products that can be easily integrated with Oracle Peoplesoft. There is enough documentation on websites of both vendors to facilitate the process

Figure 18. IBM (db2 Warehouse) vendor rating



Observations

- IBM has made 15 acquisitions in 2021 and 2022 (so far) to enhance its capabilities for hybrid cloud and AI. Many of these acquisitions have been to bolster its consulting unit as a multicloud entity and to build capabilities in emerging areas such as data and AI transformation services, and cloud-native application development and operations
- IBM offers six Cloud Paks in the areas of data and AI, business automation, AIOps, integration, network automation, and security
- Cloud Pak for Data serves as a platform for many other IBM data management offerings, including IBM Db2 on Cloud, IBM Db2 Warehouse on Cloud, IBM Cloud SQL Query, IBM Cloudant, the IBM Cloud Database family and IBM Event Streams, plus managed services for third-party offerings

Figure 19. Customer Sentiment Score for IBM (db2 Warehouse)

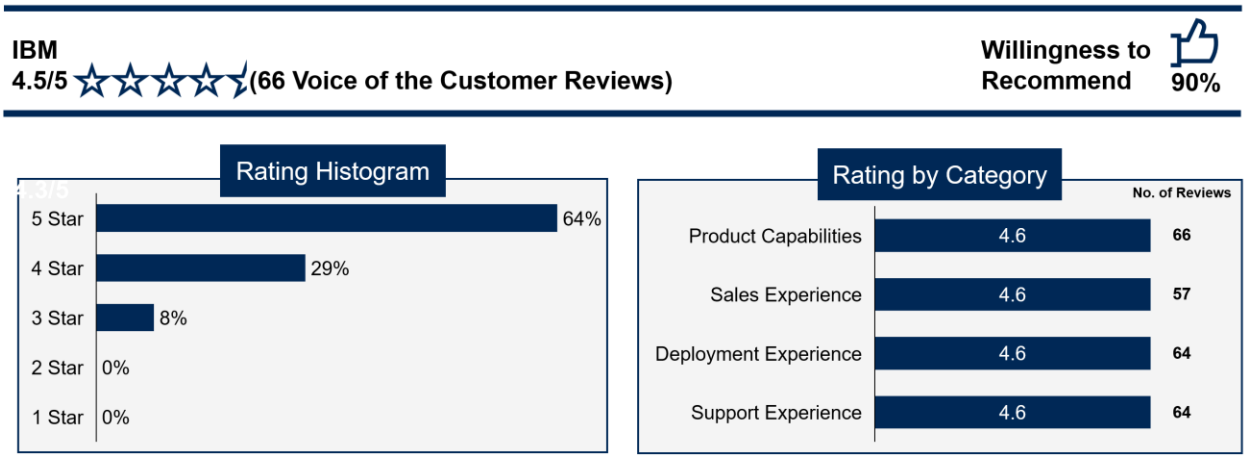


Figure 20. Gartner Peer Review and Rating for IBM (db2 Warehouse)

Vendor	Reasons for Satisfaction	Reasons for Dissatisfaction	Quotes
Total peer reviews: 189 **Rating: 4.6 / 5** **Products: IBM Db2 Warehouse**	Like the most about the product/service: – Reliable, scalable, high performing – High availability	Dislike the most about the product/service: – Steep learning curve – Customer support needs improvement – Some functionalities and feature after version updates require upgradation	*"IBM not only provides a great product in terms of database reliability, and performance, they also give excellent customer support."* ***For IBM Db2*** *"BM DB2 is a reliable and trusted database Software which handles billions of transactions each day with sub milliseconds response time, highly available , scales to handle 2,000% transactional growths in last 2 years"* ***For IBM Db2***

Figure 21. Strengths, Cautions, Opportunities and Threats for IBM (db2 Warehouse)

Microsoft (Azure Synapse)

Figure 22. Microsoft (Azure Synapse) Information

About

Microsoft is a Leader in the Magic Quadrant. It provides a broad range of cloud DBMS offerings, including Azure Synapse Analytics, Azure SQL Database, Azure SQL Managed Instance, Azure Cache for Redis, Azure SQL Edge, Azure Cosmos DB, Azure HDInsight, and Azure Database for PostgreSQL, MySQL and MariaDB

Value Creation

- Microsoft offers a comprehensive cloud data management ecosystem that spans all the use cases evaluated for the Magic Quadrant
- Microsoft has embraced a multimodel strategy for many of its data management offerings, which can simplify deployment

Portfolio

- Microsoft's focus on increased cloud delivery and evolving its support for modern work is the right strategy at the right time and is executed well. Its enterprise product portfolio is broad — from Azure to Microsoft 365 to Dynamics 365 to Windows Server and integrated security offerings

Scale

- Microsoft offers a comprehensive cloud data management ecosystem that spans all the use cases evaluated for the Cloud DBMS Magic Quadrant. Its operations are geographically diversified, and its customers cover a wide range of industries and deployment sizes

Cost

- Microsoft's ever-changing license models, contract options and support offerings continue to be areas of frustration with customers. Users must carefully assess the costs of Azure offerings within that context

Figure 23. Microsoft (Azure Synapse Analytics) performs satisfactorily with respect to the peer average for the critical capabilities

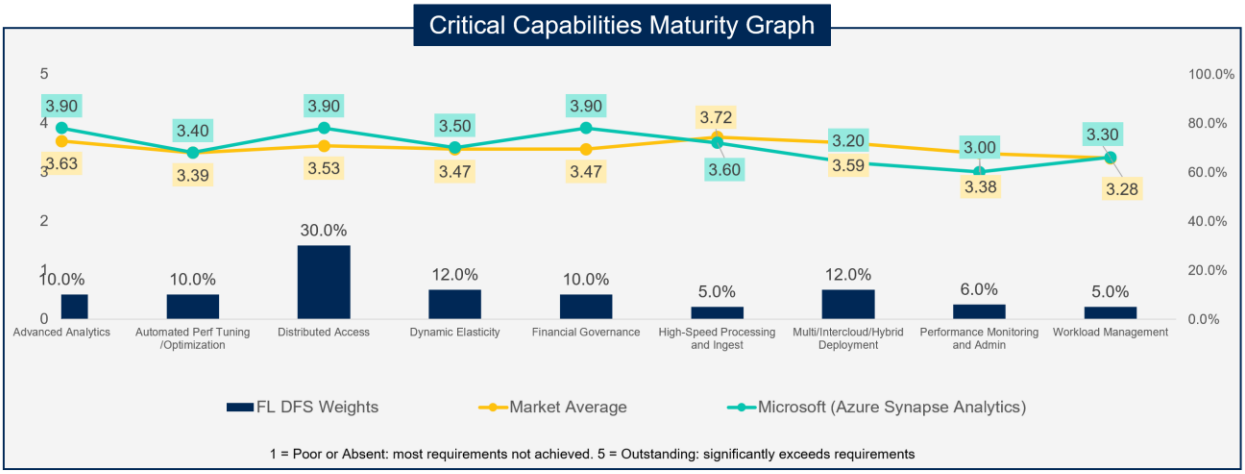


Figure 24. Microsoft (Azure Synapse Analytics) critical capabilities score

Financial Governance	Distributed Access	Advanced Analytics	High Speed Processing	Dynamic Elasticity	Automated Perf Tuning	Workload Management	Multi/Inter/Hybrid Deployment
3.90 / 5	3.90 / 5	3.90 / 5	3.60 / 5	3.50 / 5	3.40 / 5	3.30 / 5	3.20 / 5

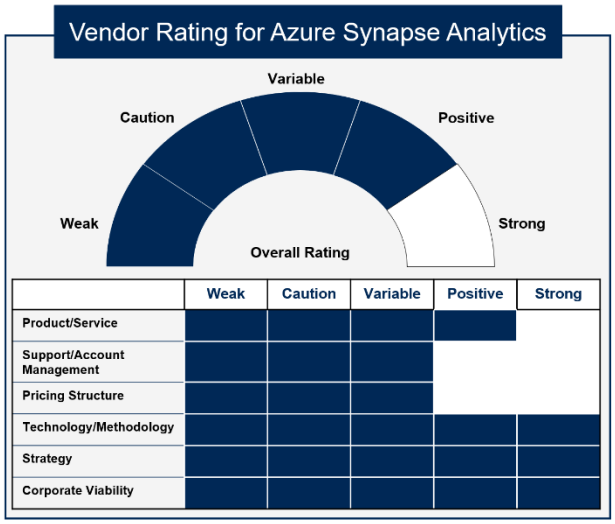
Products Portfolio

Microsoft
- Azure Synapse Analytics

Product Consideration as per FL DFS's Requirement

- Azure Synapse meets requirements as per Gartner's Capabilities and it currently ranks in the upper half of the competitors. This gives Azure Synapse a "middle of the pack" positioning, which can be attributed to Microsoft releasing more pieces of its vision for a comprehensive and cohesive ecosystem
- The Azure ecosystem is also cohesive, in that Azure Synapse Analytics has end-to-end metadata and security, plus broad integration via Synapse Link and Azure purview
- Oracle and Microsoft have created a cross-cloud connection between Oracle Cloud Infrastructure and Microsoft Azure in certain regions. This connection lets you set up cross-cloud workloads without the traffic between the clouds going over the internet, like running Peoplesoft with Azure

Figure 25. Vendor Rating



Observations

- Microsoft's offerings span a wide range of capabilities, from cloud and data center to end user and gaming. They have a diverse collection of products, services and technologies highlights the breadth of its capabilities and market coverage, and their synergies across product lines make Microsoft technologies popular with most Gartner clients
- Microsoft is a leader in data management with a comprehensive cloud data management ecosystem that includes technologies, such as Azure Synapse Analytics, Azure SQL Database and more.
- It has a strong ecosystem vision with Azure Synapse Analytics, with easy integration to other Azure offerings. It also is tightly integrated with its leading analytics and BI platform, Power BI with hybrid deployment options

Figure 26. Customer Sentiment for Azure Synapse Analytics

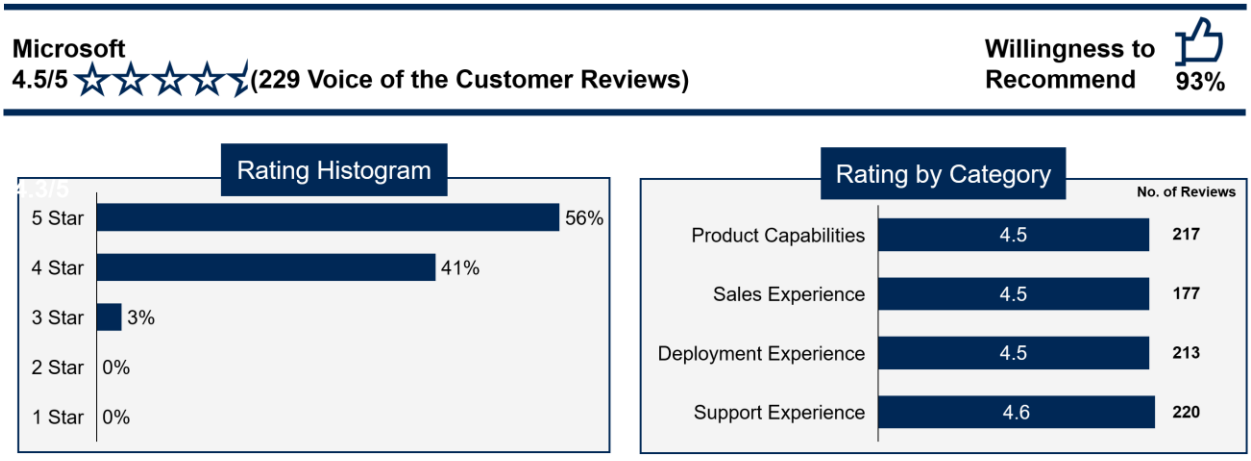


Figure 27. Gartner Peer Review and Rating for Azure Synapse Analytics

Vendor	Reasons for Satisfaction	Reasons for Dissatisfaction	Quotes
Total peer reviews: 58 **Rating: 4.4 / 5** **Products: Microsoft Azure Synapse Analytics**	Like the most about the product/service: – Easily integrated with systems – Highly scalable – Multi-cloud end-to-end service integration	Dislike the most about the product/service: – Not fully aligned with SQL, some functionalities may be missing – Complex licensing model	*"Configuration and the first Cloud deployment of this software is very easy and amazing operation. Any user can easily manage multiple business data across the Cloud services very easy and without having to risk any business data."* ***For Microsoft Azure Synapse Analytics*** *"Providing a single portal to do all of our needs that allows us to leverage multiple resources on a single page without a desktop installed tool"* ***For Microsoft Azure Synapse Analytics***

Figure 28. Strengths, Cautions, Opportunities and Threats for Azure Synapse Analytics

Strengths

- **Comprehensive Data Ecosystem Vision:** Microsoft has articulated a strong data ecosystem vision with Azure Synapse Analytics. This vision is more refined and comprehensive than that of most of its main CSP competitors, and it includes end-to-end security and metadata support
- **Clear Migration Path:** Almost every enterprise has a business relationship with Microsoft, using its data management products (such as Microsoft SQL Server), office productivity tools, identity and access management software, and other offerings. Azure represents a natural extension of this familiar Microsoft ecosystem and a low-risk migration path to cloud
- **Integrated Multimodel Capabilities:** Unlike some of its CSP competitors, Microsoft has embraced a multimodel strategy for many of its data management offerings, which can simplify deployment

Cautions

- **Inconsistent Ecosystem Maturity:** Some key components of Microsoft's cloud ecosystem are still under construction — namely, Purview, Synapse Link (for Dataverse) and industry data models
- **Pricing and Cost Challenges:** Microsoft's overall pricing model is complex and challenging, resulting in a high volume of client inquiry to Gartner's Software Pricing and Vendor Management team
- **Data Architecture Challenges:** Although Microsoft's portfolio of cloud and on-premises DBMSs is comprehensive, it is inconsistent in that deployment options for public cloud, private cloud and traditional on-premises vary on a per-product basis

Opportunities

- **Third-party ISV connections:** Easy integration with other Azure offerings (via Synapse Link and Purview) is a major selling point, and the ecosystem is open to third-party ISV offerings as well
- **Product based functionality variations:** Varying and inconsistent deployment options can be seen in distinct Microsoft products. This enables a hybrid architectures for users that need them
- **Simplifying cost licensing:** Creating buckets or setting a more structured cost structure can lead to further customer satisfaction with respect to pricing

Threats

- **Compatibility of architecture:** Users must decide carefully where they will manage specific datasets and run diverse data processing workloads so that the deployment options in distinct products employed match their organizational requirements
- **Immature ecosystem in development:** Prospective users should carefully check that Microsoft's current capabilities meet their needs, and that timelines for the delivery of additional required functionality are clear and be cautious of future functionalities that may not perform as well as they look on paper

Appendix B — Business Intelligence Options

Salesforce Tableau

Figure 29. Salesforce Tableau Information

About	Tableau a Leader in the ABI MQ, offers a visual-based exploration that enables business users to access, prepare, analyze and present findings in their data. Tableau CRM, formerly Einstein Analytics, provides augmented analytics capabilities for analysts and citizen data scientists	
Value Creation	▪ Salesforce has grown its product portfolio beyond the CRM business into integration (MuleSoft)	▪ After acquiring Vlocity in 2020, Salesforce completed another major acquisition in July 2021 — Slack. Its product portfolio is becoming more complex
Tableau Prep	▪ With Tableau Prep, users can combine data from different sources using joins and unions. The GUI is intuitive for even novice data wranglers	▪ Tableau Prep Builder outputs can be written to Tableau datasets or to multiple external cloud databases
Scale	▪ Tableau improved enterprise capabilities by adding centralized row-level security and virtual data connections that enable users to extract and manage data tables. It creates reusable visual flow diagrams that are interactive, allowing users to inspect each step in the data pipeline	
Cost	▪ Compared with cloud vendors in this market, Tableau's license cost is expensive, an issue raised by clients during inquiries with Gartner ▪ Additional fees are required for Data Management, Server Management & Einstein Discovery	

Figure 30. Tableau fares above average for most of the highly weighted FL DFS relevant Capabilities

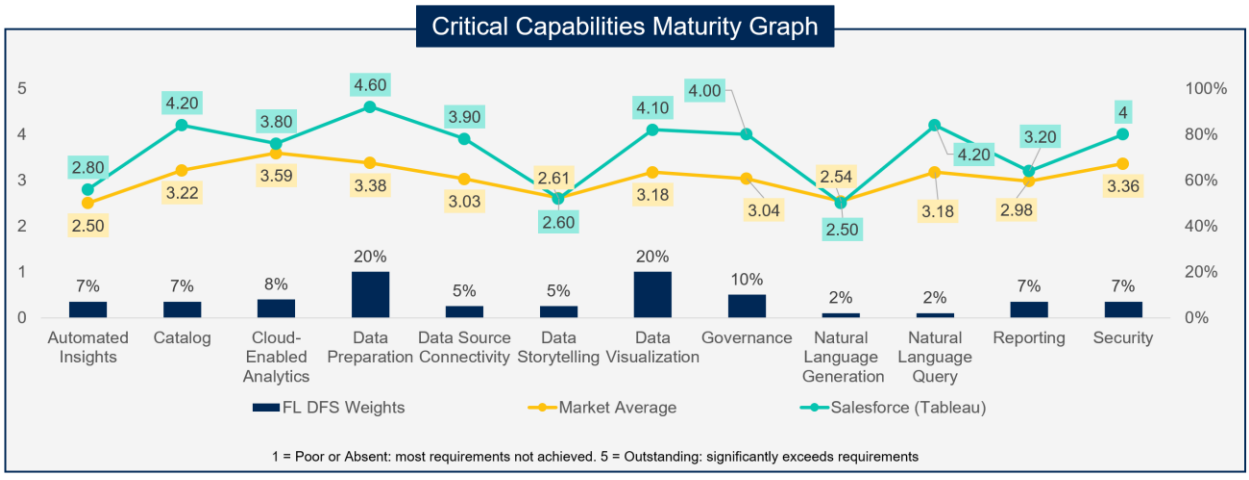


Figure 31. Tableau critical capabilities score

Tableau Critical capabilities Score							
Data Preparation	Data Visualization	Governance	Cloud-Enabled Analytics	Catalog	Automated Insights	Security	Reporting
4.60 / 5	4.10 / 5	4.00 / 5	3.80 / 5	4.20 / 5	2.80 / 5	4.00 / 5	3.20 / 5

Products Portfolio

Tableau

- Tableau Prep
- Tableau CRM
- Einstein Discovery

Product Consideration as per FL DFS's Requirement

- Tableau scored above average on most relevant capabilities specified by FL DFS. It enables multiple joins and unions allow data to be combined from multiple sources, intuitive GUI for novice data analysts due to the strong interactivity and easy-to-make interactive charts while maintaining security
- Tableau falls short on data governance on the cloud due to inability to hide specific variables in shared dashboards and being dependent on data warehouse governance than its own governance
- Tableau server integrations runs into issues with visualizations containing millions of data points with visualizations become slow and time consuming taking several minutes to load and refresh
- Advanced analytics is not built-in to tableau relying on either python scripts or purchase of Salesforce's Einstein product
- Tableau allows easy integration with the Oracle Database which can allow FL DFS by specifying SQL commands or through third party Tableau – Peoplesoft integration tools through Tableau's ODBC (Open Database Connectors)
- The Tableau Server can be on Microsoft Azure – through a preconfigured deployment on an Azure Marketplace VM

Figure 32. Vendor Rating

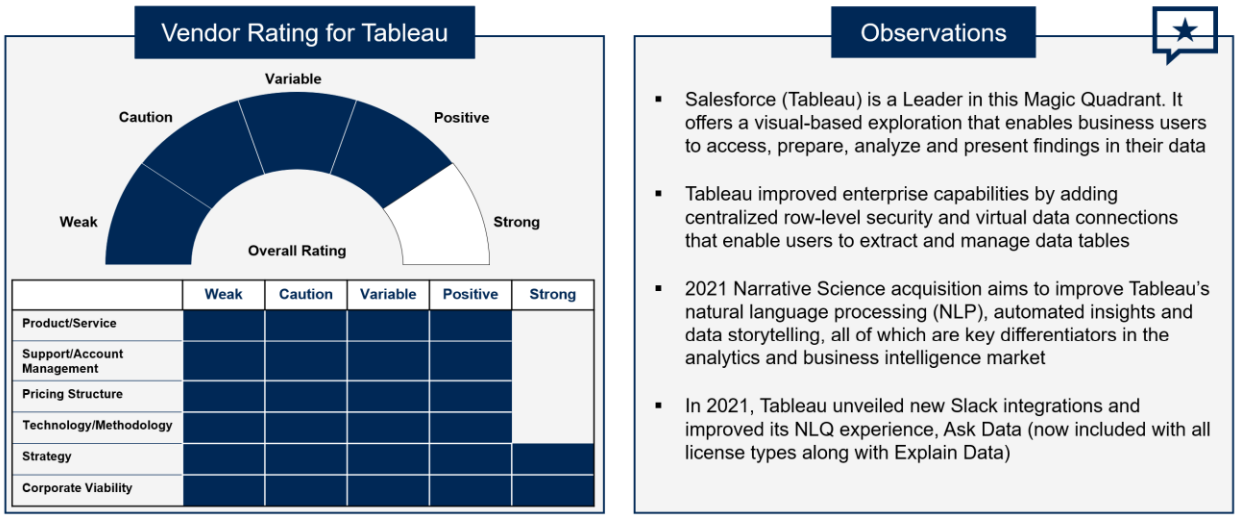


Figure 33. Customer Sentiment

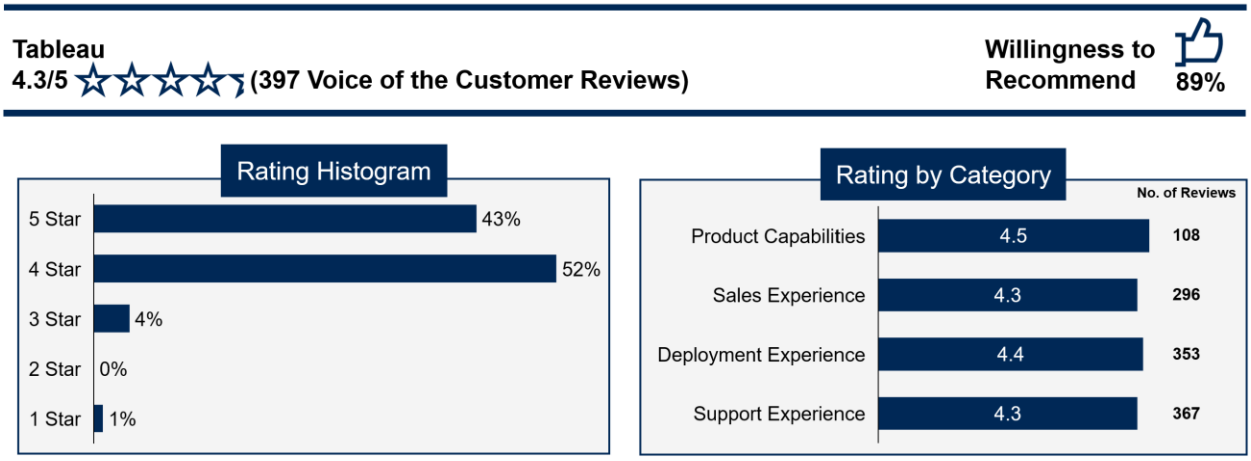


Figure 34. Gartner Peer Review and Rating for Tableau

Vendor	Reasons for Satisfaction	Reasons for Dissatisfaction	Quotes
Total peer reviews: 2147 **Rating: 4.4 / 5** **Products: Tableau (Desktop)**	Like the most about the product/service: – Data Source Connectivity – Self Service Data Preparation – Ability to work with very large data sets – Comprehensive import/export functionality	Dislike the most about the product/service: – Learning curve can be a bit steep – The price is too high per user compared to its competitors	*"Easy report makings with in built analytics which helps in data entry. Pre calculated data are already given. Sometimes we don't even need to make reports because templates are enough."- **For Tableau Desktop"*** *"It enables us to securely and fastly communicate data from a variety of data sources, including on-premise, or on-cloud."- **For Tableau Desktop***

Figure 35. Strengths, Cautions, Opportunities and Threats for Tableau

Strengths

- **Business user-centric:** Tableau Prep provides an intuitive experience for business users to visually explore their data. The patented VizQL engine powers the no-code drag-and-drop interface
- **Analytics economy** : Users demonstrate a fanlike attitude toward Tableau. The analytics ecosystem Tableau has built, the Tableau Economy, brings an expansive community of customers, partners and people with analytics skills
- **Salesforce ecosystem opportunity:** Salesforce's dedicated investment to data and analytics business as part of its ecosystem can be seen by the introduction of the new revenue category, "Data"

Cautions

- **Premium pricing:** Compared with cloud vendors in this market, Tableau's license cost is expensive, an issue raised by clients during inquiries with Gartner. Additional fees are required for Data Management, Server Management and Einstein Discovery
- **Service and support:** Some Tableau customers are unclear about the process for finding the Tableau-specific support they expect
- **Evolving Einstein Discovery experience:** The process for building and deploying Einstein Discovery 's no-code machine learning models is disconnected from the Tableau user experience. Users are redirected to Tableau CRM Studio in Salesforce, where they must reconnect to their desired dataset to train a model and then manually map the fields

Opportunities

- **Narrative Science Acquisition:** In 2021, Salesforce acquired Narrative Science, a data storytelling company that helps transform data into a modern, narrative format. This acquisition aims to improve Tableau's natural language processing (NLP), automated insights and data storytelling
- **Enterprise subscriptions for Tableau:** Tableau introduced new enterprise subscription plans with the aim of making it easier and more cost-effective for organizations to procure and deploy. It bundles Creator, Explorer, and Viewer licenses for Tableau Online with Data Management; and it bundles Data Management and Server Management with Tableau Server
- **Salesforce Flow:** More product integrations with MuleSoft, Tableau and Slack to be seen

Threats

- **Cloud only capabilities:** Tableau's new augmented analytics capabilities are based on integration with CRM Analytics which are cloud-only, which has led to concerns from some of Tableau's large on-premises installed customer base about its future roadmap
- **Third Party Connector:** Although there is integration between Tableau and Oracle, there may be a need to contact third-party vendors who specialize in integrating Tableau with Oracle Peoplesoft

Domo

Figure 36. Domo Information

About	Domo is a Challenger in the Magic Quadrant. It has strong functionality and momentum in the face of much more established competitors
Value Creation	▪ While multicloud, Domo is gaining traction from organizations with a non-Microsoft cloud ecosystem but want a strong native cloud ABI platform ▪ In 2021, Domo's Sandbox was introduced, enabling customers to take a DevOps approach to analytics content creation and promotion
Rapid Deployment	▪ Domo's connectivity is differentiated in that it maintains API-like connectors that can respond dynamically to changes in source-side schemas ▪ Domo for Snowflake goes beyond a push-down query model to enable full read/write from Domo to the cloud database
Scale	▪ Domo's cloud-based ABI platform offers over 1,000 data connectors, consumer-friendly data visualizations and a low-code/no-code environment for BI application development ▪ Domo's ease of use and fast time to deployment, leads to its sales directly to lines of business
Cost	▪ Domo's prices have decreased substantially in the face of stiff competition, but it still prices at a premium compared with the low-cost cloud providers ▪ Domo has been forced to readjust its pricing model to keep pace, but evaluators will still need to consider its pricing

Figure 37. Domo performs specifically better than industry peers in Data Preparation, faring well for most of FL DFS's needs

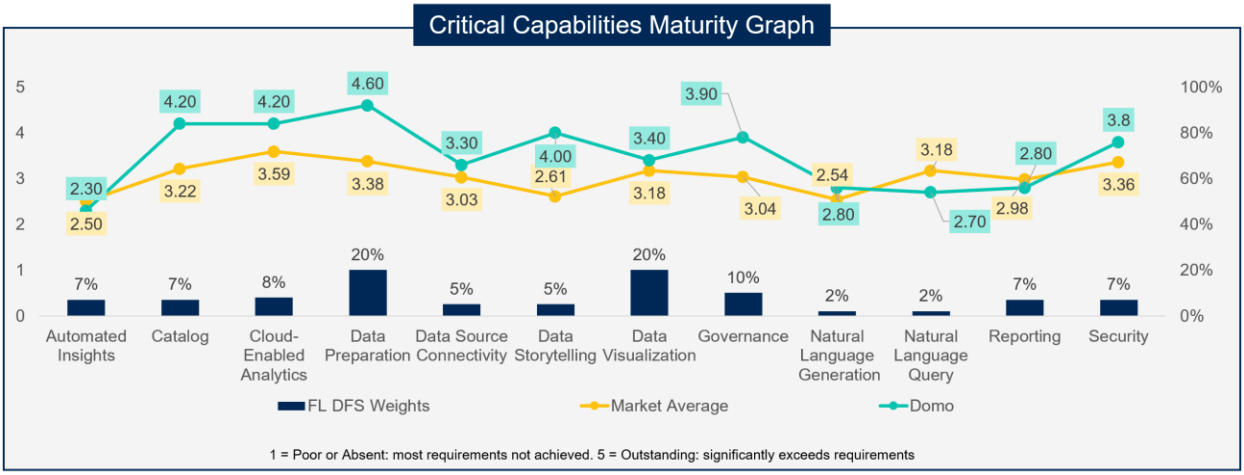


Figure 38. Domo critical capabilities score

Data Preparation	Cloud-Enabled Analytics	Catalog	Data Storytelling	Governance	Security	Data Visualization	Data Source Connectivity
4.60 / 5	4.20 / 5	4.20 / 5	4.00 / 5	3.90 / 5	3.80 / 5	3.40 / 5	3.30 / 5

Products Portfolio

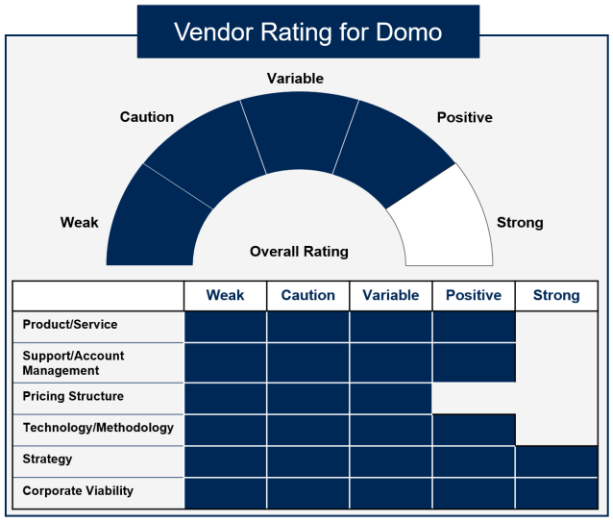
Domo

- Domo Business Cloud
- Sandbox
- Magic ETL

Product Consideration as per FL DFS's Requirement

- For data visualization, Domo offers strong interactivity, geographic mapping (automatic geocoding, renders data in choropleths) and support for third-party charting libraries. Also, Domo's data preparation is one of the best in the market. Its strong data storytelling capability includes excellent collaborative story capture and social user interface
- Purchase of Domo's DBMS solution required for faster parallel processing of visualizations – Domo can store and process millions to billions of records
- Domo's Oracle Database Connector provides a comprehensive business view by combining Oracle data with other data sources in Domo. Other third-party apps assist with Peoplesoft integration
- Domo allows connecting to Microsoft Azure through the Microsoft Azure Data Factory which is a cloud-based data integration service that orchestrates and automates the movement and transformation of data. The Domo Azure Data Factory connector gives access to data about Activity Runs, Datasets, Operations, Pipeline Runs, Pipelines and Triggers

Figure 39. Vendor Rating



Observations

- Domo Business Cloud offers strong features in terms of visual self-service analytics. It offers strong interactivity, geographic mapping (automatic geocoding, renders data in choropleths) and support for third-party charting libraries including D3.js, Highcharts, and Chart.js
- Domo cost per user is moderate, although its best-in-the-market data visualization capabilities make up for the high upfront licensing costs, due to which it is gaining momentum in the ABI Platforms market
- Domo offers a strong data storytelling capability that includes excellent collaborative story capture and social user interface and boasts of a maturing automated insights capability, much ahead of its industry peers

Figure 40. Customer Sentiment for Domo

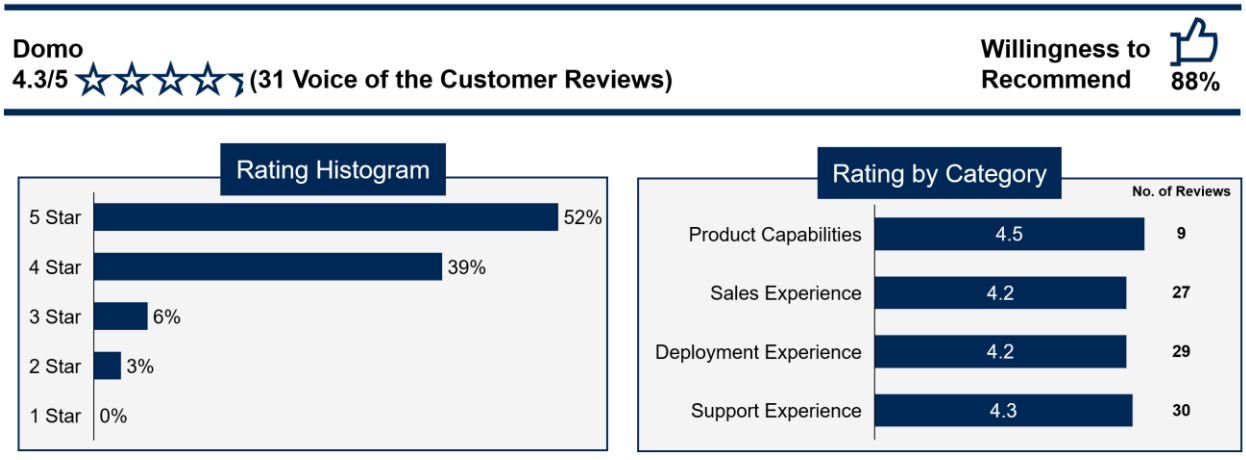


Figure 41. Gartner Peer Review and Rating for Domo

Vendor	Reasons for Satisfaction	Reasons for Dissatisfaction	Quotes
Total peer reviews: 343 **Rating: 4.4 / 5** **Products: Domo Business Cloud**	Like the most about the product/service: – Good ETL Data flows – Intuitive interface – Ability to handle large and complex datasets – End to end integration	Dislike the most about the product/service: – Lack of native integration with other applications – Lack of user-friendly back tracking – Premium pricing	*"Domo has amazing visualization tools, I can see my numbers (and drill down) from my phone, and the Domo team can connect any of our datasets to our dashboard."- **For Domo Business Cloud*** *"By converting the raw data into intelligible reports, visualizations, and displays, Domo helps us to obtain quicker insights and drive us towards greater revenue" - **For Domo Business Cloud***

Figure 42. Strengths, Cautions, Opportunities and Threats for Domo

Strengths

- **Momentum in a crowded market:** Domo is winning new customers and increasing its relevance to enterprise buyers by catering to a wide array of user personas
- **Speed of deployment:** Domo's ability to connect quickly to enterprise applications enables rapid deployment. Domo's connectivity is differentiated in that it maintains API-like connectors that respond dynamically to changes
- **Consumer design focus:** New market dynamics emphasizing the "analytic consumer" and the "empowered analyst" should work in Domo's favor
- **Visualizations:** Domo offers strong interactivity, geographic mapping (automatic geocoding, renders data in choropleths) and support for third-party charting libraries

Cautions

- **Lack of Integration with incumbent systems:** Some buyers will prioritize ABI platforms that are embedded as integrated components in their cloud incumbent (such as AWS, Microsoft Azure or Google) or application incumbent (such as Salesforce, Oracle or SAP)
- **Limited geographic presence:** As a cloud-based vendor, Domo relies on virtual presence for countries beyond the U.S., Japan, the U.K. and Australia
- **Premium pricing model:** Domo's prices have decreased substantially in the face of stiff competition, but it still prices at a premium compared with the low-cost cloud providers such as Microsoft (with Power BI) and AWS (with QuickSight)

Opportunities

- **Improvement in Forecasting, AI features:** Domo needs to bolster its key driver analysis, automatic forecasting, clustering and explainable AI features
- **Natural Language Query:** Domo's natural language query capability could improve its chatbot, support for synonyms, and type-ahead feature
- **Greater API Interaction:** Greater integration would allow Domo to be seen as useful by more users who would like to incorporate it in their existing systems

Threats

- **Lack of broader application ecosystem channels:** Domo faces a competitive disadvantage against ABI platform vendors that leverage the existing installed base of their own application ecosystems and cloud platform
- **Customer Service:** Greater emphasis on improvement of customer service to provide resolutions to customers purchasing a premium-priced product is required for business longevity
- **Cloud only Deployment:** As an open-cloud platform, the Domo system supports hybrid deployment options so users can develop data apps with data sourced from any cloud or across multiple clouds. Additionally, with Domo Workbench, users can simply and safely move their data into Domo from their on-premises systems

Microsoft Power BI

Figure 43. Microsoft Power BI Information

About	Microsoft is a Leader in the ABI MQ and has massive market reach and momentum through Office 365 and a comprehensive, visionary product roadmap. Microsoft Power BI offers data preparation, visual-based data discovery, interactive dashboards and augmented analytics	
Value Creation	▪ The new “goals” capability enables data-driven and collaborative tracking of key business metric scorecards	▪ Power BI is primarily deployed as a SaaS option running in Azure, but offers a less-functional on-premises option in Power BI Report Server
Integrated Suite	▪ Inclusion of Power BI in the Office 365 E5 SKU has provided an enormous channel for the platform’s spread	▪ Microsoft continues to align Power BI closely with Office 365, Microsoft Teams, Excel and SharePoint
Scale	▪ Power BI is primarily deployed as a SaaS option running in Azure but offers a less-functional on-premises option in Power BI Report Server ▪ In 2022, Microsoft’s vision is to make Power BI the hub for data and analytics in an organization	
Cost	▪ Power BI does not sacrifice quality in order to achieve its disruptively low pricing model ▪ Its cloud service is rich in its capabilities, which include an enlarged set of augmented analytics and automated ML (autoML) capabilities.	

Figure 44. Microsoft Power BI fares above average for most of the highly weighted FL DFS relevant Capabilities

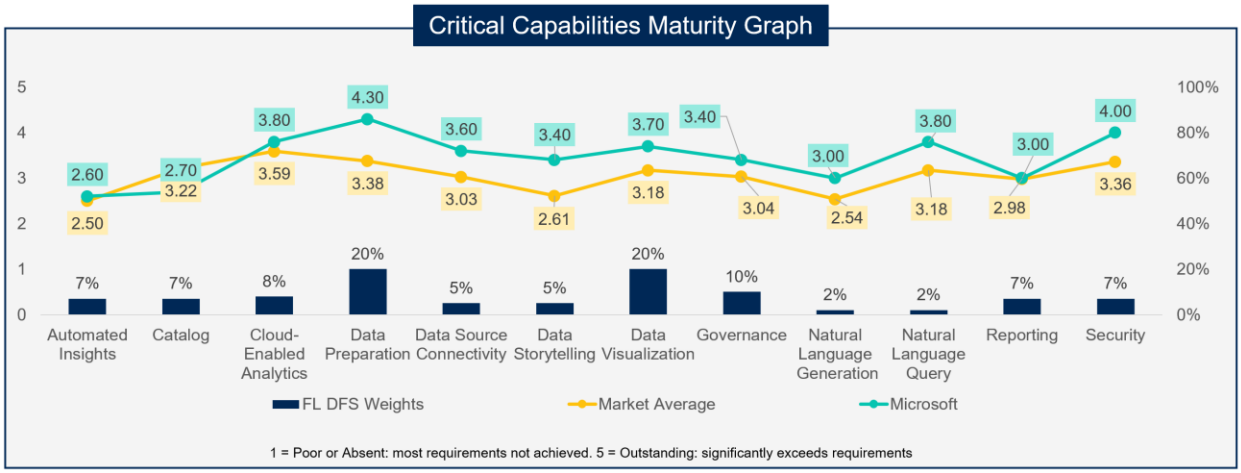


Figure 45. Microsoft Power BI critical capabilities score

Data Preparation	Security	Natural Language Query	Cloud-Enabled Analytics	Data Visualization	Data Source Connectivity	Governance	Reporting
4.30 / 5	4.00 / 5	3.80 / 5	3.80 / 5	3.70 / 5	3.60 / 5	3.40 / 5	3.00 / 5

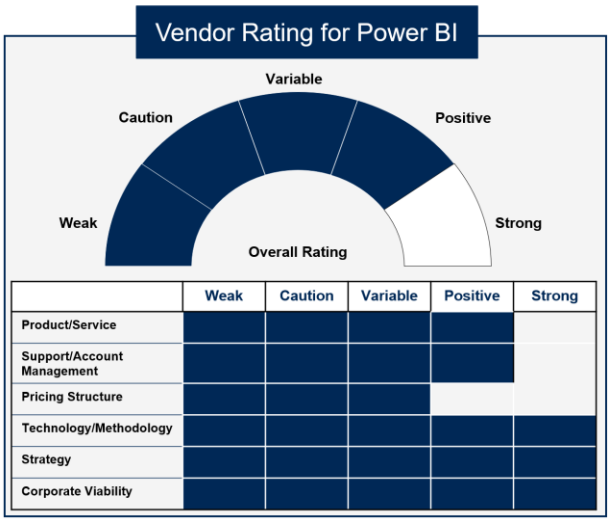
Products Portfolio

Power BI

Product Consideration as per FL DFS's Requirement

- With above-average capabilities for data preparation while keeping the data secure, Microsoft Power BI's strongest use case is visual self-service analytics. It automatically analyzes the dimensionality of the data and its distribution to infer the best-fit data visualization. Power Query enables easy, quick, and effective data preparation
- Power BI server requires Azure Database, cannot natively run on other clouds including Oracle's
- Power BI faces performance issues with very large dataset visualizations and governance is not at par due to Microsoft Purview governance being nascent in development
- Highly compatible with MS Azure, Azure Analytics and Power BI together provide insights at scale, allowing one to develop the data-driven culture needed to thrive in a fast-paced, competitive environment. The additional advantage of the global reach and multi-geography capabilities offered by Microsoft's cloud platform can only be leveraged by Azure deployment
- Only Power BI Desktop can easily be integrated with an Oracle Database – not Power BI Server for running on cloud

Figure 46. Vendor Rating



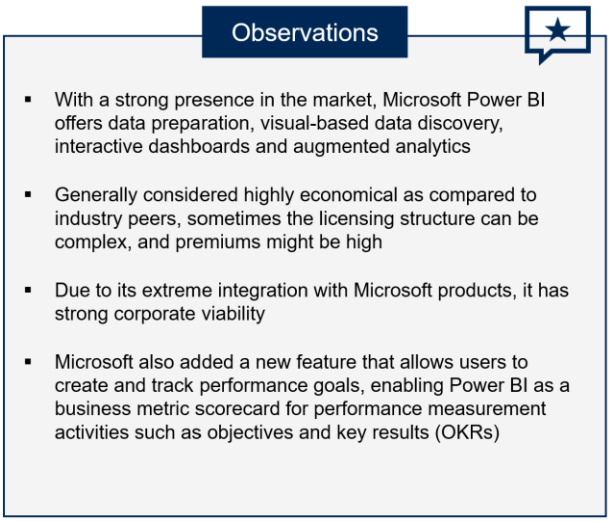


Figure 47. Customer Sentiment for Microsoft Power BI

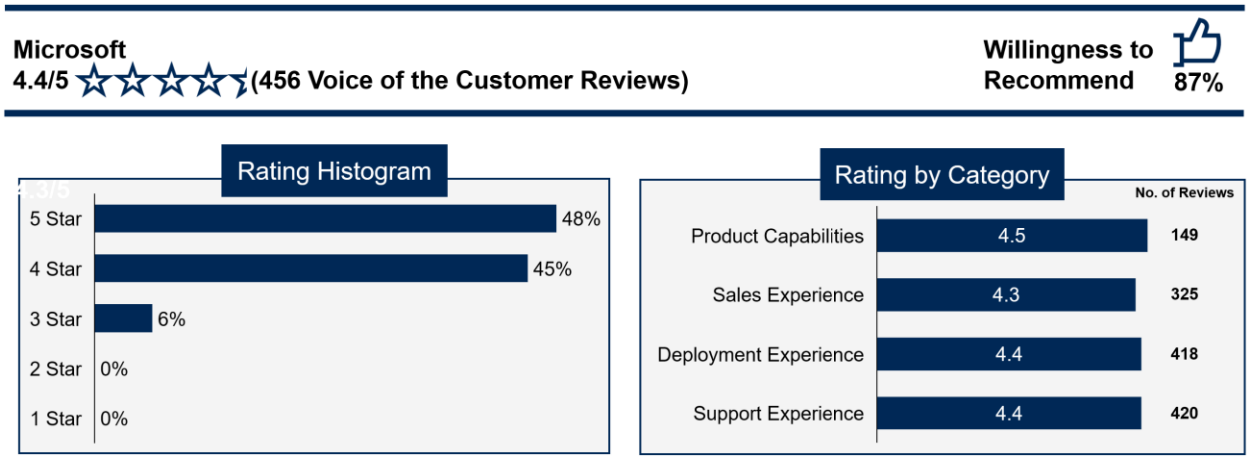


Figure 48. Gartner Peer Review and Rating for Microsoft Power BI

Vendor	Reasons for Satisfaction	Reasons for Dissatisfaction	Quotes
Total peer reviews: 2147 **Rating: 4.4 / 5** **Products: Power BI**	Like the most about the product/service: – Simple and easy reporting tool – Economically priced tool – Visually appealing reports and dashboards – Seamless integration and ease of import of data	Dislike the most about the product/service: – Limited data handling available with free version – Requires high specifications on the hardware to run smoothly (high RAM requirements) – Complex license Structure	*"Power BI has completely automated our data reporting methodology, resulting in more accurate data analysis and output"- **For Power BI*** *"The tool simply analyzes complicated data faster and more accurately, and we can reformulate the required reports in a more full and secure way. "- **For Power BI***

Figure 49. Strengths, Cautions, Opportunities and Threats for Microsoft Power BI

Strengths

- **Alignment with Office 365, Teams and Azure Synapse:** The inclusion of Power BI in the Office provides an enormous channel for the platform's spread. Due to a rise in remote work collaboration, the ability to access Power BI and now "goals" within the same Teams interface is a compelling integration for business users. Power BI and Azure Synapse alignment addresses multiple data and analytics personas
- **Price/value combination:** Power BI does not sacrifice quality in order to achieve its disruptively low pricing model. The Power BI cloud service is rich in its capabilities, which include an enlarged set of augmented analytics and automated ML (autoML) capabilities

Cautions

- **Gaps in on-premises capabilities:** Compared with the Power BI cloud service, Microsoft's on-premises offering lacks significant functional capabilities, including dashboards, streaming analytics, prebuilt content, natural language question and answer, automated insights, and alerting
- **Azure as the only deployment option:** While data connectivity enables multicloud and hybrid cloud scenarios, Power BI runs only in Azure, and no other IaaS offering
- **Content publication process and governance:** Creating a process for promotion and publication of Power BI content can lead to a significant administrative overhead for customers. With a one-to-one relationship between published Power BI apps and Workspaces, organizations may be manually managing many hundreds of Workspaces

Opportunities

- **Diversifying to other cloud offerings:** Customers that utilize Azure can take advantage of the global reach and multigeography capabilities offered by Microsoft's cloud platform, although Microsoft can move to accommodate other cloud vendors to gain market share
- **Governance of Self-Service Usage:** How to govern self-service usage is one of the most common questions asked about Power BI by users of Gartner's inquiry service, and hence more detailed documentation would ease the minds of users
- **Power portfolio and product ambition:** Microsoft has a clear vision for cross-utilization of Power BI, Power Apps and Power Automate to drive business value

Threats

- **Unavailability of NLQ onTeams:** Natural language query Q&A works well on Power BIs mobile apps, but is yet to be available via Teams
- **Lack of Automated data stories:** Power BI users cannot automatically generate data stories based on the ongoing monitoring of findings output by its automated insights functions
- **Third Party Connector:** Although there is integration between Power BI Desktop and Oracle, there may be a need to contact third-party vendors who specialize in integrating Power BI with Oracle Peoplesoft or a requirement to write SQL/ DIrectQuery scripts and no connection between Oracle and Power BI server

Gartner

Oracle Analytics Cloud

Figure 50. Oracle Analytics Cloud Information

About

Oracle is a Visionary in the Magic Quadrant. Oracle Analytics Cloud is a cloud-first platform that provides augmented analytics capabilities across the data and analytics workflow. Oracle Analytics Server is available for on-premises deployments, and it also offers prebuilt data and analytics solutions for a growing list of Oracle applications

Value Creation

- In 2021, customer programs like Cloud Coach and Code Innovate were added to help customers maximize the effectiveness of their environment
- Oracle offers Oracle Analytics Server (OAS) which is the same as OAC but made available on-premises

Functionality

- OAC and OAS can access any data source, but most customer usage and ecosystem implementation skills tend to be directed toward Oracle's horizontal applications. Oracle offers an end-to-end cloud solution, including infrastructure, data management, analytics and analytic applications

Scale

- Fusion Analytics Warehouse (FAW) offers native integration and closed-loop actions for Oracle's ERP, human capital management, supply chain and NetSuite products. Oracle maintains an open architecture approach to accommodate customers' multicloud needs

Cost

- Oracle offers uniform pricing across all global regions. It simplifies cost management and eliminates billing surprises. Customers also get committed use discounts, software license portability, and rewards for OCI consumption

Figure 51. Oracle fares above average for most of the highly weighted FL DFS relevant Capabilities, lags in Governance and Security

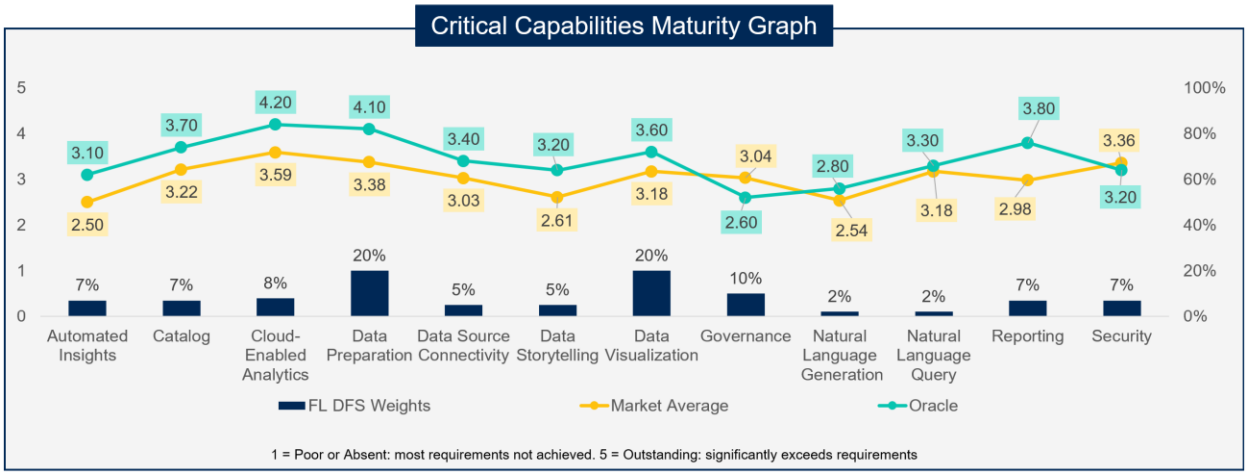


Figure 52. Oracle Analytics Cloud critical capabilities score

Cloud-Enabled Analytics	Data Preparation	Reporting	Data Visualization	Catalog	Automated Insights	Security	Reporting
4.20 / 5	4.10 / 5	3.80 / 5	3.80 / 5	4.20 / 5	2.80 / 5	4.00 / 5	3.20 / 5

Products Portfolio

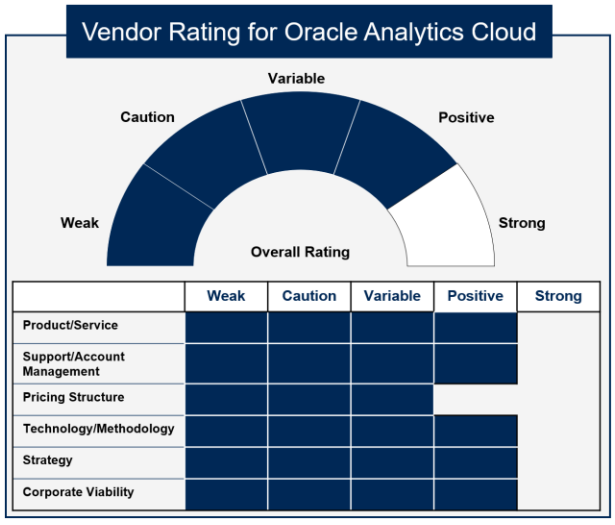
Oracle

- Oracle Analytics Cloud

Product Consideration as per FL DFS's Requirement

- Oracle scores highly for both data preparation and data visualization. For data preparation, it provides strong data inference where Oracle Analytics can automatically detect similarly named columns and data types across datasets. Moreover, Oracle provides a strong set of smart recommendations including data repair, semantic enrichments, search and replace, and date formatting. For data visualization, OAC offers good visual interactivity and automatically renders the best-fit visualization from the data selection
- Oracle is highly compatible with other Oracle Business Suite products like Peoplesoft
- Seamless advanced analytics by importing industry models on Oracle databases and updated visualizations and ETL make self service easy
- Oracle and MS Azure have a partnership where enterprises can seamlessly connect Azure services to Oracle Cloud services through a dedicated private connection, utilize single sign on via identity federation, and access collaborative technical support from both Oracle and Microsoft

Figure 53. Vendor Rating



Observations

- Launched in 2020, Oracle is heavily encouraging the adoption for the Oracle Analytics Cloud (OAC). Oracle is a Visionary in the Magic Quadrant
- Oracle offers Oracle Analytics Server (OAS) which is the same as OAC but made available on-premises. With OAS, customers do not have to upgrade every quarter, but they must upgrade at least once a year, where maximum benefits can be reaped from the Oracle ecosystem
- In 2021, customer programs such as Cloud Coach and Code Innovate were added to help customers maximize the effectiveness of their Oracle environment and co-innovate alongside customers
- Pricing point for enterprise is most of the hindrance point in most of the consumer, although Oracle is making difference in pricing and quality by understanding user pressure points

Figure 54. Customer Sentiment for Oracle Analytics Cloud

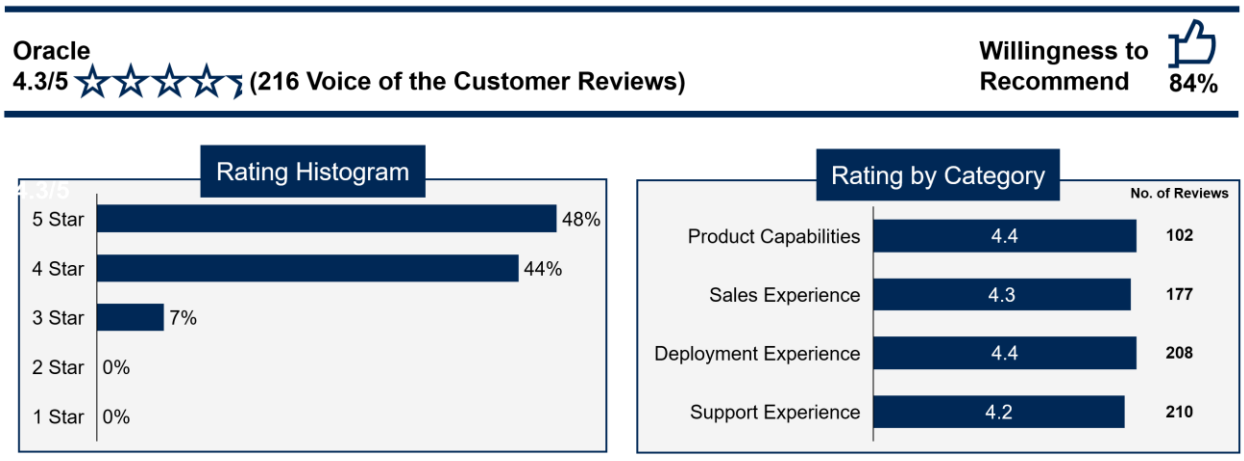


Figure 55. Gartner Peer Review and Rating for Oracle Analytics Cloud

Vendor	Reasons for Satisfaction	Reasons for Dissatisfaction	Quotes
Total peer reviews: 391 **Rating: 4.3 / 5** **Products: Oracle Analytics Cloud**	Like the most about the product/service: – Integration with Oracle ecosystem – Scalability across the cloud – Visualization capabilities – Augmented analytics capabilities	Dislike the most about the product/service: – Instability with version updates – Lack of intuitive GUI – After sales support	*"The dashboards are attractive and provide a good variety of visual display. Time series in Data Visualizer is a great functionality. We used Oracle to do our implementation and the consultants were fantastic and very knowledgeable. Lastly, the ease of scalability is a huge plus."* ***For OAC*** *"Good Integration with another Oracle Products, we have been using OBIEEE, DATA SCIENCE, ADW and Buckets with OAC."* ***For OAC***

Figure 56. Strengths, Cautions, Opportunities and Threats for Oracle Analytics Cloud

Strengths

- **Enterprise cloud D&A:** Oracle offers an end-to-end cloud solution, including infrastructure, data management, analytics and analytic applications, with data centers in 30 cloud regions. FAW offers native integration and closed-loop actions for Oracle's ERP, human capital management, supply chain and NetSuite products. Oracle maintains an open architecture approach to accommodate customers' multicloud needs
- **Augmented capabilities throughout:** Oracle enhanced its strong augmented analytics capabilities, by adding integrated graph analytics capabilities. Users can leverage NLQ through the OAC interface, Oracle Analytics Day by Day for mobile devices, and interfaces powered by Oracle Digital Assistant
- **Consumer-focused product vision:** Oracle invests aggressively in capabilities that augment the analyst and the consumer, such as conversational user experiences and automated data storytelling features

Cautions

- **Momentum in crowded market:** Oracle has a strongly competitive product but is not considered as frequently as the Leaders in competitive evaluations known to Gartner. Traction outside the Oracle ecosystem installed base is limited
- **Oracle application-centric:** Although OAC can access any data source, its packaged analytic applications (Fusion Analytics Warehouse and NetSuite Analytics Warehouse) work only with Oracle enterprise applications out of the box. Non-Oracle application customers would have to build applications for themselves using OAC

Opportunities

- **Evolving operations:** Oracle has invested to improve customer programs focused on collaborative support and innovation in 2021 for OAC
- **Expanding to other ecosystems:** Oracle-supported integration with non-Oracle products tends to be limited. Enhancing the scope of this integration to other ecosystems can go a long way in increasing user adoption to the OAC

Threats

- **Version Control:** Oracle needs to improve its version control and multi-developer support. This can lead to instability in the platform when there are system updates
- **Security and Governance:** Oracle scores below average for governance and security as per Gartner's capabilities. This is because of its immature multi developer support

Appendix C — Use Cases and Roles

Use Cases

1) Comprehensive and user-friendly Access Management

Attribute	Description
Use Case Definition	Sensitive data should only be accessed by users with relevant privileges,. Access restrictions could be at a database, table, or even row level. Managing who has access to what and when should be easy(enabled by security policies) for admins and power users
Main "Actor(s)"	While all data-accessing stakeholders are affected, the main users are system administrators and managers
Capability	Security, Performance Monitoring and Admin
Scenario Beginning	An employee has just received and promotion and undergone security screening to be eligible to access sensitive data.
Scenario End	System admins must alter this employee's username/profile to grant access to previously inaccessible data tables.
Business Value of Scenario	Proper access management helps prevent unauthorized users from accessing sensitive data, and mechanisms for easy, simple role changes help expedite profile changes and reduce risk of errors.
Desired Features	• Ability to restrict view/read only capabilities to data by defined criteria (e.g., user id, user group, agency, and division). • Ability to list or provides links only to reports that the user is authorized to see in detail. • Ability to leverage the roles and security definitions that will be deployed for the core Solution within the reporting and business intelligence function to minimize any duplication of security administration functions. • Ability to restrict update/refresh/delete capabilities to data to specific users or source systems.
Functional Requirements Supported	10.0191, 10.0192, 10.0417, 10.0418, 10.042, 10.0446, 20.0294, 20.0295, 30.0106, 30.0112, 30.016, 30.0211, 30.0434, 30.0496, 30.0497, 30.0498, 30.05, 30.0506, 40.0087, 40.0256, 40.0259, 40.0266, 60.0229, 60.023, 60.0231, 60.0232, 80.0015, 80.0029, 80.0045, and 80.0046
Technical Requirements Supported	100.0015, 100.0086, 100.0087, 100.0332, 100.0335, 100.0336, 100.0339, 100.0341

2) Data platform should provide means to display and interact with data as well as produce graphics and visualizations

Attribute	Description
Use Case Definition	As a data analyst/agency user, I need to see what data is available and to quickly and easily do high level analysis. I also need to be able to create reports, dashboards, or other visualizations without extensive training and be able to socialize these products in a variety of ways.
Main "Actor(s)"*	Analysts, agency users and report/visualization consumers
Capability	Data visualization
Scenario Beginning	Manager requests ad hoc reporting on metrics for a particular region and timeframe
Scenario End	Analyst can compile relevant data and provide basic-to-moderately complex reporting and visualization to sufficiently address queries as well as provide additional context and documentation
Business Value of Scenario*	Enable self-service for low- to moderate-complexity data analysis and exploration
Desired Features	• Ability to present data in both tabular and graphical formats • Ability to easily create and deploy reports and information dashboards with minimal training using techniques like drag-and-drop from a populated list of available data fields • Ability to export query and report results to a variety of standard formats • A solution that includes pre-built data structures and data transformations for Accounts Payable, Accounts Receivable, Asset Management, Budget, Cash Management, Contracts, General Ledger, Grants, Projects, Travel, Treasury Management and Payroll.
Functional Requirements Supported	10.0405, 10.0412, 20.0121, 20.0129, 20.0244, 30.0089, 30.0094, 30.0164, 30.0257, 30.0279, 40.0098, 40.01, 40.0131, 40.0213, 50.0091, 50.0092, and 80.0023
Technical Requirements Supported	100.0003, 100.0006, 100.0025, 100.0026, 100.035, 100.0337, 100.0338, 100.0342, 100.0344, 100.0345, 100.0346, 100.0347, 100.0362, 100.0363, 100.0356, 100.0357, 100.036

3) Tool provides capability to conduct various types of data analysis while enhancing end-user experience

Attribute	Description
Use Case Definition	As an agency user, I want to build a forecast model for my department's budget needs for next year based on the last 25 years' worth of data. The Analytics and business intelligence (ABI) platform should provide me the capability to build the forecast using trusted data without requiring extensive IT support.
Main "Actor(s)"*	An agency user who has financial responsibility for the agency's yearly budget
Capability	Reporting
Scenario Beginning	Collect data and start building the forecasting report for departmental budgetary needs
Scenario End	Trustworthy report that explains the required budget for the following year along with additional details (expected overrun, other risks etc.)
Business Value of Scenario*	Informed decision making based on facts. Reduced budgetary overrun/underrun helps in agencies allocating optimal funds to serve Floridians
Desired Features	• Provide lineage and impact analysis reporting. • Provide ability to support trend analysis. • Provide data structure designs and tools that simplify and enhance the reporting and analysis experience. • Provide ability to support financial data projection analysis based on historical performance and future variants. • Provide the ability to accommodate reporting on forecasting and predictive analysis scenarios.
Functional Requirements Supported	10.017, 10.0179, 10.018, 10.0181, 10.0186, 10.0189, 10.019, 10.0191, 10.0192, 10.0195, 10.0315, 10.0318, 10.0319, 10.0359, 10.0398, 10.0403, 10.0409, 10.041, 10.0421, 10.0423, 10.0424, 10.0425, 10.0429, 10.044, 10.0442, 10.0443, 10.0444, 10.0445, 10.0446, 10.0464, 10.0489, 20.0001, 20.0025, 20.003, 20.0031, 20.0058, 20.0059,20.006, 20.0065, 20.0066, 20.0068, 20.0108, 0.0117, 20.0121, 20.0123, 20.0157, 20.0168, 20.0173, 20.0205, 20.0218, 20.0244, 20.0293 20.0294, 20.0295, 20.0346, 30.0003, 30.0013, 30.0014, 30.0021, 30.0063, 30.0074, 30.0099, 30.01, 30.0101, 30.0102, 30.0103, 30.0104, 30.0105, 30.0106, 30.0107, 30.0108, 30.0111, 30.0112, 30.0157, 30.0159, 30.0164, 30.0179, 30.0258, 30.0259, 30.0281, 30.0311, 30.0338, 30.0351, 30.0387, 30.0434, 30.045, 30.0478, 40.0114, 40.0214, 40.0249, 40.0267, 40.0272, 50.0032, 50.0093, 60.0028, 60.0031, 60.0177, 60.0178, 60.0208, 60.0209, 60.0211, 60.0217, 60.0218, 60.0236, 60.0237, 60.0238, 60.0241, 60.0242, 60.0243, 60.0244, 60.0252, 60.0266, 60.0267, 80.0001, 80.0005, 80.0007, 80.001, 80.0015, 80.002, 80.0022, 80.0023, 80.0024, 80.0025, 80.0026, 80.0027, 80.0028, 80.0029, 80.003, 80.0033, 80.0034, 80.0035, 80.0038, 80.0045, 80.0046, 80.0047, 80.0048, 80.0049, 80.005, 80.0051, 80.0052, 80.0053, 80.0054, 80.0055, 80.0056, 80.0057, 80.0058, 80.0059, 80.006, 80.0061, 80.0062, 80.0063, 80.0064, 80.0065, 80.0066, 80.0067, 80.0084, 80.0085
Technical Requirements Supported	100.0001, 100.0005, 100.0004, 100.0007, 100.0018, 100.0021, 100.0023, 100.0024, 100.033, 100.0334, 100.0329, 100.0361

4) A&BI platform has the capability to drill down on multiple dimensions, filter on parameters and perform free-text search

Attribute	Description
Use Case Definition	As a citizen report developer and consumer, I want the ability to slice and dice at will on a range of filters, dates, variables, etc. I also want the ability to perform a free-text search within the result sets.
Main "Actor(s)"	End users of the reports
Capability	Reporting, Advanced Analytics
Scenario Beginning	As a citizen developer, I want to find Account Receivables filtered by a particular account from May 2019 to Aug 2019
Scenario End	Successfully view/export data for the filtered account for the time period
Business Value of Scenario	Improve the *efficiency* of citizen users by narrowing down the range of historical data reviewed and analyzed
Desired Features	• Provide ability to perform multi-dimensional analysis. • Provide ability to support drill down from summary data to detail transaction data and drill up from detail transaction to the summary balance • Provide ability to support selection and query of historical data at a point in time or a range of time(s) • Provide authorized users with the capability to perform free-form text searching
Functional Requirements Supported	10.0193, 10.0194, 10.0203, 10.0204, 10.032, 10.0359, 10.0401, 10.0405, 10.0406, 10.0411, 10.0412, 10.0413, 10.0416, 10.0417, 10.0418, 10.0419, 10.042, 10.0422, 10.0428, 10.043, 10.0431, 10.0432, 10.0441, 20.0029, 20.0112, 20.0123, 20.0124, 20.0166, 20.0168, 20.0209, 20.0211, 20.0216, 20.0293 30.0055, 30.0073, 30.0075, 30.0076, 30.0077, 30.0078, 30.0085, 30.0086, 30.0089, 30.009, 30.0091, 30.0096, 30.0098, 30.011, 30.0113, 30.0114, 30.0115, 30.0116, 30.0117, 30.0118, 30.0119, 30.012, 30.0121, 30.0122, 30.0123, 30.0124, 30.0125, 30.0126, 30.0128, 30.0129, 30.013, 30.0131, 30.0132, 30.0133, 30.0134, 30.0136, 30.0137, 30.0138, 30.0139, 30.014, 30.0141, 30.0143, 30.0144, 30.0146, 30.0147, 30.0148, 30.0149, 30.0151, 30.0153, 30.0154, 30.0155, 30.016, 30.0161, 30.017, 30.0282, 30.0353, 30.0454, 30.0456, 30.046, 30.0462, 30.0464, 30.0469, 30.0487, 30.0489, 30.0491, 30.0493, 30.0494, 30.0496, 30.0497, 30.0498, 30.05, 30.0502, 30.0503, 30.0505, 30.0506, 30.0508, 30.0509, 30.0512, 30.0514, 40.0087, 40.0092, 40.0098, 40.01, 40.011, 40.0113, 40.0115, 40.0116, 40.0117, 40.0118, 40.012, 40.0122, 40.0124, 40.0125, 40.0126, 40.0127, 40.0128,40.0129, 40.0131, 40.021, 40.0211, 40.0212, 40.0213, 40.0215, 40.0216, 40.0217, 40.0218, 40.022, 40.0221, 40.0222, 40.0223, 40.0233, 40.0234, 40.0243, 40.0244, 40.0245, 40.0246, 40.0247, 40.0249, 40.025, 40.0251, 40.0252, 40.0253, 40.0255, 40.0256, 40.0257, 40.0258, 40.0259, 40.026, 40.0261, 40.0262, 40.0263, 40.0264, 40.0265, 40.0266, 40.0268, 40.0269, 40.0277, 50.0027, 50.0058, 50.0067, 50.0072, 50.0088, 50.0089, 50.009, 50.0091, 50.0092, 60.0063, 60.0205, 60.0207, 60.021, 60.0213, 60.0219, 60.022, 60.0221, 60.0222, 60.0229, 60.023, 60.0231, 60.0232, 60.0233, 60.0234, 60.0235, 60.0239, 60.024, 60.0248, 60.025, 60.0251, 80.002, 80.0024, 80.0025, 80.0036, 80.0037, 80.0039, 80.004, 80.0042, 80.0043, 80.0052, 80.0053, 80.0068, and 80.0073
Technical Requirements Supported	100.0002, 100.0348, 100.0351, 100.0352, 100.0353

5) Data Warehouse can connect and ingest data from various sources natively but can also expose data for consumption

Attribute	Description
Use Case Definition	As a database professional, I want the Datawarehouse platform to natively integrate with various data sources; in addition, I want the Datawarehouse platform to expose data in various formats for downstream consumption (e.g., report building, advanced analytics model etc..)
Main "Actor(s)"*	Primarily Database developer/architect but can also include citizen developers from different agencies
Capability	Data Preparation, High-Speed Processing and Ingest, Distributed Access
Scenario Beginning	Integrate data from legacy database and from PALM database to produce a "merged dataset"
Scenario End	Successfully publish the new "merged dataset" for self-service analytics
Business Value of Scenario*	Agency users can rapidly build their own dashboards without depending on IT thereby reducing time taken to make critical decisions
Desired Features	• Provide for the Data Warehouse's Analytical Applications to fully integrate business processes and associated data that cross modules of the Solution. • Provide ability to include or integrate with data modeling tools to facilitate data warehouse design. • Provide ability to exchange metadata with other systems that use open standards. • Provide ability to join Datawarehouse data with external data sources.
Functional Requirements Supported	10.0248, 10.0398, 30.0281, 60.0163, 60.0177, 60.0178, 60.0266, and 80.0085
Technical Requirements Supported	100.0009, 100.0019, 100.0022, 100.0028

6) Data Warehouse must integrate with third party tools in both on-prem and cloud environments

Attribute	Description
Use Case Definition	As a database professional, I want the ability to integrate with various tools such as email servers, third party data sources (public APIs for analytics). Datawarehouse platform must also store unstructured data(images, emails, text) from other sources and perform analytics on the data
Main "Actor(s)"*	Data engineer
Capability	Data Source Connectivity, Multi/Intercloud/Hybrid Deployment
Scenario Beginning	As a database professional, I would like an API to connect with Data.Gov and retrieve datasets for use in analytics
Scenario End	Successfully integrate data from data.gov into analytics
Business Value of Scenario*	Ensures accurate decision making at FL DFS by connecting to the latest and greatest third-party data/platforms
Desired Features	• Provide ability to integrate with MAPI and SMTP mail servers and be compatible with and allow for full integration with industry leading electronic mail servers (e.g., Microsoft Exchange, sendmail, Open-Xchange, Postfix, and Exim might). • Provide ability to ensure modern integration patterns and best practices from ERP providers are implemented. • Provide ability to customize the delivered data structure to include storing data from sources other than the Solution. • Provide functionality to seamlessly integrate with leading third-party business intelligence and reporting tools (e.g., Crystal Reports, Cognos, MS SQL Server BI, and Microsoft Office Suite).
Functional Requirements Supported	30.0456, 30.0464, 40.0277, 50.0062, 60.0218, and 80.0058
Technical Requirements Supported	100.0013, 100.0211, 100.0236, 100.0354, 100.0355, 100.0364, 100.0366, 100.0367, 100.0368, 100.0395

7) Successful Migration to the new Information Warehouse needs to Powered by Training and Documentation

Attribute	Description
Use Case Definition	As an Agency leader, I want my colleagues to successfully migrate their analytical operations from FLAIR Information Warehouse to the new PALM Information Warehouse. To Enable this, there must be adequate documentation of the new platform aided by training to enable self-service options.
Main “Actor(s)”*	Agency end-user of the analytics platform
Capability	N/A
Scenario Beginning	Agency end-user knows the location and definition of the data set he/she is looking for
Scenario End	Agency end-user consumes the data from identified data set and completes his/her business activity
Business Value of Scenario*	Self-services minimizes the time and dependency on IT resources leading to cost savings and efficiency improvement for the state of FL
Desired Features	• As part of new IW, establish a training program for various users to understand the capabilities of the new IW • Provide online searchable repository where users can use to access data warehouse functionality, features, and tools. • Provide self service portals, report templates, meta data repositories and other documentation / help tools that promote self sufficiency among information users. • Provide ability for users to search for data, transactions or documents using a range of data values.
Functional Requirements Supported	• N/A
Technical Requirements Supported	100.001, 100.0274, 100.034

8) Data platform needs tools to create, schedule, and manage processing jobs that extract, transform, and load data

Attribute	Description
Use Case Definition	As a data engineer, I want the ability to write, test, and run data processing jobs in an environment close integrated with a data warehouse solution. These ETL jobs should be schedulable and respect interdependencies, and log successes or raise alerts for job failures.
Main "Actor(s)"*	Data engineers and architects
Capability	Data Preparation, High Speed Processing and Ingest
Scenario Beginning	A new data set is being introduced to augment existing reporting metrics and must be integrated into the existing pipelines
Scenario End	A data engineer can build and test how this new integration might work without affecting existing pipelines, and then seamlessly insert this new job into the current landscape while respecting upstream and downstream dependencies
Business Value of Scenario*	Automated recurring data pipelines with proper error handling and messaging frees up limited engineering resources to focus on more value-add initiatives
Desired Features	• Ability to schedule and manage data processing jobs in either a one-off or recurring manner, as well as manage any interdependencies or error handling • Ability to manage ETL or other system change processes in real-time, just-in-time, or batch processing • Ability to schedule and manage processing or standard reports • Ability to trigger data processing, standard reporting, or other jobs automatically if certain conditions are met (e.g., 95% of budget expended), as well as manage notification of running or completion
Functional Requirements Supported	20.0244, 30.0078, 30.0089, 30.0091, 30.0094, 30.0146, 30.0257, 30.0279, 30.0367, 30.0487, 30.0489, 30.0491, 30.0493, 30.0494, 30.0496, 30.0497, 30.0498, 30.05, 30.0502, 30.0503, 30.0505, 30.0506, 30.0508, 30.0509, 40.0131, 40.0211, 40.0212, 60.0241, 60.0242, 60.0252, 80.0001, 80.0034, and 80.0038
Technical Requirements Supported	100.0027, 100.0029, 100.0089, 100.009, 100.0091, 100.0273, 100.0275, 100.0276

9) Data platform needs resources for documenting housed data, such as metadata management, ERDs, and a data dictionary

Attribute	Description
Use Case Definition	As a data professional, I need the ability to easily understand what data is available, what it means, where it comes from, and where it goes. This information can support the development of new analysis, pipeline or data table augmentation, or simply serve as a resource for educating new stakeholders.
Main "Actor(s)"*	Data engineers, data analysts
Capability	Catalog, Advanced Analytics
Scenario Beginning	A new data pipeline has thrown an error referring to a particular data element in the middle of a complex weekly batch process
Scenario End	The data engineer is able to search the data dictionary and lineage resources to track down what may have caused this error and troubleshoot any other possible dependencies a solution may affect
Business Value of Scenario*	Easy access to a well documented data environment helps enable the inevitable growth and evolution of the system's scope and capabilities
Desired Features	• Ability to maintain an active metadata repository that contains definitions of all data elements and attributes within the data warehouse • Ability to visualize data lineage, entity relationship diagrams, or other information around data structures within the warehouse • Ability for users to easily locate and browse data dictionaries, lineage visualizations, or other data management collections
Functional Requirements Supported	Not identified yet
Technical Requirements Supported	100.0012, 100.0014, 100.0272, 100.0349

10) Data platform can connect to various data sources and provide new insights based on pre-defined algorithms

Attribute	Description
Use Case Definition	Data scientists develop algorithms based on deep subject matter expertise of the organization's data; the algorithms then generate insights automatically for end users based on the dataset they are analyzing
Main "Actor(s)"	Data scientists, end users
Capability	Automated Insights
Scenario Beginning	Agency user is analyzing a dataset to publish a report for internal agency consumption
Scenario End	Automated insights leverages pre-defined algorithms and highlights key datapoints (e.g., decrease in unemployment rate, population growth etc..) to include in the report
Business Value of Scenario	ML powered insights drive significant value by helping guide decision making across various agency users
Desired Features	• Data Platform can connect to various data sources (not just collect) to gain insights into data • A&BI tools can consume data from Data Platform and generate insights for consumption by end-users • Ability to convert generated insights into text for easier use*
Functional Requirements Supported	10.0401, 10.0489, 20.006, 20.0029, 30.0282, 40.0255, 80.0005, 80.0007, 80.001, and 80.0022
Technical Requirements Supported	100.0326, 100.0327

11) Ensure Data Warehouse performance meets business user needs

Attribute	Description
Use Case Definition	Stakeholders of all types, as well as various departments or infrastructure resources, need an information warehouse that is readily available to access data actively or run a multitude of workloads "behind the scenes." A user's experience should not be affected regardless of how many other users are connected or background processes are running.
Main "Actor(s)"	Any user that might need to access the data warehouse directly (e.g., run a query) or indirectly (queueing a batch report)
Capability	Automated Perf Tuning/Optimization
Scenario Beginning	A data analyst wants to run an intensive analytical workload.
Scenario End	If run during the day, other uses accessing the system should not notice any degraded performance. If run late in the evening, any scheduled workloads with overlapping runtime should not exhibit any performance change.
Business Value of Scenario	Available and performant resources allow employees to complete their work in a timely manner without the frustrating of excessive slow analytic environments.
Desired Features	• Ability to run a variety of analytics in real-time in the data warehouse without sacrificing system performance or data integrity (i.e., a single user or group of users will not be able to bring the entire system to a crawl with this capability enabled). • Functionality to support elastic scaling of resources to match periods of increased workloads or draw down during less busy times to maintain system availability but minimize cloud spend • Ensure system sees minimal downtime so as not to impact time-sensitive business processes • Ability to support both active user analytics as well as simultaneous background batch reporting
Functional Requirements Supported	10.0248, 30.0079, 30.0093, 30.0107, 30.0108, 30.0111, 30.0112, 30.0113, 30.0114, 30.0115, 30.0116, 30.0117, 30.0119, 30.012, 30.0121, 30.0122, 30.0123, 30.0124, 30.0125, 30.0126, 30.0128, 30.0129, 30.013, 30.0131, 30.0464, and 80.0023
Technical Requirements Supported	100.0008, 100.002, 100.027, 100.0289, 100.0331

12) Data platform should include ability to track usage and manage how data is accessed, validated, and archived

Attribute	Description
Use Case Definition	As a data executive or manager, I need to understand when and how my data grows or changes, as well as who accesses my data and when. I need the ability to run validation workflows, archive data when needed for audit and compliance purposes, and purge data as guided by business or regulations and compliance protocols.
Main "Actor(s)"*	Data owners, data quality and compliance team, business leaders
Capability	Governance, Performance Monitoring and Admin
Scenario Beginning	GASB Financial Reporting Standards require a comprehensive annual financial report to maintain compliance
Scenario End	A stock or custom-developed template provides a starting point to decrease level of effort to produce required compliance materials
Business Value of Scenario*	Templatized reporting tools can significantly reduce the time involved in preparing documentation for statutory compliance reporting requirements
Desired Features	• Provide comprehensive edit, validation, and balancing controls which prevent incomplete or incorrect data from being processed • Ability to comprehensively log information on users, access, and activity to sufficiently comply with Florida statutes or other regulatory standards audit requirements • Ability to produce standard compliance reports for a variety of regulatory agencies, or create custom compliance reports or similar output for the sake of demonstrating standards compliance • Ability to update tables/files upon completion of a logical unit of work according to State/agency business rules • Ability to support archiving and purging of data in the data warehouse according to defined business rules which may vary by data type or source • Ability to customize alerts and tracking of data warehouse performance including data staging performance and reporting performance.
Functional Requirements Supported	10.017, 10.0318, 10.0319, 10.0442, 10.0443, 10.0444, 10.0445, 10.0446, 10.0464, 10.0489, 30.0013, 30.0014, 30.0021, 30.0073, 30.01, 30.0003, 40.0264, 40.0265, 80.0005, 80.003, 80.004, and 80.0078
Technical Requirements Supported	100.0011, 100.0088, 100.0092, 100.0271, 100.0328, 100.0333, 100.037

13) Cloud-based analytics tools integrate legacy data sources, PALM data with external data sources to produce reports

Attribute	Description
Use Case Definition	As an end-user of PALM IW, I want to ensure the analytics tools reliably access legacy (FLAIR IW, Mainframe data etc.) and new PALM IW and Operational data, as well as integrating external third-party (cloud based) data to perform traditional and advanced analyses; in addition, the analytical tools must scale in performance as applicable
Main "Actor(s)"*	End-User
Capability	Cloud-enabled Analytics
Scenario Beginning	Agency user attempting to integrate PALM IW data with demographic data to model sales tax forecast
Scenario End	Successfully generate report that produces 10-year, 15-year expected sales tax revenue for the state agency
Business Value of Scenario*	Rapidly connect to various data sources to conduct advanced analytics to generate insights for senior executives
Desired Features	• Provide APIs to integrate with third party data source both on-prem and cloud • Embed algorithms and build prototypes rapidly to evaluate the possible outcomes • Low-code/no-code means to building out reports and show the outcomes visually
Functional Requirements Supported	N/A
Technical Requirements Supported	N/A

Roles

Role Name	Description
Data Analyst	Have a foundational understanding of statistical analysis and use these skills to support specific business areas. They either are, or work closely with, domain experts to apply insights to business processes or functions.
Business Intelligence Analyst	Have a foundational understanding of statistical analysis and use these skills to support specific business areas. They either are, or work closely with, domain experts to apply insights to business processes or functions.
Data Manager	Supports the deployment of D&A throughout the rest of the organization. They are key contributors to the strategy and vision for D&A, build the roadmap, manage senior stakeholders, and are responsible for budgets and resources. Besides measuring the performance of their team, they should also monitor and track the contribution of D&A to the business objectives
Report Consumers/End User	Leaders, managers, or colleagues that consume the produced reports, to either stay informed or direct business decisions. Also

Role Name	Description
	can include auditors for compliance checks or the public for transparency initiatives.
Data Architect	Strengthens the impact of (and provides recommendations on) business information. This information will need to be available and shared consistently across the company through the identification, definition and analysis of how information assets drive business outcomes. The data architect "owns" the data models and understands the impact of the various D&A scenarios (like data science or machine learning) on the overall enterprise architecture
Data Engineer	Responsible for building, managing and operationalizing data pipelines in support of key D&A use cases. They are also primarily responsible for leading the tedious (and often complex) task of curating datasets and data pipelines created by nontechnical users (for example, through self-service data preparation tools), data scientists or even IT resources, and operationalizing data delivery for production-level deployments. Finally, they support the key task of deploying analytics and data science outputs into existing business processes and applications.
Data Scientist	Responsible for modeling complex business problems and discovering business insights using quantitative disciplines (statistical, algorithmic and mining), and visualization techniques. Data scientists typically have an advanced degree in computer science, statistics, economics or related fields. The data scientist contributes to building and developing the organization's data infrastructure, and supports the organization with insights, and analysis for decision-making processes. Data scientists often predict (predictive analytics) or classify situations and develop next-best-action models (prescriptive analytics).
Business Leader/Owner	Accountable party for the data that you're processing and doing your analytics on. You'll have multiple of these, and they need to really take ownership and surround themselves with sufficient supporting roles (like risk officers and compliance and what

Role Name	Description
	not) to be able to take decisive actions if needed.
D&A Strategy Lead	Accountable for D&A Strategy across the state of Florida and is deeply involved in establishing D&A Strategy at FL DFS. He/she is the single point of focus/escalation for all issues pertaining to D&A Strategy and is part of the leadership team.
Chief Data Officer (CDO)	The CDO is the senior executive who bears responsibility on behalf of an organization for enhancing the quality, reliability, access and governance of data, and creating value from its data assets and the external data ecosystem. Value creation comes through data exploitation, enabling all forms of business outcomes through analytics (including D&A governance) and enterprise information policies.
Data Governance Lead	With data stewards widely dispersed across the organization (along department/functional lines or business process lines), there is a critical need to coordinate stewardship activities for consistency and leverage. The lead data steward drives this coordination by establishing processes for how other stewards execute their policy enforcement activities, and how they communicate their actions to their peers, and for escalations and proposals upward to the data governance board.
Enterprise Architect Managers	EA managers lead the enterprise architecture team within your organization. This person is typically an enterprise architect with additional leadership responsibilities.
Solutions Architect	Solutions architects provide architectural guidance to delivery teams, bringing together such EA viewpoints as business, application, information, and technology architecture to design solutions that deliver business value and enable organizations to become resilient and future-fit
Technical Managers	Technical Manager oversees the development, implementation and maintenance of technological company systems and processes, including troubleshooting any potential issues.

Role Name	Description
Technical Directors	Oversee a group of Technical Managers; have broader managerial responsibilities in addition to technical responsibilities
Change Management Analyst	Change management analysts are typically responsible for managing all aspects of IT changes. They prioritize change requests, assess their impact, and accept or reject changes. They also document change management processes and change plans.
Executive Committee	An executive committee is a smaller group of senior stakeholders elected by their peers to address pressing issues. This group of leaders meets regularly (often with little notice) to make decisions about urgent matters that may alter the course of the project.
Training Analyst	Training Analyst serves as a specialist in the planning and execution of instructional assignments; provides input to customize content based on personas
Data Literacy and Training Lead	Manages a group of training analyst and co-ordinates content creation and persona based curation along with training analysts. Has training analyst responsibilities in addition to managerial responsibilities.
D&A CoE	Data and Analytics Center of Excellence acts as a small group of focused resources responsible for executing on D&A related initiatives.

Any questions regarding this Report should be addressed to:

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