

An Intelligent, Connected System of Data and Analytic Hubs for CJADC2



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“The battlefield is becoming faster; it is becoming more lethal; and it is becoming more distributed. OVERMATCH will belong to the side that can make better decisions faster. We are transforming to provide the Joint Force with the SPEED, RANGE, and CONVERGENCE of cutting-edge technologies to gain the DECISION DOMINANCE and OVERMATCH we will need to win the next fight.”

**- General James C. McConville,
Chief of Staff of the Army**

Executive Summary

The vision of the DoD Data Strategy is to be “a data-centric organization that uses data at speed and scale for operational advantage and increased efficiency.”¹ Additionally, the strategy of the Combined Joint All-Domain Command and Control (CJADC2) is to produce warfighting capabilities to “sense, make sense, and act ... across all domains, and with partners, to deliver information advantage at the speed of relevance.”²

To fulfill this vision, the DoD needs to embrace an intelligent, connected system of data and analytic (DA) hubs designed to enable decision-making at scale. Each hub must be able to deliver the correct data to the right place at the right time—even in a contested battlespace where hubs are not connected to each other.

Teradata’s strategy for CJADC2 is to establish a set of analytic capabilities that provide actionable information to command, control, communications, computers, cyber-defense, combat systems, intelligence, surveillance, and reconnaissance (C6ISR) for each service as well as across services and partners. Our strategy involves the creation of connected data platforms within DA hubs that enable agility, behavioral analytics, collaborative ideation,

1 Department of Defense, Office of Prepublication and Review, Executive Summary: DoD Data Strategy: Unleashing Data to Advance the National Defense Strategy (September 30, 2020), pg.1

2 Department of Defense, Summary of the Joint All-Domain Command & Control (CJADC2) Strategy (March 2022)

analytic apps, and autonomous decision-making. These data platforms will deliver against the complexity that the DoD requires to achieve decision dominance over the nation's adversaries.

Teradata brings a best-of-breed connected data platform for enterprise analytics to the C6ISR and CJADC2 strategies, complementing technologies and capabilities necessary to complete the vision. Teradata uniquely provides speed at scale by leveraging a massively parallel architecture. When considering a data platform, ask these questions:

- Can you use your data pipeline and analytic tools of choice on your data platform?
- Can you use behavioral analytics to map complex interactions?
- Can your data platform operationalize analytic models?
- Can your data platform support thousands of concurrent users?

If you answered no to any of these questions or want to talk to Teradata about transforming analytics within the DoD, please contact Teradata at <https://www.teradata.com/About-Us/Contact> to schedule a meeting.

Enabling the Information Advantage

Teradata Vantage™, the connected, multi-cloud data platform for enterprise analytics, can help the DoD collect and analyze massive volumes of data quickly as well as operationalize analytics within DA hubs. The DoD can use Teradata's platform to identify anomalies, predict equipment failures, and optimize resource allocation. Vantage integrates with best-of-breed technologies within each DA hub, and it connects to other data stores, creating a single lens of the data ecosystem.

Nations know how to build potent, accurate weapons; the harder question is when and how to use them. Decision-making relies on the ability to process lots of information quickly, which is why CJADC2 is a top priority for the DoD. The CJADC2 vision requires a connected, secure, and expansive web of DA hubs, deployed at the tactical edge and in the cloud, that provides real-time insights regarding threats. Information from these hubs must be delivered quickly and securely to decision makers and the system. C6ISR solutions collect massive amounts of data from sensors at nodes, which the DoD must combine with data from ERP systems, social media, and other data sources worldwide. Once the data is fused and processed into usable information, it can be shared securely among authorized users. Analytics drives intelligence from the data to C2 systems supporting complex or unpredictable military operations across all domains.

To process raw data and drive intelligence from that data, the DoD requires data platforms within each DA hub that can leverage machine learning (ML) and artificial intelligence (AI) to run at high speeds at DoD scale. Data platforms must integrate with best-of-breed tools that not only meet the needs of specific DA hubs, but also connect to other data stores.

A System of DA Hubs

Within the DoD, data is created by millions of devices and processes. The system includes the following:

- **Nodes:** points where data is captured (such as sensors or transactions)
- **Data platforms:** (as defined by Teradata), a single technology for storing and processing data
- **DA hubs:** a collection of tools and technologies, including a data platform, that collect, analyze, and distribute data

In a CJADC2-enabled data ecosystem, the data is generated at the nodes, pushed to a DA hub for processing, and then pushed to other hubs for additional processing and analytics.

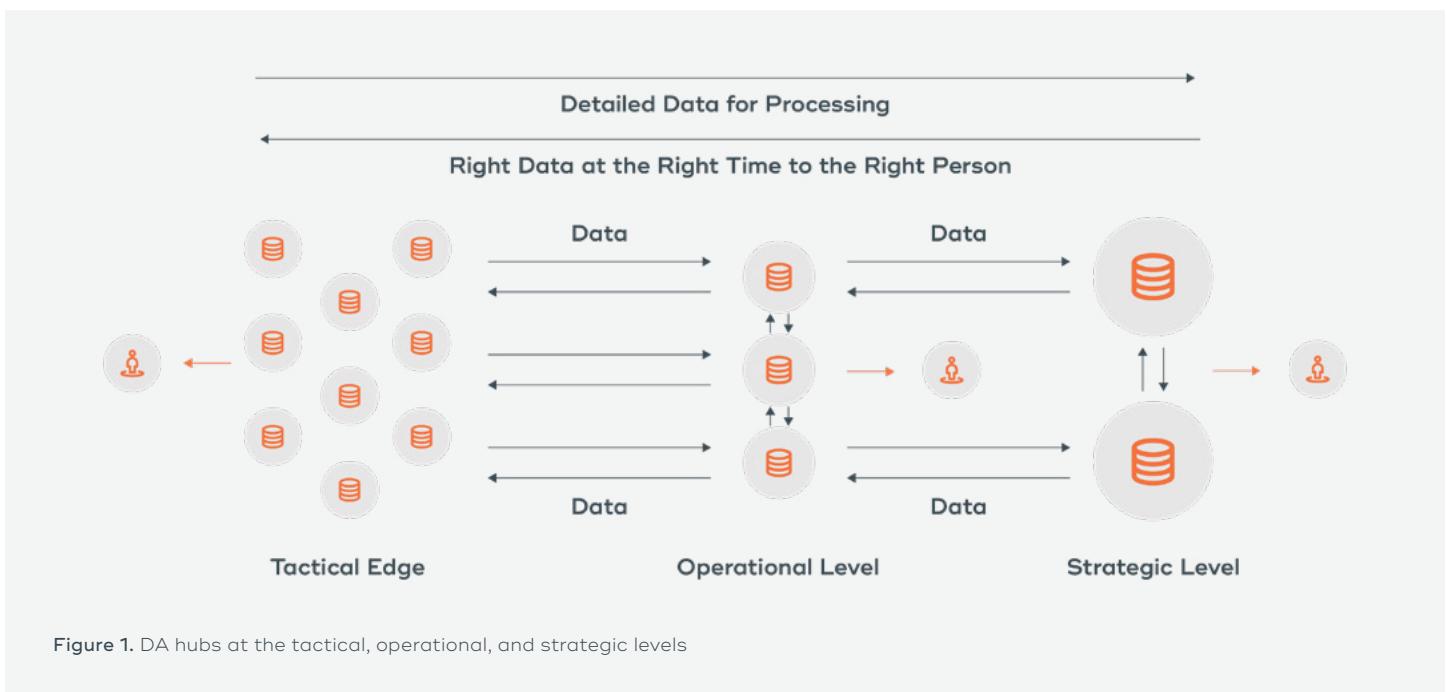


Figure 1. DA hubs at the tactical, operational, and strategic levels

Each circle in Figure 1 represents DA hubs distributing data to other DA hubs, different combat systems, or personnel. DA hubs exist on three levels: the tactical edge, the operational level, and the strategic level. Data flows from the tactical edge to the strategic level to support broader data analysis and analytic modeling. Likewise, data that flows down to the tactical edge is available to personnel in the field.

Moving Data in a System of Hubs

Teradata Vantage can support use cases at the tactical edge and at the operational and strategic levels. The DoD can move data residing in Vantage at different levels by querying data directly in Teradata and pulling and pushing data across hubs, exporting data to common file formats such as Parquet, or using replication tools to copy data from one Vantage system to another.

The DoD creates purpose-built data pipelines to move data from one DA hub to another. Data is transferred based on predefined data needs. In some cases, data codified as data products will move between nodes leveraging data mesh application programming interfaces (APIs). In other cases, data will move in pipelines that support real-time data movement. In the future, the DoD will leverage intelligent extract, transform, and load (ETL) data pipelines that understand APIs and can automatically map data based on them. This will ensure connectivity between all DA hubs, and DoD personnel won't need to spend time and money building data mappings.

Collecting Data on the Tactical Edge

Teradata Vantage can be deployed at the tactical edge on a virtual machine, providing the ability to collect and process data (e.g., sensor data processing) and to run analytic models to provide immediate insights at the tactical edge.

The tactical edge, which often collects detailed data from sensors and devices, is deployed on mobile units, such as soldiers, armored vehicles, or satellites. Here, DA hubs are potentially disconnected, smaller, and have lower data storage and processing capabilities. The tactical edge can have millions of DA hubs, each with different storage and analytic capabilities. Some data processing (e.g., filtering out unimportant data) can occur here. Analytic models score data on the edge to make sense of the data. These models can be deployed to any operating system or data store using common standards such as Predictive Model Markup Language (PMML). The tactical edge can identify or receive crucial information that a system or individuals can use to make decisions.

Curating and Distributing Data at the Operational Level

Teradata Vantage can be deployed at the operational level on a virtual machine or on an optimized server, offering a scalable way to integrate and process data from the tactical edge to provide situational awareness in a disconnected environment.

Data from devices on the tactical edge flows to DA hubs on the operational level, where more data processing occurs. The operational level can be a forward-operating base or vehicle command center.

On this level, DA hubs are located outside the cloud, but they have more disk storage and computing power than devices on the tactical edge. The operational level may also be disconnected. Tens of thousands of operational DA hubs could be deployed in forward-operating bases. In addition to sharing data amongst themselves, DA hubs at this level pass highly curated data to the tactical edge and send raw data to the strategic cloud.

Integrating Data at the Strategic Level

Teradata Vantage can be deployed in the cloud to enable the integration of large data sets for data science (e.g., analytic mode development), operational analytics, and dashboarding.

The strategic level, which is typically in the cloud or a data center, collects raw or curated data from devices on the tactical edge and operational level. Data on the strategic level is integrated from many DA hubs. There are advantages to integrating data within large DA hubs, including faster querying times and access to a single record of truth. Dashboards and other reporting solutions leverage DA hubs to provide strategic decision-makers with critical insights. Additionally, the DoD trains and scores analytic models on the integrated data at the strategic level.

Data Security Across DA Hubs

Teradata Vantage can connect to security middleware, which brokers the connections, credentials, and data security (e.g., attribute-level security). The middleware provides a central hub for managing security—not only within Vantage, but also for users querying other data sources from Vantage.

CJADC2 has data security requirements that require data element-level security mapped to metadata tags. When data is copied or combined with data elements of different security levels, the original security of the data element must persist in the new dataset at the column level. Users and their security access levels are maintained by centralized LDAP servers within DA

hubs, while data platforms link to the LDAP servers to manage user authentication and authorization.

Information Lifecycle Within a DA Hub

As data moves through the system of DA hubs, each hub must collect, process, and distribute (“sense”) the data. Then, each hub must understand (“make sense”) and distribute insights (“act”) (Figure 2). Depending on where the hub is located within the field of operations, these activities may vary. For example, at the tactical edge, an analytic model may be run to make sense of the data. In a hub at the operational level, the DoD may collect data from many different tactical DA hubs. And, in a hub at the strategic level, the DoD may use the DA hub to train thousands of analytic models on a massive data set. Similarly, acting on the tactical edge may involve alerting a shooter to a target, whereas acting in the strategic cloud may involve a robust dashboard describing the flow of goods supplies across multiple battlefield arenas.

Enabling the Capability to Sense Data

Teradata Vantage can integrate and store large volumes of data and provide in-database analytics to process data at scale.

The following functions occur in a data hub to enable sense:

- **Data preprocessing:** filtering out data at the tactical edge, limiting the amount of data sent upstream
- **Data integration:** harmonizing and integrating large amounts of diverse data from multiple sources, such as sensors, drones, and other IoT devices, to make data available for situational awareness and decision-making

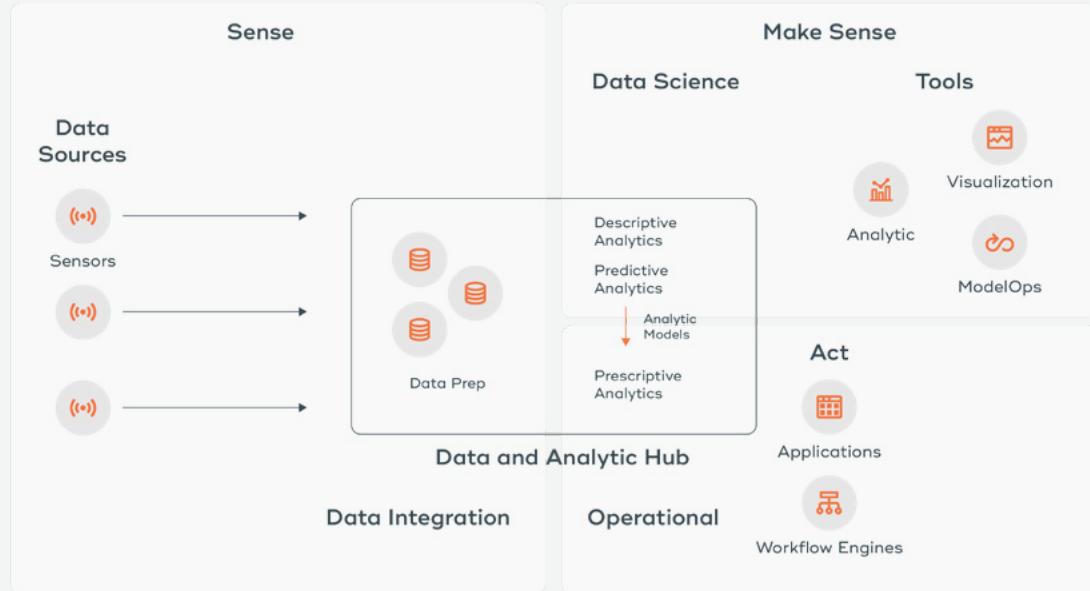


Figure 2. The flow of information within DA hubs

- **Data storage:** storing raw or integrated data to support real-time decision-making in dynamic and rapidly evolving military scenarios

These functions require scalability to quickly process and integrate data as well as store large data sets.

Enabling Functions That Make Sense of Data

Teradata Vantage includes hundreds of high-performance, in-database analytic functions that leverage Vantage's parallel architecture to derive new insights. Teradata's integrated ModelOps tool enables model management across the analytic modeling lifecycle.

The following functions occur in DA hubs to enable the capability to make sense of data:

- **Analytics:** providing advanced capabilities such as AI, ML, and predictive modeling to support CJADC2 decision-making and situational awareness
- **Analytic modeling:** developing analytic models by training models on large data sets
- **ModelOps:** supporting the creation, training, and operationalization of analytic models at scale

The above functions require analytics to run at scale across large data sets.

Enabling People and Systems to Act on Data

Teradata Vantage can export and import data into common data formats such as Parquet and JSO. Vantage can also import and export analytic models using open-model formats like PMML and ONNX. And it can scale to support daily scoring of millions of analytic models.

The following functions occur in DA hubs to enable the capability to act on data:

- **Data sharing:** secure, efficient data sharing to enable collaboration across multiple domains and organizations
- **Analytic model scoring:** scoring millions of models a day
- **Autonomous decision-making:** supporting the development and deployment of intelligent, autonomous systems and technologies, such as autonomous vehicles and drones, for CJADC2 missions

Analytic model scoring and autonomous decision-making require scaling compute to support complex analytics on potentially large datasets.

Platform Roles for Sense, Make Sense, and Act

Teradata's strategy is based on the Five-Stage Sentient Enterprise Capability Maturity Model, a blueprint for operationalizing analytics.³

- **The agile data platform:** shifts traditional data management structures and methodologies to an open framework built for agility that provides the flexibility to use any tool, access any data, and create and reuse data and data products

³ Oliver Ratzesberger and Mohanbir Sawhney, "The Sentient Enterprise: The Evolution of Business Decision Making," October 16, 2017

- **The behavioral data platform:** captures insights from transactions and maps complex interactions around the behavior of people, networks, and devices using advanced analytics
- **The collaborative ideation platform:** allows enterprises to keep pace with data explosion by socializing insights among DoD analytic professionals
- **The analytic app platform:** leverages the simplicity of an app economy for the deployment of analytic capabilities on an open platform
- **The autonomous decision platform:** acts as a whole to make tactical decisions independently without human intervention, freeing personnel to make strategic decisions from those insights and recommendations

Boosting Data Use With an Agile Data Platform

Teradata Vantage is an agile data platform that enables analysts to use best-of-breed data visualization and analytic tools. These tools are engineered to scale analytics on Vantage's massively parallel platform. Analysts can query open-file formats on object storage, Hadoop, and other relational data stores from Vantage using intelligent query federation. They can also use Vantage to develop and manage data products as well as feature stores, which are used for analytic modeling.

In an agile data platform, data is consolidated within key DA hubs—preserved in its most granular and malleable forms—so data becomes transparent, consistent, and accessible. Detailed data is broken down, facilitating problem-solving and collaboration. Agility promotes active discovery and use of data at all levels. Excessive governance barriers are eliminated without opening the floodgates to data anarchy. An agile data platform enables:

- **Tool of choice:** to leverage best-of-breed data integration, visualization, or data science tools to integrate, analyze, and share data at scale
- **Data fabric:** to connect data sources through a single lens, allowing data to be left in place but accessible through a single query
- **Data reuse:** to create and reuse data products to support a data mesh or feature stores to support analytic modeling

The Predictive Power of a Behavioral Data Platform

Teradata Vantage is a behavioral platform that enables analysts to look at paths of interactions to understand how behaviors impact the paths. Vantage has in-database time-series analytics to process sensor data at scale and ML to predict future events and interactions.

The behavioral data platform uses insights from interactions to adapt and respond to the real world in real time, leveraging data that helps expose behaviors that serve as markers and artifacts of an experience—human or machine. When the DoD is set up this way, it can study the behavior of individuals and systems to identify patterns that lead to new insights. For example, the DoD can look at the vital behavioral steps that lead to a decision to fire weapons. It can take readings of sensors worldwide, opening analytic capabilities for the IoT. Behavioral data lets the DoD dig deep into the areas where transactional information touches the surface. A behavioral data platform is a data science platform that use analytics such as pathing, time-series analytics, and ML to understand current behavior and predict future behavior.

Socializing Insights With a Collaborative Ideation Platform

Teradata Vantage integrates with collaborative tools such as Collibra and Alation to accelerate and improve the analytic development process.

A collaborative ideation platform enables better data usage by capturing user community preferences and insights on the data. Think of it like LinkedIn for analytics combined with an analytics-on-analytics team. Adopting this approach allows you to leverage social media conventions to help the organization understand which ideas, projects, and people get followed, liked, and shared. It's essentially analytics about your analytics community. The idea is to bring to analytics the same culture of engagement you see on LinkedIn and other social and gaming platforms to help solve critical concerns about scalability.

Simplifying Data With an Analytic Application Platform

Teradata Vantage supports the development of analytic apps through common interface languages such as REST, SQL, or Python. Vantage can support thousands of concurrent queries scaling to meet app load requirements.

The analytic application platform is where DoD data professionals build or deploy advanced performance workflows to be packaged up for the broader analyst community as user-friendly apps that can be deployed in accessible, fast, and repeatable ways on each DA hub. A DevOps approach can be used to boost agility through collaboration between developers and IT

operations teams, resulting in better quality assurance and faster delivery of apps. “Enterprise listening” can be built in at the edge, where the DoD can plug into the mainstream of data collected in real time and make key data available for personnel to act on—instead of continually operating under the old ETL-driven pull model of reverse-engineering data’s usefulness.

The True Intelligence of an Autonomous Decision Platform

Teradata Vantage can import and score analytic models using PMML and ONNX. Millions of models can be scored per day to support analytic apps designed for autonomous decision-making.

As the DoD makes its organizations more self-aware and autonomous, algorithmic intelligence and ML are the engines driving the process. Algorithms developed in the agile data and behavioral data platform can be used to make independent decisions that elevate the DoD to a fundamentally new way of operating. Using an “analytics on algorithms” approach, analytics can be applied on data sets, workflow applications, and entire algorithms to examine how the DoD behaves so that the DoD can train them to make decisions the way it wants them to be made. Autonomous decision platforms are at all three levels: tactical edge, operational, and strategic.

Teradata’s Contribution to the CJADC2 Human and Technical Enterprises

Teradata Vantage™ Overview

Teradata has been a recognized leader in data warehousing and advanced analytics for over 40 years. In this time, we have continued to advance our capabilities to drive value for commercial companies and government agencies.

Teradata Vantage, our connected multi-cloud data

platform for enterprise analytics, can ingest large quantities of data while driving analytics against that data to help make decisions. As the industry's leading massively parallel processing platform (MPP), Vantage can scale to massive sizes to meet the DoD's performance requirements at the lowest price point. Competitive advantages for the DoD include:

- Providing near real-time data integration and analytics at scale on massive datasets, delivering insights to the right people at the right time
- Connecting the data ecosystem to create a single lens of multiple data stores through intelligent query federation
- The flexibility to be deployed on edge devices and in the cloud and to allow tools of choice to be used for data integration and analytics

Vantage can handle large amounts of data with many terabytes per node and scale up as data analytics needs change. This is an ideal solution for the DoD, which produces and collects vast amounts of data.

Human Enterprise: Using Analytics 1-2-3 to Make Information Actionable Within an Agile Data or Behavioral Data Platform

Teradata Vantage offers the scalability and performance needed to support the analytic modeling process. Vantage provides unique capabilities to create and manage feature stores and includes a robust ModelOps solution to manage the analytic process..

A key line of effort (LOE) for CJADC2 is the Human Enterprise. To enable human performance and decision-making, large volumes of data must be distilled into consumable, validated, and actionable data packages. Otherwise, personnel may spend hours daily sifting through data that are irrelevant to the decisions they

need to make. This is a complex challenge that is best approached with analytic modeling. Analytics running on the data platform must leverage ML and AI to identify critical information to send to other DA hubs—and ultimately to the decision makers.

Teradata's method for distilling data through analytic modeling is called Analytics 1-2-3. Our approach lies in "decoupling" the various parts of the modeling process and instead focusing on three key components: feature engineering, model training, and deployment. As a process that enables an agile platform, Analytics 1-2-3 balances freedom with governance by combining the optimal technology for feature engineering, reuse, and deployment with many tools of choice for model training. It enables data analysts and data scientists to build and manage thousands of analytic models they can embed in apps.

Technical Enterprise: Enabling the Information Advantage With a Data and Analytics Platform

Another important LOE for CJADC2 is the Technical Enterprise. The DoD must quickly collect, store, and process massive amounts of data and handle diverse analytic workloads in DA hubs. This work should be done on a high-speed data platform that scales efficiently and supports any question, with any data, for any number of users and application workloads.

Key attributes of Teradata Vantage that benefit the Technical Enterprise include:

Scalable and fast analytics: Unifying analytics and data management enables data exploration, modeling, and scoring at scale across domains in a single, easy-to-use, consolidated platform. It also offers the critical flexibility to implement complex algorithms with languages the DoD already uses, such as SQL and Python, to build data products and create analytic models. Analytics running in-database enable sub-second data processing. Vantage includes a new capability to process time-series data at scale, providing unparalleled performance for processing sensor data.

Analytic model management: Teradata's end-to-end tool for analytic model management, ModelOps, is designed to supply the framework to manage, deploy, monitor, and maintain analytic outcomes. ModelOps includes capabilities such as dataset auditing, code tracking, model approval workflows, model performance monitoring, and alerting when models become nonperforming. The DoD can leverage ModelOps to schedule model retraining as the team drives towards autonomous retraining based on data drift. And with ModelOps embedded into Vantage, the DoD will be able to quickly scale ML initiatives.

Integration with first-party cloud services: Natively integrating with cloud services accelerates data pipeline deployment in a data mesh. A modern platform integrates with services across Amazon Web Services (AWS), Microsoft Azure, and/or Google.

Tools of choice: The tool of choice becomes critical in a data mesh to allow end users to build data pipelines and access and use data successfully. Our customers use preferred languages such as R and Python or tools like SAS and Dataiku to push analytics to Vantage, minimizing data movement and increasing the performance of the analytics. Teradata partners with the most widely used visualization tool vendors, including Microsoft and Tableau, to ensure tools of choice leverage the massive scalability of Vantage.

Ingestion of modern data sources: A data mesh platform must harness a diverse set of information to create data products that provide a complete picture of the business. Vantage supports all common data types and formats, including JSON, BSON, XML, Avro, Parquet, and CSV, as well as unstructured data. Vantage also includes the ability to store time-series data (e.g., sensor data) in optimized structures for analytics. Additionally, Teradata's enterprise application solution (EAS) enables high-performance reporting, analytics, and agile business intelligence by providing a single view of enterprise resource planning (ERP) application data.

Dynamic resource allocation and workload

management: Demand for resources is dynamic, and changes occur at the speed of thought. The DoD must be able to optimize the resources and workloads aligned to business priorities within domains with "set it and forget it" controls. Workload management enables Vantage to prioritize resources to ensure service-level agreements (SLAs) are met while supporting data pipeline development.

Connected ecosystem: QueryGrid, Teradata's data virtualization software, enables data to be left in place for data pipeline development but still accessible over the query fabric. QueryGrid creates a single lens in Vantage for all data sources and provides pushdown processing into remote data stores to decrease data movement and improve performance. Additionally, Vantage enables users to consume data from the Teradata's Native Object Store (NOS) for analysis as well as to write data back to NOS for sharing data or data products.

Built for a hybrid, multi-cloud world: Vantage works consistently across public and private clouds in addition to supporting on-premises data center deployments. This architecture allows Vantage to be deployed in multiple environments, including the tactical edge on a virtual machine (VM) and the strategy level in the cloud.

Security: In combination with Teradata's partners, Vantage incorporates data security best practices with robust capability for authentication, authorization, and data protection (via encryption, tokenization, data masking, and anonymization) as well as audit logging and monitoring.

Mission-critical availability: Vantage's architecture incorporates redundancy in every component, ensuring mission-critical availability of the system.

Better Decision-Making With Teradata DA Hubs: The Predictive Maintenance Example

There are thousands of use cases for enabling better decision-making across an intelligent, connected system of DA hubs. A good example is predictive maintenance. Today, the number of hours a DoD vehicle is available for operations or training is limited by:

- Aging equipment
- Increasing numbers of working vehicle parts that are unavailable, removed, and used elsewhere due to parts shortages
- An increase in casualty reports, i.e., reports of events that impair a vehicle's ability to do its job
- An increase in maintenance delays

Teradata Vantage provides supply chain analytics at scale to:

- Establish performance goals and measures to better manage deferred depot maintenance backlog by including inventory across DoD departments
- Improve data tracking of, and address execution challenges with, intermediate maintenance periods or inventory delivery
- Provide predictive and prescriptive steps to ensure new vehicles are reliable and can be sustained as planned when procured

In an intelligent, connected system of DA hubs, sensor nodes collect vehicle performance. Assuming a disconnected environment, the data is transferred back to the operational level at the depot. Analytic apps running on Vantage at the operational level leverage analytic models that tell depot workers if parts in the vehicle need replacing. The apps tell the depot when more parts should be added to the inventory.

Detailed data from the operational level is transferred to the cloud onto Vantage through a data pipeline and

then combined with data from other depots. The data provides a behavioral profile of parts with performance and maintenance history. Data scientists in a DA hub use analytics integrated with Vantage to build or update analytic models. Vantage provides an agile platform for developers, enabling tools of choice to analyze and build models on any data. Data scientists collaborate with their peers by sharing their findings in metadata captured in collaboration tools integrated with the data platform. Data scientists can deploy their analytic models back to the operational level.

Case Study: Operationalizing Sensor Analytics at Volkswagen

Volkswagen sought to leverage real-time analytics to enable greater transparency and efficiency in car body construction. At Volkswagen's plant in Emden, which produces more than 1,000 cars daily, robots in the body shop set approximately 7 million spot welds per day. A robot needs only a few seconds to set a spot weld according to specific materials, layer thicknesses, and positions to ensure quality and durability. However, the quality assurance team must then check every spot weld using samples, which is a time-consuming process.

Volkswagen leveraged Teradata Vantage to create "spot-welding analytics," an intelligent solution that makes use of data generated by welding robots to drive quality assurance—a previously untapped potential of manufacturing data. This has transformed the body shop into a digitized factory.

Spot-weld data and additional metadata are captured by sensor nodes and moved to an operational DA hub in the factory. The sensor data is then moved in near real time to a DA hub (strategic level) for analysis leveraging Teradata VantageCloud in AWS.⁴ This is where analytic processing, model training, and data scoring take place, and where data is combined with other sources. Volkswagen developed 40 thousand ML models on Vantage using horizontal scaling, training one decision tree for each sensor to detect process phases in the time series. This results in 9 million models being scored per day.

⁴ <https://www.teradata.com/Cloud/AWS>

The solution classifies and refines the data based on various process characteristics using analytic models incorporating self-learning and self-enhancing AI or ML algorithms. The results provide Volkswagen's autobody engineers with information on the process stability of all weld spots. In addition to the process characteristics of each spot weld, the solution supports the analysis of the effects of integrated maintenance measures, material combinations, and welding process parameters.

Conclusion

Teradata's strategy is to power the DA hubs with data platforms that inform all of the components of C6ISR. The data platforms must be agile, provide behavioral analytics, support collaborative ideation, enable apps, and provide autonomous decision-making.

Teradata Vantage, the connected multi-cloud data platform for enterprise analytics, enables an intelligent, connected ecosystem of DA hubs. Vantage operationalizes analytics and machine learning to meet the DoD's stringent performance requirements while not breaking the bank. It also connects the data ecosystem with intelligent query federation.

As an agile data platform, Vantage enables the DoD to use tools of choice to create data products and analytic models with integrated data and feature stores. DoD data product owners can import and export data products and analytic models to other DA hubs using Vantage's open APIs. Vantage also provides a ModelOps solution to manage the analytic model lifecycle and integrates with other tools like Alation and Collibra to support collaborative ideation. The DoD can build analytic apps leveraging advanced analytics and score millions of analytic models daily on Vantage to power autonomous decisioning.

Teradata Vantage enables the DoD to scale CJADC2 at Teradata speed. To learn more, please visit [Teradata.com](https://www.teradata.com).