

Data & Analytics Universe

Stimulating thoughts for building an INTELLIGENT ENTERPRISE



Background

Building an INTELLIGENT ENTERPRISE is crucial for product innovation, delivering personalized customer experience, maximizing operational efficiency, and achieving other business goals. While data-driven INTELLIGENCE provides ample opportunities, there are an equal number of challenges for Chief Information Officers and Chief Data Officers in managing data and delivering timely insights. And the magnitude of the challenge enlarges when the INTELLIGENCE needs to be delivered across various business functions.

With the rise in usage of data-driven INTELLIGENCE across enterprises, CIOs and CDOs need to take a holistic and long-term view of the data requirements and establish a proper structure.

Fundamentally, the structure should help evangelize the benefits of a data-driven approach for decision making and provide business and technical stakeholders with an environment to experiment and implement a variety of ANALYTICS/AI use cases.

DATA & ANALYTICS UNIVERSE is a thought stimulating content, that can assist customers in the journey of building an INTELLIGENT ENTERPRISE and briefs about subjects like the 3 V's (Volume, Velocity and Variety), DATA INFRASTRUCTURE, DATA QUALITY, SECURITY & PRIVACY,

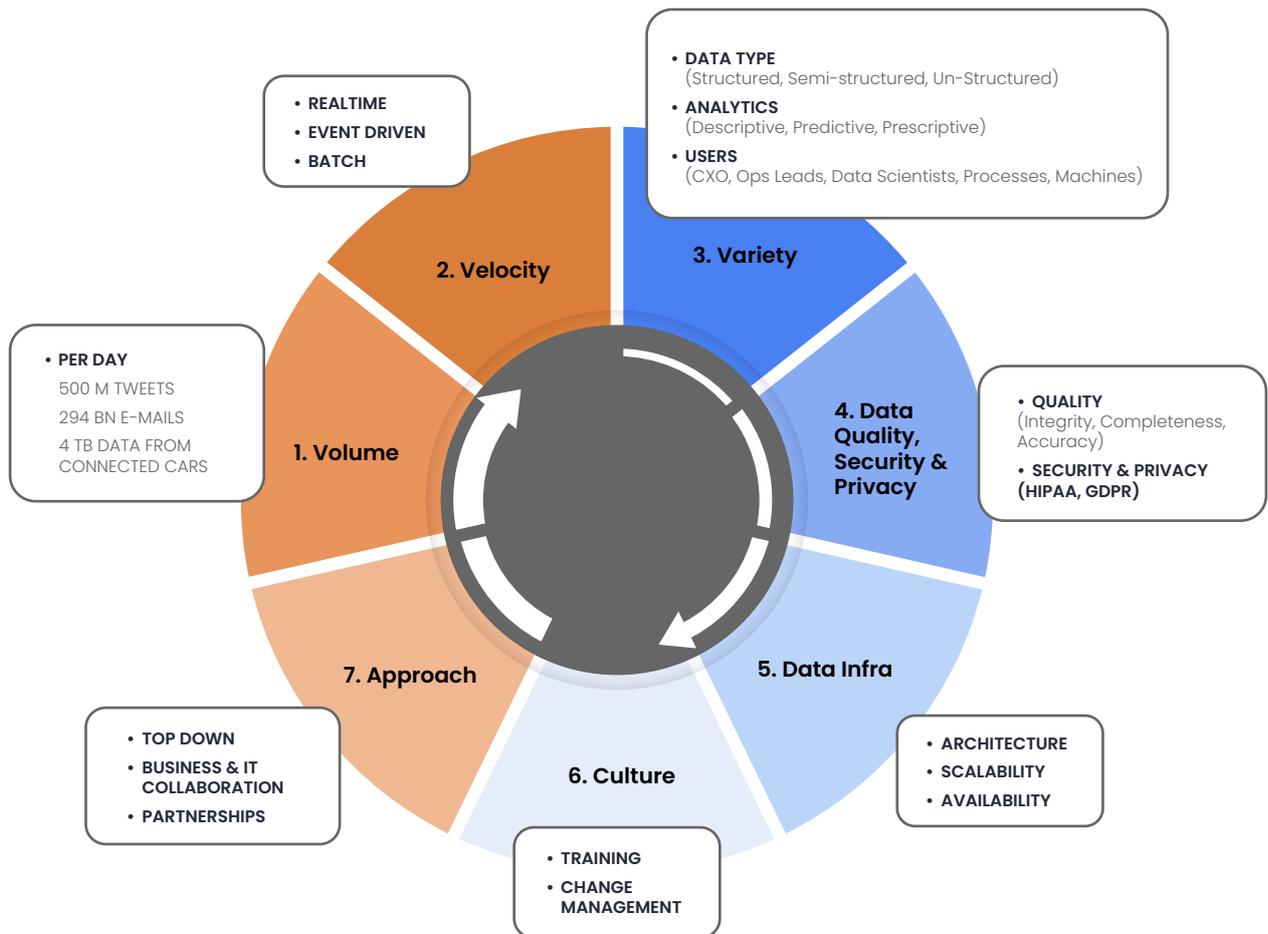


CULTURE, and APPROACH organizations should take.

Concisely, an INTELLIGENT ENTERPRISE believes in utilizing data-driven intelligence for decision-making and thrives on continually improvising people, processes, and technology aspects.

Relevance of INTELLIGENCE is nil if obtained beyond the expected time. For example, a service representative needs customer-specific INTELLIGENCE in terms of credit, service, and billing history in a timely manner to resolve issues and provide a personalized experience. For delivering the INTELLIGENCE, data from different enterprise applications and social media needs to be collected, processed, modeled and delivered.

Below diagram mentions different attributes of the key subjects for building an Intelligent Enterprise



Let's dwell into each of the subjects and their importance



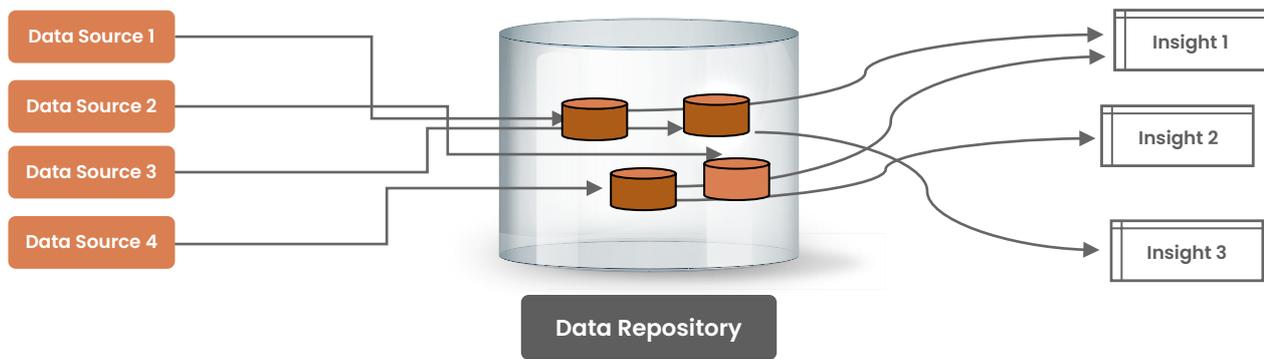
Volume & Velocity

Smart phones, social media, sensors, and enterprise applications generate vast volumes of data. On an average per day, 500 million Tweets, 294 bn emails, and 4 Terabytes of data from connected cars is generated.

The primary challenge to delivering INTELLIGENCE is storing the data gathered from different sources in a format that is easy to search & access. In addition to the analytics use cases, IT Operational & Data Archival requirements drive the data storage structure.

Data extraction and storage strategies will be tested when the requirement for data and insights increase at high velocity. While the storage technologies allow storing and retrieving vast amounts of data, logical structuring and bringing data reusability across use cases will be the focus.

Below diagram depicts a high-level view, with multiple data sources on the left, analytics use cases on the right, and data flowing across.



From the diagram, we can infer that the data coming from a source can be used for different use cases, and the same use case can use data from various sources, leading to multiple permutations and combinations.

How the data get stored to meet the different combinations is going to be a constant challenge for CIO and his team. And the storage needs to address staging, integration, and transformation stages.

It will be very complex to depict enterprise-wide scenarios and much more complex to visualize column or row-level data details.

We need understand

- How much data needs to be collected and stored, and who determines it and how long should it be stored?
- Do we collect and store the data by use case or per statutory compliance or any other criteria?
- What is the rationale for deleting a specific data set, and will it impact the integrity or have any untraceable dependencies?
- How do we plan to store data for

Strategic and Operational reporting purposes?

- Do we need both Data Warehouse and Data Lake?

Variety

Data, Analytics, Users, and Use Cases all come in different varieties, starting from the variety of USE CASES. A specific USE CASE determines data type (Structured, Semi-structured, Unstructured), ANALYTICS technique (Descriptive, Predictive, or Prescriptive), and the end-users (Strategic, Operational, Machines, Processes). Many permutations and combinations arise, leading to the complexity of implementing multiple use cases.

For each use case, different combinations will be formed, and the challenge is to build a platform to meet the needs that emerge from different use cases over a period.

| ATTRIBUTE | User Type | Data Type | Analytics | Time |
|------------|---------------------|-----------------|--------------|----------------|
| Use Case 1 | CXO | Structured | Descriptive | Real-time |
| | Operational Leaders | Semi-structured | Predictive | Near-real time |
| Use Case 2 | Industrial Machines | Un-Structured | Prescriptive | Batch Analysis |

Key question for CIOs is whether to choose one platform addressing all types of use cases or integrate best-of-the-breed technologies, how and when do they make this critical decision?



Data Quality

Accuracy level of the AI/Analytics model is directly dependent on the quality of data. Integrity, Completeness and Accuracy are among the few attributes that define data quality. As discussed earlier, for a specific use case, data from multiple data sources is required, and Data Quality must be ensured at individual source levels and after integration.

It requires constant communication between the data analysts and application or data owners. Communication will help in establishing checkpoints needed at the data generation points.

Primary challenge is, how to measure data quality and provide remedy to each unique scenario in a dynamic fashion.

To achieve Data Quality standards across the enterprise, a framework with a Vision, People & Technologies, Governance, Processes & Metrics, and Monitoring can help.



Data Security & Privacy

As data holds the key information of employees, citizens, or patients, protecting it from hackers is important.

In addition to **SECURITY**, data stewards should ensure that it is accessible only to appropriate individuals and ensure **DATA PRIVACY**. Breach of data privacy can lead to identity threats, financial loss, and economic impact.

A comprehensive approach, including infrastructure, application, database, and physical environments is essential. Evangelization, training and embedding security features within the Business and IT processes or applications can help minimize the security incidents.

Experts recommend constant innovation and adopting new methods to ensure data security and privacy. Cyber & Information Security Officer can definitely add value.



Data Infrastructure

As the variety of use cases require different types of DATA to be processed at varied speeds, we require DATA INFRASTRUCTURE, which meets the variety.

DATA INFRASTRUCTURE is just not about SERVER, STORAGE, and NETWORKING, but how do we put all these components together along with data processing tools, ETL, ELT, and DATA STREAMING, to ensure INSIGHTS are delivered just in time, at the right place and at scale?

We have many computing models like DISTRIBUTED, CLOUD, EDGE, PARALLEL, & INMEMORY COMPUTING. Do we choose one among the others or do we use them selectively based on the use case?

Data Warehouse Vs Data Lake an ever going debate, which one we implement?

Technology evaluation, Architecture, and System Integration are not easy tasks. There are multiple options with technology refreshing at rapid space, which makes it challenging. How do we make the right choice and ensure that the investment gives maximum returns?

Application of ARTIFICIAL INTELLIGENCE has a very important place throughout the data lifecycle and for analytical model development. It requires an exclusive paper to explain the role of AI and a few use cases to mention are Test Data Generation, Data Security.



People & Culture

Most important part is the people, the drivers, custodians, and consumers of data & intelligence. Technology alone is insufficient.

Business Leaders should primarily believe in the benefits of the data-driven insights to business and drive from the front. A task force (Data Governance) to establish the infrastructure, processes, and policies need to be put in place.

We can have all the facilities in place, but if the business users do not adapt, all efforts will be in vain. The question is how we develop a culture where personnel at different hierarchies get comfortable working with data and make insights-based decisions.





Approach

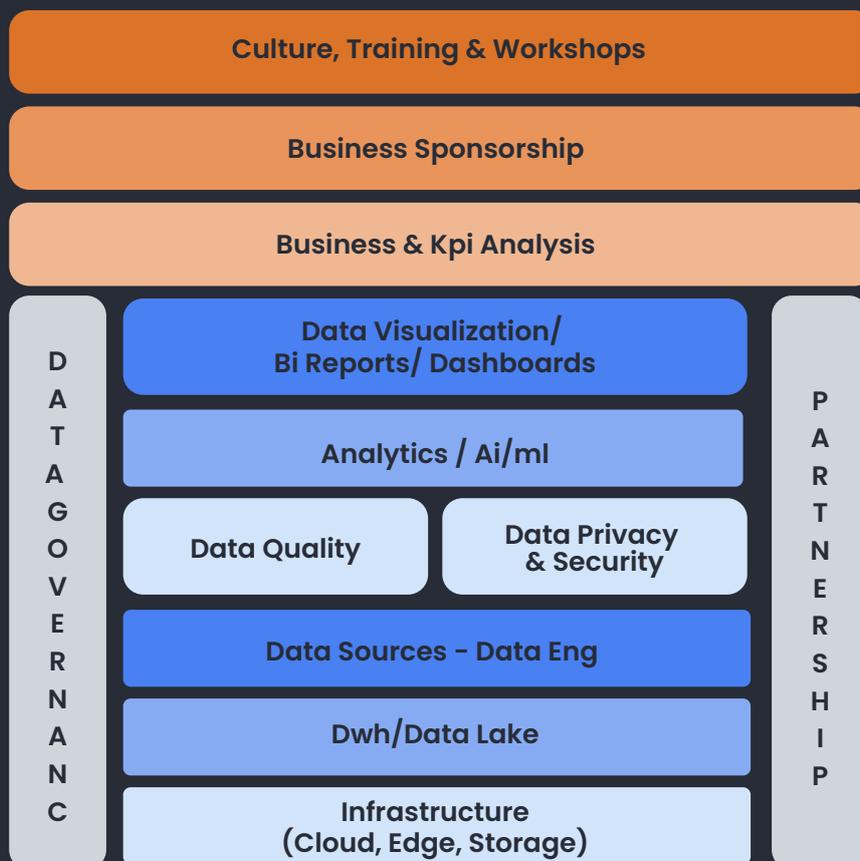
Average humans make decisions based on their instinct, not on data. We can expect resistance to adopting the data-driven approach. Hence a small and incremental approach is suggested, as it helps to learn, believe, and improve.

Change Management programs that include evangelization of data benefits, and success stories will help.

One will be able to reach the goals faster if the initiative is driven by Executive Leadership, which means a top-down and transformative approach with a proven strategy aligned to the business goals and objectives.

Business & IT Collaboration, Governance, and Partnerships are critical to the success.

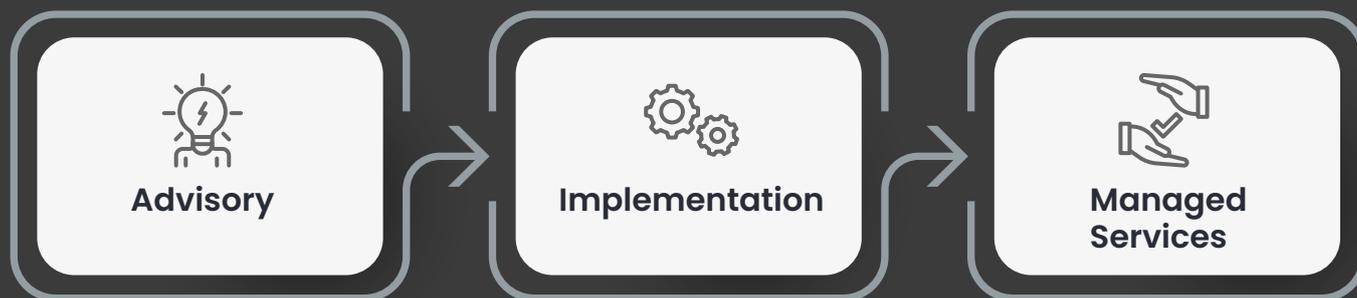
Logical Model of Data & Analytics Universe



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