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What is the Analytical Ecosystem? And why is it making my life more complicated?

Brian Grant

Agenda

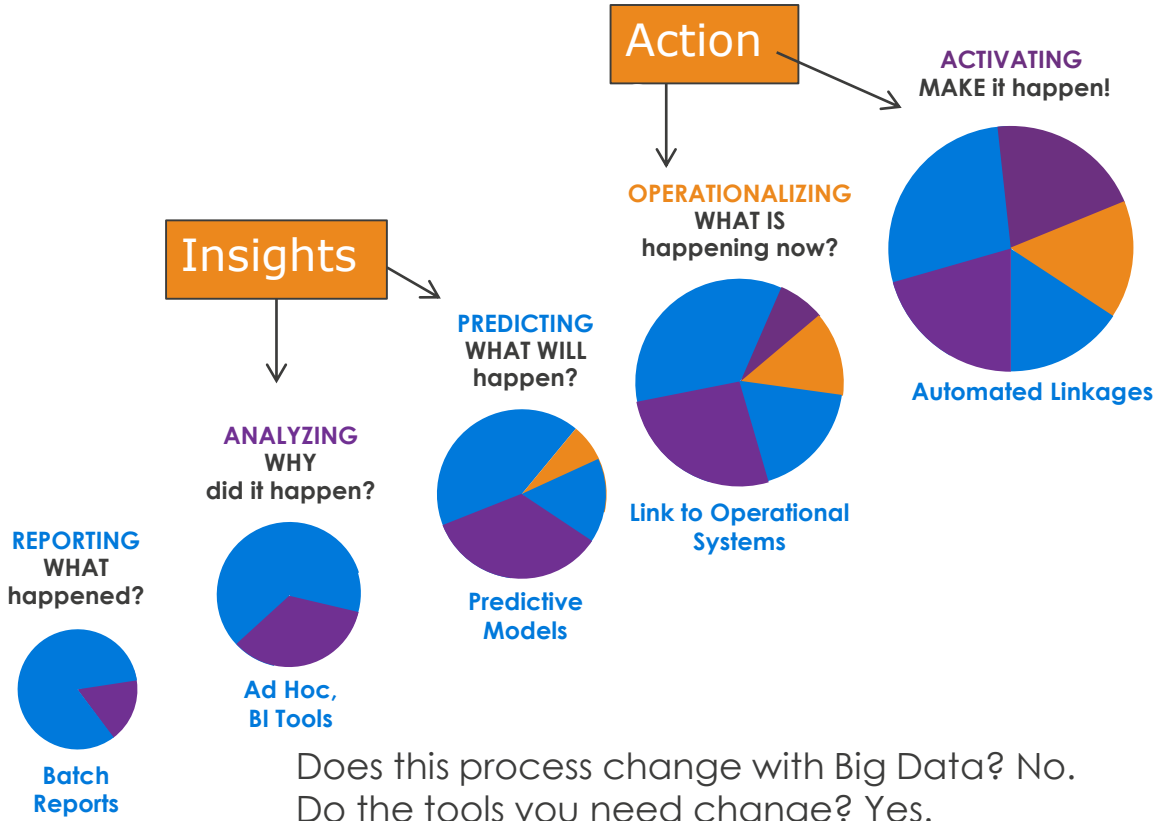
The Changing Environment

What are the new Technologies?

How does It all fit together?

Conclusions

Evolution in The Use of Information



Does this process change with Big Data? No.
Do the tools you need change? Yes.

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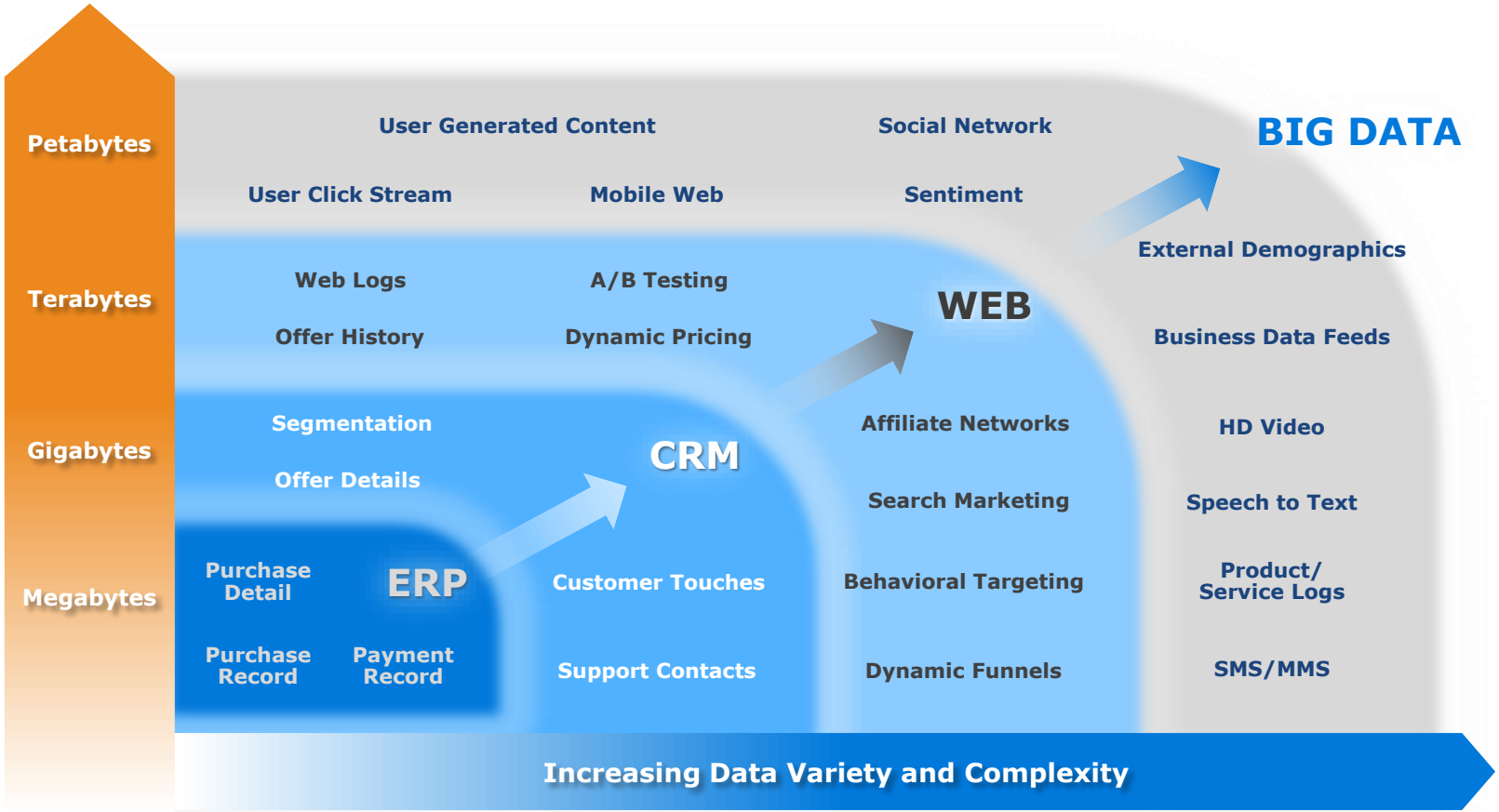
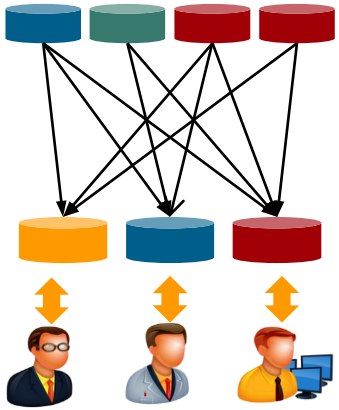
How is Data Changing?



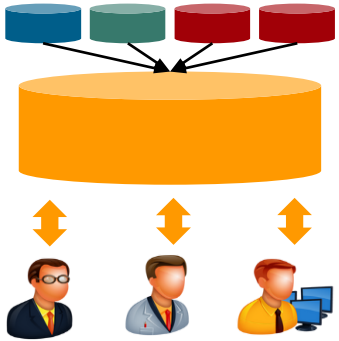
How have Enterprise Analytical Architectures evolved?

The Data Mart Era



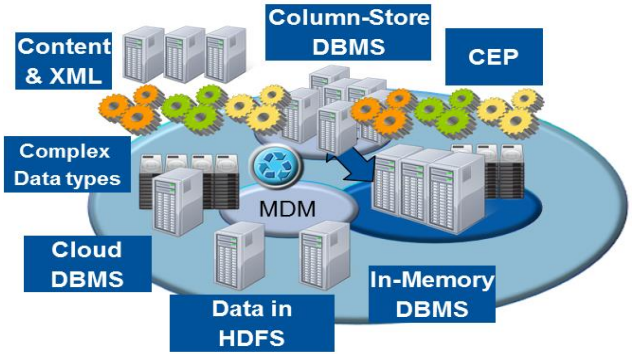
”Just Give Me Any Old Data – And Fast!”

The EDW Era



“Give me integrated, high quality data that enables me to optimise end-to-end business processes cost-effectively.”

The Logical Data Warehouse Era



“Centralise the data that are widely re-used and shared - but integrate ***all*** of the data and the analytics.”

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What is a Database?

- High performance data access
  - Random and sequential
  - An access language + API
- High availability
  - Recovery following errors
- Data model for business applications
  - Isolates schema from application
  - Relationships enforced between data attributes
  - Logical and physical data designs
- ACID properties
- Shared resource, concurrency
- Data controlled by database
  - Data types
  - Secure access controls

Atomicity
apply all changes or none

Consistency
rollback on errors

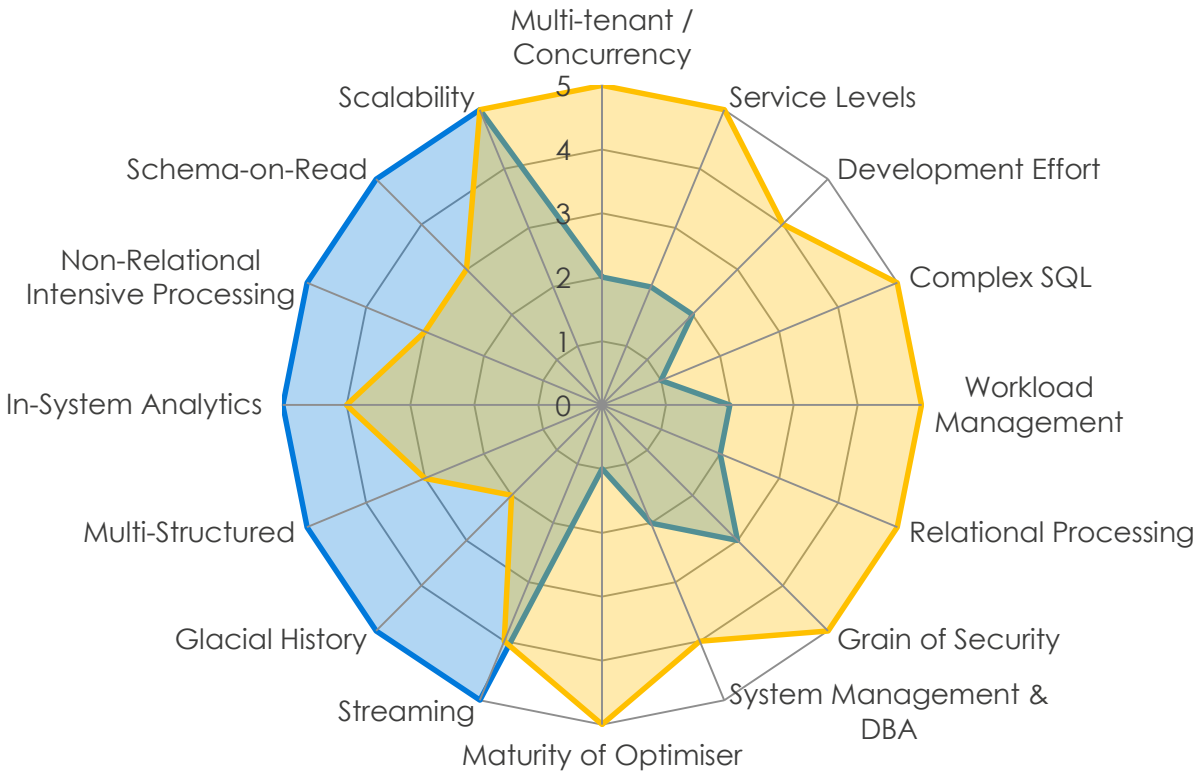
Isolation
one update at a time

Durability
transactions survive crashes

So what is Hadoop?

- Open source Data Store Optimized to handle
  - Massive amounts of data
  - Variety of data (Structured/Unstructured/Semi-structured)
  - Contributors: Yahoo!, IBM, Google
- Growing list of supporting tools
- Great Performance for certain Use Cases
- Reliability through replication

Hadoop vs RDBMS: Complementary Capabilities



Observations…

- **Technology changing**
- **Different perspectives**

Focus really needs to be…

- **Capabilities**
- **Client Skill Sets**
- **Requirements**

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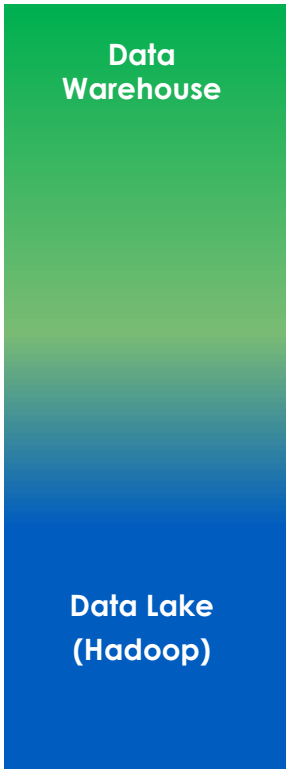
Usage Patterns
Data Warehouse extended by Data Lake



Usage Pattern	Example
Best at…	
• Secure data • Integrated data • Quality data • Scrubbed data	• Privacy requirements • Product-plan analysis • Regulatory reporting • Enterprise reporting • Financial reporting
Better at…	
• Enriched data • Historical data	• Dollar-chain rules • YoY trend analysis
Good at…	
• Descriptive analytics • Predictive analytics	• Product forecasting • Campaign mgmt
Better at…	
• Machine learning • Document mgmt • Discovery analysis • Streaming data	• Fraud detection • Contract mgmt • NPS drivers • Sensor
Best at…	
• Unstructured data • Raw data • Schema evolution • Natural Language	• MRI / CT images • CEP analysis • Evolving protocols • *Google like search*

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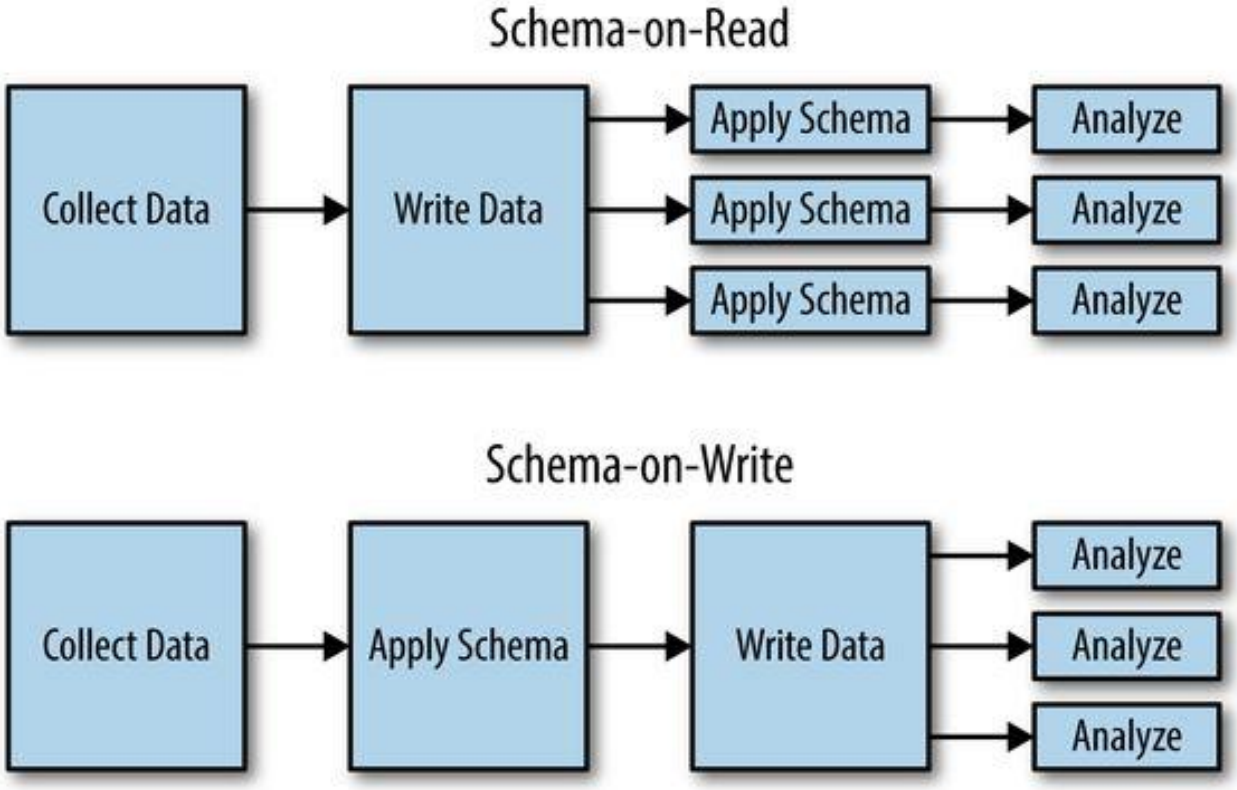
How am I supposed to remember all of that?

Remember "Schema on Read"



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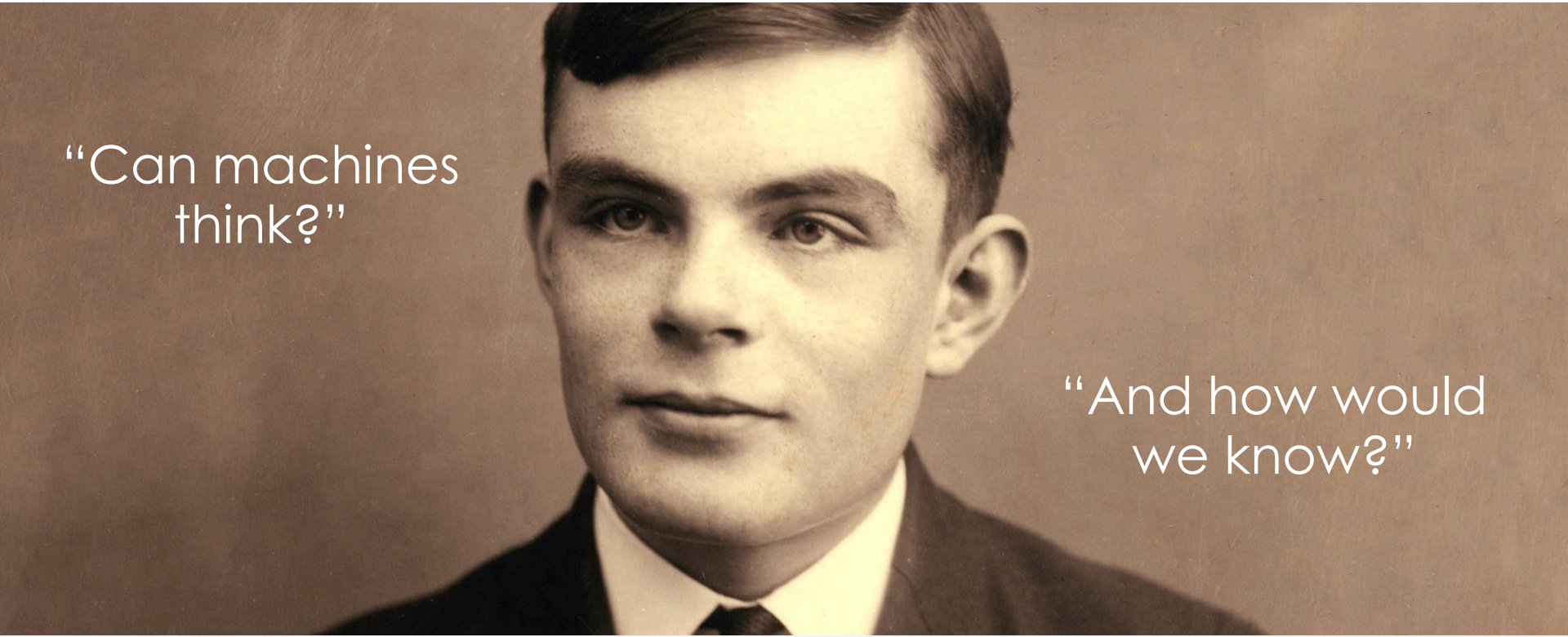
1950: Alan Turing defines the imitation game



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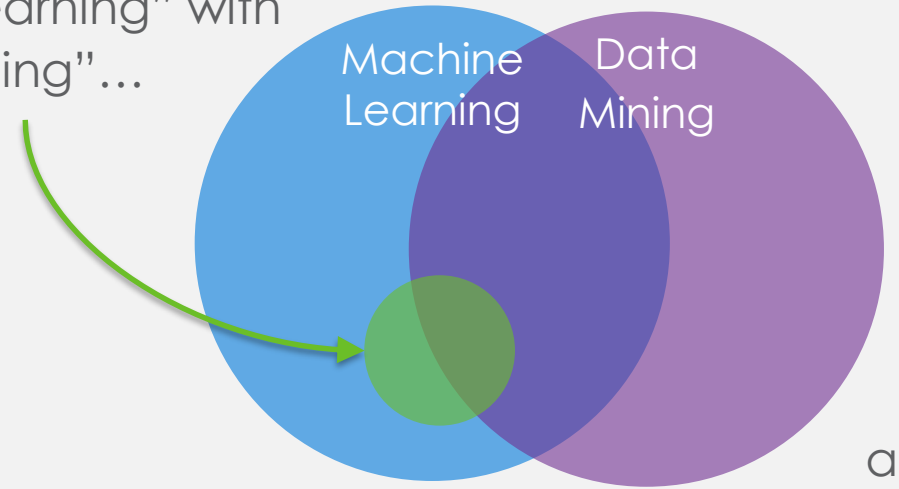
New Analytical Tools

Many people associate "Machine Learning" with "Deep Learning"…



Deep Learning is one "supervised" approach to Machine Learning.

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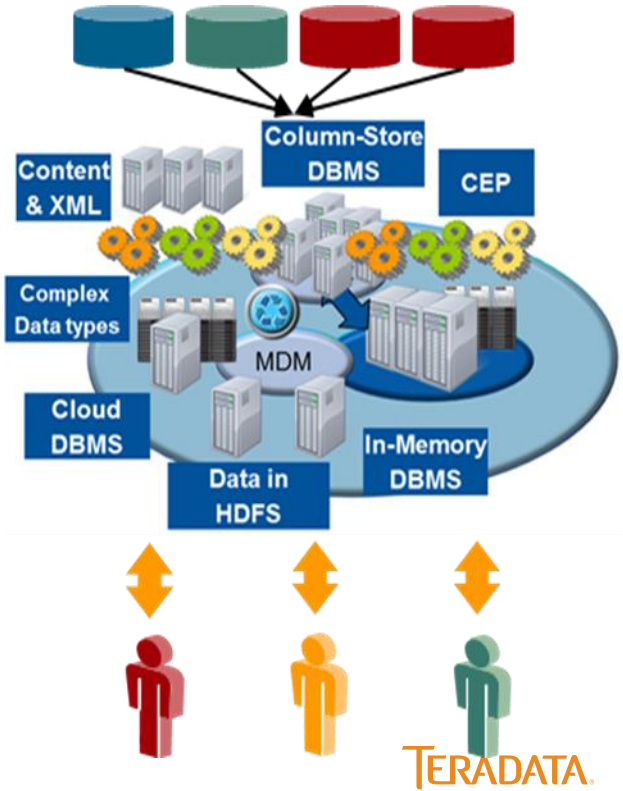
Blended Architecture

Blended architecture is using the **right tools and technologies** for the **right purpose**

- IDW ***AND*** Data Lake
- On Premise ***AND*** Cloud
- Open Source ***AND*** Proprietary
- File System ***AND*** Database
- Agile ***AND*** Waterfall
- BI ***AND*** Advanced Analytics
- ETL Tools ***AND*** Roll Your Own

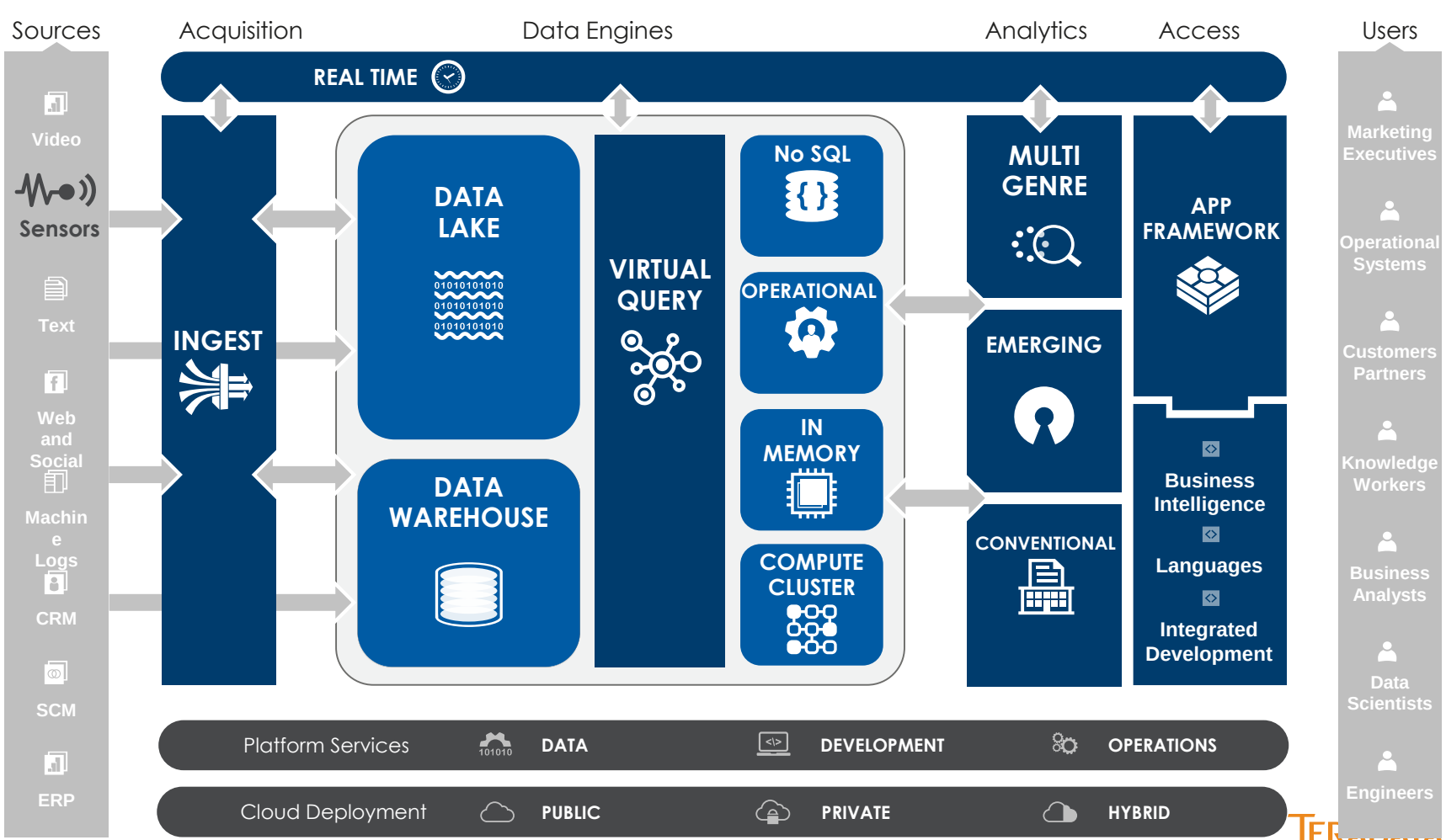


The blended architecture era: from "OR" to "AND"

The Challenge is selecting the right technology

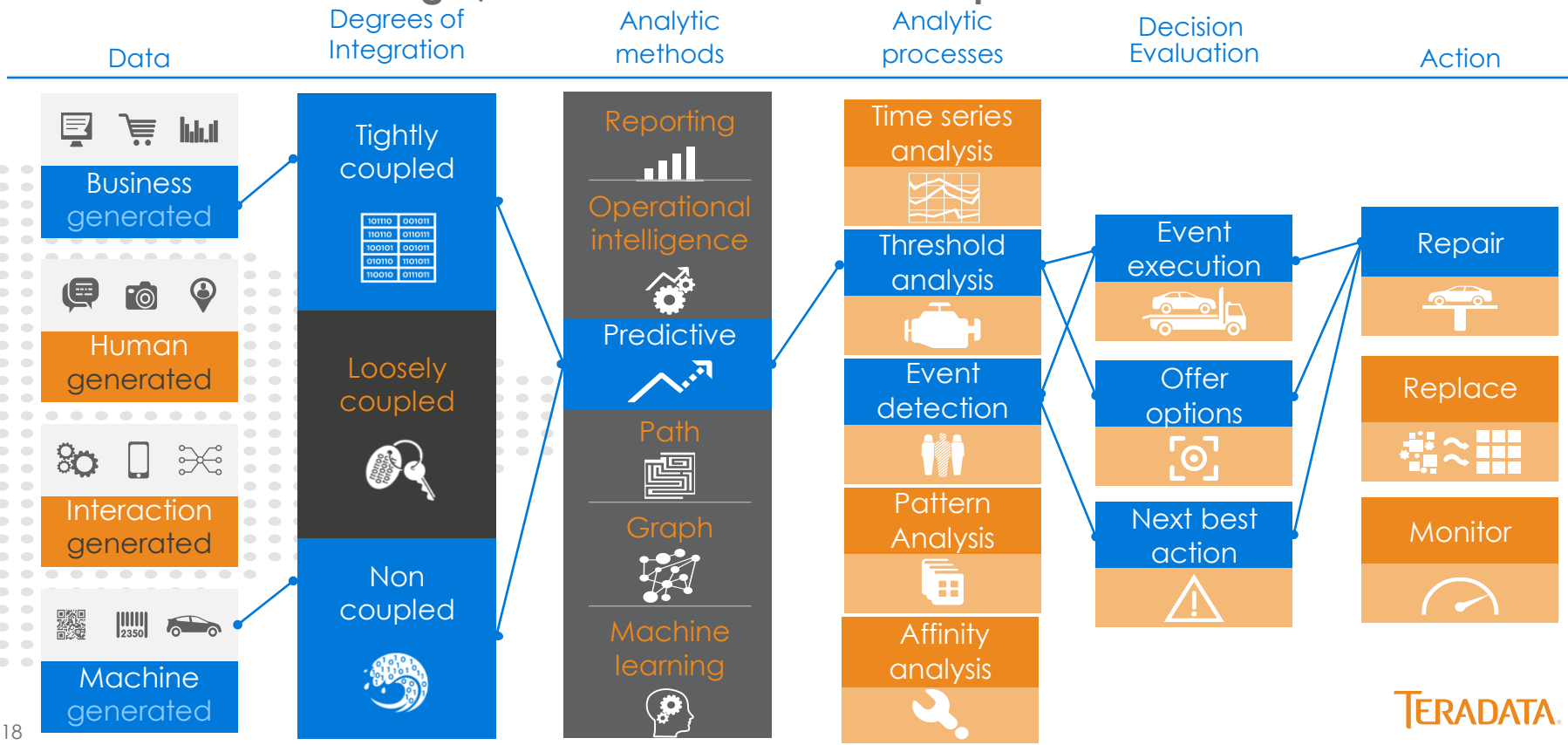
Enough time…
Enough money…
Work magic with technology…

What is the time to value?
What is the cost of re-engineering?
What is the optimal solution?


Sources
Acquisition
Data Engines
Analytics
Access
Users
REAL TIME
Video
Sensors
Text
Web and Social
Machine Logs
CRM
SCM
ERP
INGEST
DATA LAKE
DATA WAREHOUSE
VIRTUAL QUERY
No SQL
OPERATIONAL
IN MEMORY
COMPUTE CLUSTER
MULTI GENRE
EMERGING
CONVENTIONAL
APP FRAMEWORK
Business Intelligence
Languages
Integrated Development
Marketing Executives
Operational Systems
Customers Partners
Knowledge Workers
Business Analysts
Data Scientists
Engineers
Platform Services
DATA
DEVELOPMENT
OPERATIONS
Cloud Deployment
PUBLIC
PRIVATE
HYBRID

Migrate From Projects To Frameworks

Shift focus from a single, tactical exercise to a comprehensive framework



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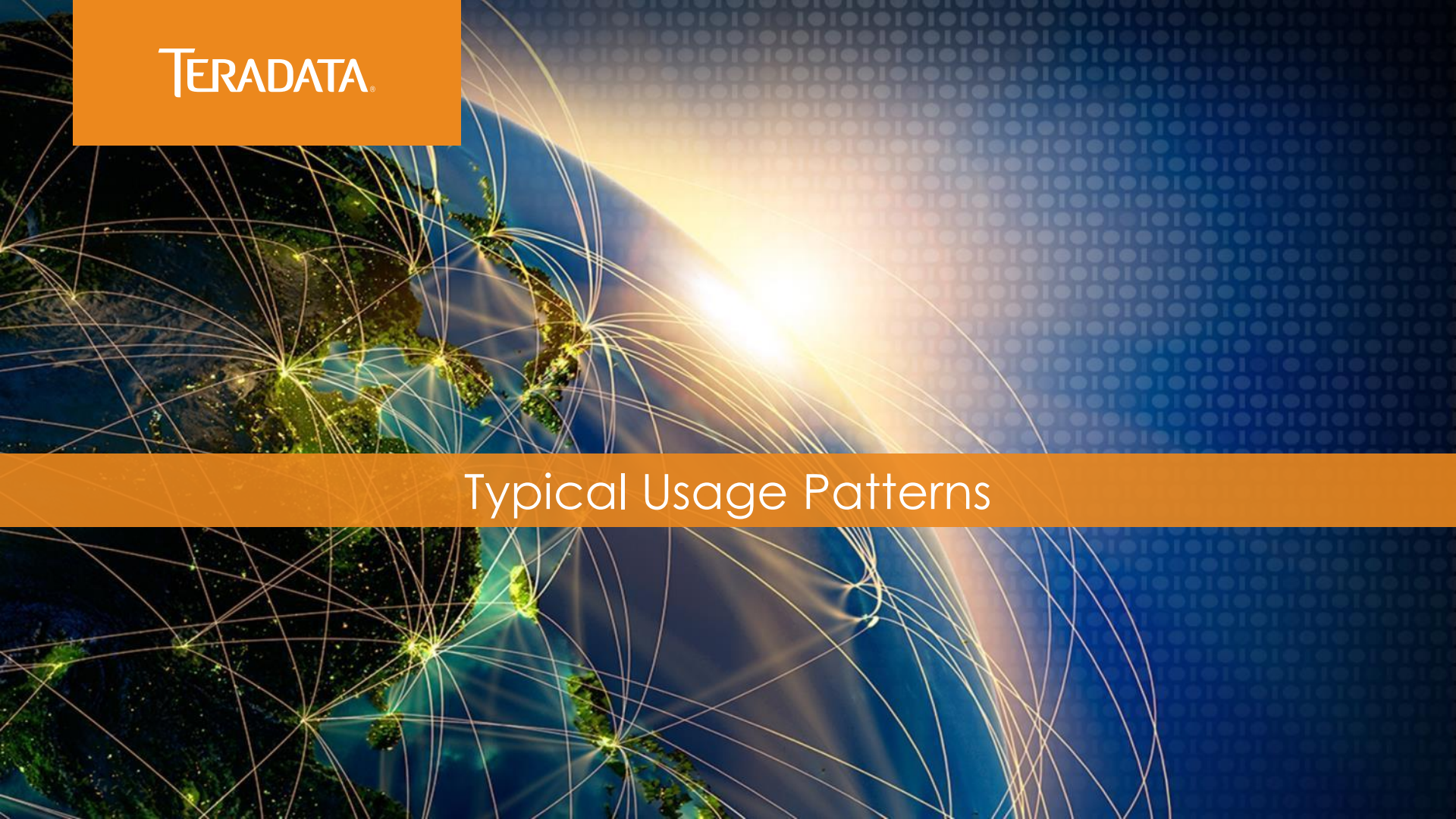
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Typical Usage Patterns

Hadoop for Active Data Archive

Active data archive for better data management

Situation

High performance storage is expensive. A large integrated pharmacy HC provider deals with a variety of data with different business value. All data cannot be store on the same system. Ever expanding data is only adding to this challenge.

Problem

Long terms storage data cannot be queried and it takes a long time for retrieval. No analysis can be performed on the archived data. Losing out on business value from this valuable data.

Solution

Used Hadoop to store all the data coming in from weblogs, medical data, JSON files. Hadoop also serves as a enrichment layer to enhance data for high-end analytics consumption. The complete solution provides easy movement of data from Hadoop, Aster and Teradata.

Impact

- **Reduced storage costs for data variety**
- **Perform adhoc analytics on the multiple versions of data**
- **Retrieve data in minutes (vs. days with tape archives)**
- **Reduced load and improved performance of DW/Databases**

Analyze Customer Web Interactions

Capture, Refine, Store ClickStream Data

Situation

Customers interact with public websites of large PC vendor for various purposes — resulting in huge volumes of raw data. Because of its nature, the data structure and format is not always consistent and because of the volumes, processing the amount of data is difficult.

Problem

Inconsistencies like file errors, corrupted file compressions in the raw omniture data makes the capturing and analysis process error prone. The volume, velocity (70files/hr, 1M files) adds to the complexity.

Solution

Teradata Big Analytics solution to provide a landing and staging area for in-coming data at high velocity. Hadoop nodes to curate the data, check for data consistency, and prepare the data for consumption by higher end analytic platforms.

Impact

- **Reduced data inconsistencies and improved performance**
- **Capture and curate ALL the data and prepare for analysis**
- **Perform ad hoc analytics on multi-level interactions**
- **Improves the marketing campaigns and the customer support process**

Document Classification

Enabling Real-time Processing of Clinical Records

Situation

Current Mayo Clinic architecture has diverse architectures and varied applications to manage clinical documents for storing, indexing, viewing- resulting in high latencies and inefficiencies

Problem

Mayo Clinic's NLP technology has been used to implement various research and clinical use cases which leverage unstructured documents, but these have been constrained in deployment due to RDBMS technology limitations.

Solution

Teradata Appliance for Hadoop platform to design applications to ingest ALL documents types (radiology, operation, ECG/EKG, notes), make data available for free text search while making them simultaneously available for batch processing.

Impact

- **Enabling near real-time processing of messages and documents**
- **Real-time querying by end users via Elastic search (in seconds)**
- **Combine real-time and batch processing for better results**

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Telematics

Geospatial Analytics for Better Risk Management

Situation

A large diversified insurance provider needed to accurately calculate risk scores and adjust risk premiums for its enterprise fleets based on vehicle data, driver behavior, GPS data, weather data, traffic and DW data. Current custom developed applications limits the effectiveness of these scores.

Problem

Lacks infrastructure and system to handle the huge volumes of real time data. No ad-hoc reporting systems to combine, enrich and analyze the data. Limited storage capacity limits the amount of data that can be captured, refined and stored.

Solution

Used Big Analytics to design a platform to streamline the ingestion process for telematics data from multiple sources, data types, structure, and frequency and combine with other data sources to perform meaningful analytics.

Impact

- **Quickly analyze data for informed decisions and ad hoc reporting**
- **Streamlined process to calculate vehicle and fleet scores**
- **Cost effectively quantify, adjust and manage risk premiums**

Cyber Analytics

Network Analysis for Advanced security threats

Situation

Current network traffic solutions are not real-time. They either employ a deep packet inspection later or try to analyze one packet at a time in the hope of catching bad apples.

Problem

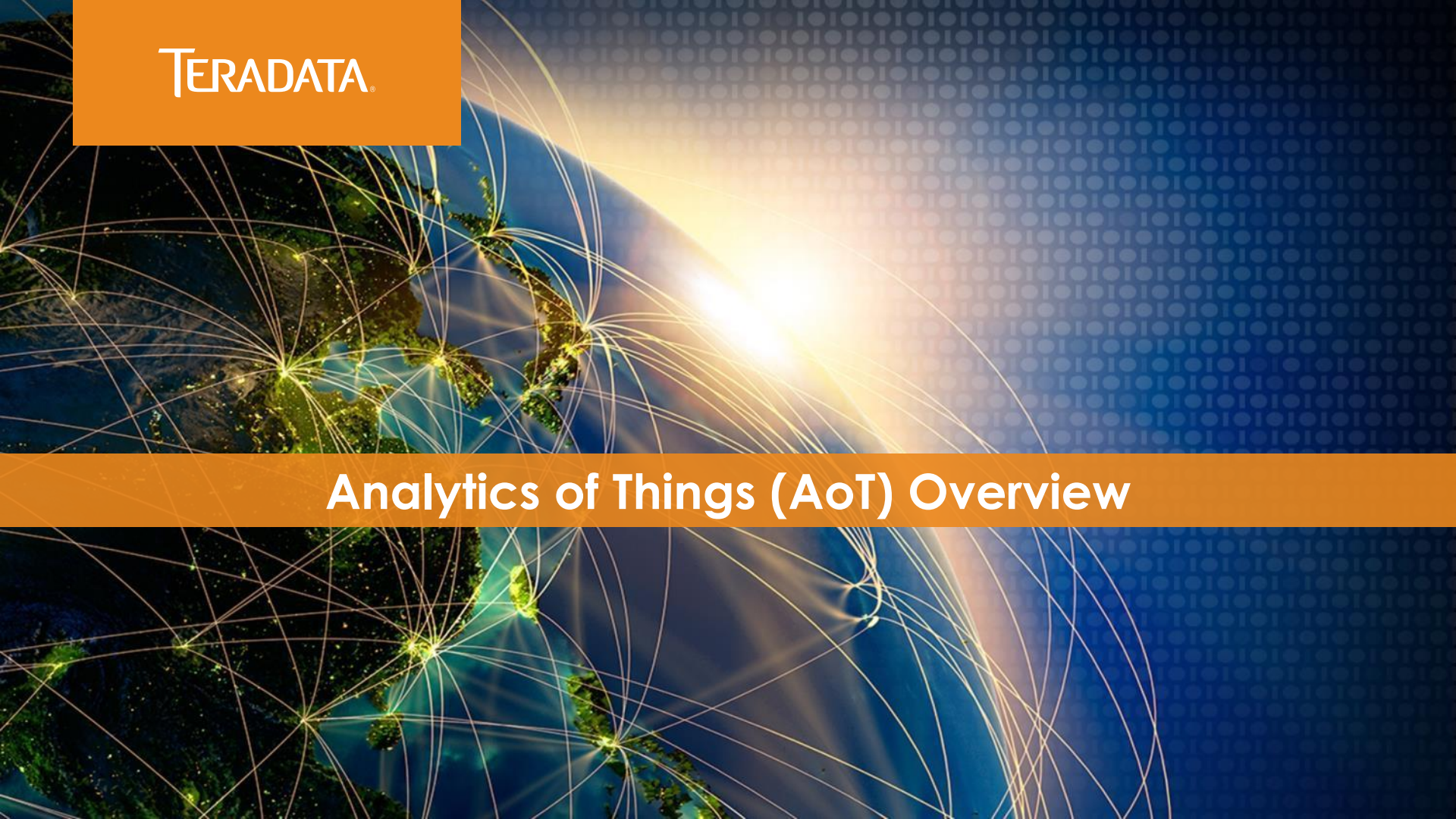
Ineffective detection techniques with only 0.001% of the corporate traffic which might be infested. Today's APT (advanced persistent threat type viruses) make it even more difficult to get detected with the current processing architectures

Solution

Teradata Appliance for Hadoop is critical part of the UDA solution architecture that can process enormous volumes of data in near real-time and the ability to point accurately malicious code, predictively preventing malicious attacks

Impact

- **Improve response times drastically to network traffic events**
- **Improve effectiveness of controls, fraud detection, and DLP efforts**
- **Proactively & automatically respond to malicious events or risks**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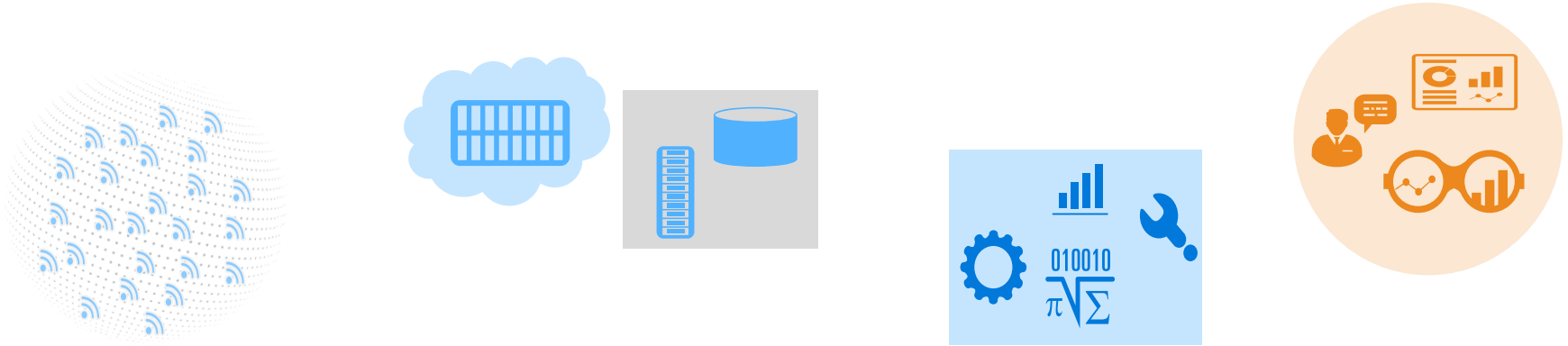
Analytics of Things (AoT) Overview

AoT – Connecting Sensor Data for Business Outcome



Sensor Data | Other Data Sources | Analytics | Business Actions

Business Benefits

Right data, right insights, right actions driving business outcomes – revenue growth, customer satisfaction, operational efficiency

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Our Most Frequently used Capabilities in AoT

Industrial AoT

- Smart Assets
- Service 360
- Connected Factory
- Connected Supply Chain

Consumer AoT

- Health & Fitness
- Smart Home
- Connected Car
- Usage based Insurance

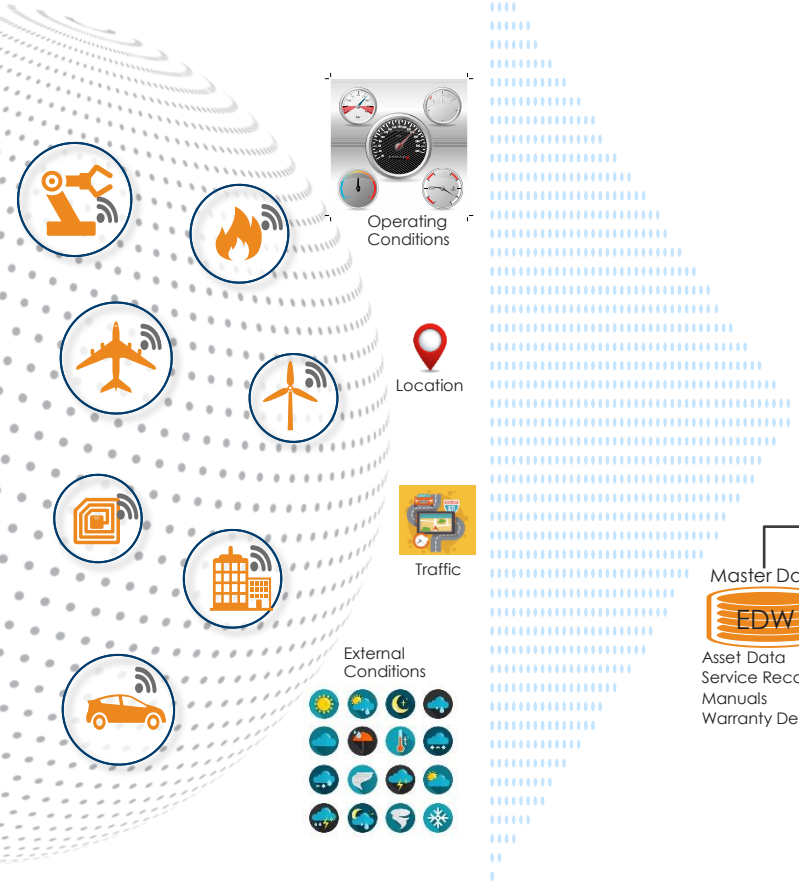
Smart City

- Smart Infrastructure
- Smart Utilities
- Smart Citizen
- Smart Mobility

IoT Data

- Sensor Data Qualification (AoT accelerators)

Smart Assets – Solution



Master Data

EDW

Asset Data
Service Records
Manuals
Warranty Details

machine learning nPath
graph regression affinity
cluster geo-spatial

Asset Health

Monitor asset health
Monitor utilization

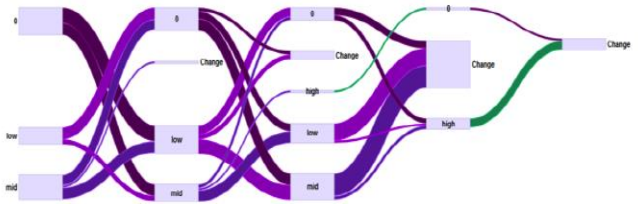
Decision on Edge

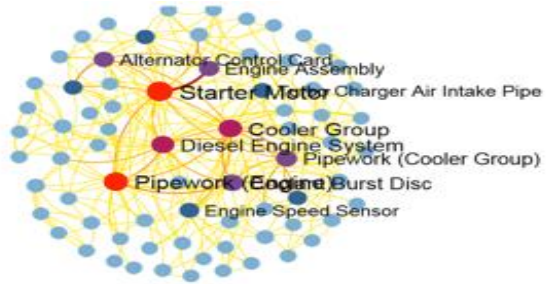
Auto shut down
Auto back up initiation
Change operating condition

Centralized Decisions

Preventive maintenance
Planned maintenance
Spares network
Technician Planning
Failure Rates
Warranty Planning

Case Study: Predictive model for engine failures on trains





Business Objective

- Avoid unplanned train downtime through prediction model
- Repair trains before failure occurs, secure uninterrupted process

Data Challenge

- Sensor data from engines and data from maintenance management system
- Understand patterns to failure (pattern analysis)
- Understand correlation of errors / sensor readings around a failure
- Based on this insight, build a predictive model
- Example: daily pattern of temperature readings mid – low – mid often occurs 3 days prior to an engine problem

Solution

- Data structure to support ingestion, transformation, storage of data for analytics
  - Leverage Teradata analytics capability for predictive modeling
  - Scoring of predictive model to predict failures

Opportunity to Impact

- Pre-Dispatch required spare parts in time
- Avoid unplanned downtime, penality, process interruption
- Save time on failure analysis

Where might Smart Assets Help You?

- Are you responsible for the uptime of an asset used by end customers?
- Does a downtime affect your production, revenue or customer service?
- Will you benefit from predicting a failure of a remote asset?
- Can you improve your product quality by understanding product behavior in the field?

Agenda

The Changing Environment

What are the new Technologies?

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Conclusions

Blended Architectures are no longer an option; They are a requirement

- Data Warehouse + Data Lake
- On Premise + Cloud
- RDBMS + HDFS
- Commercial + Open Source

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