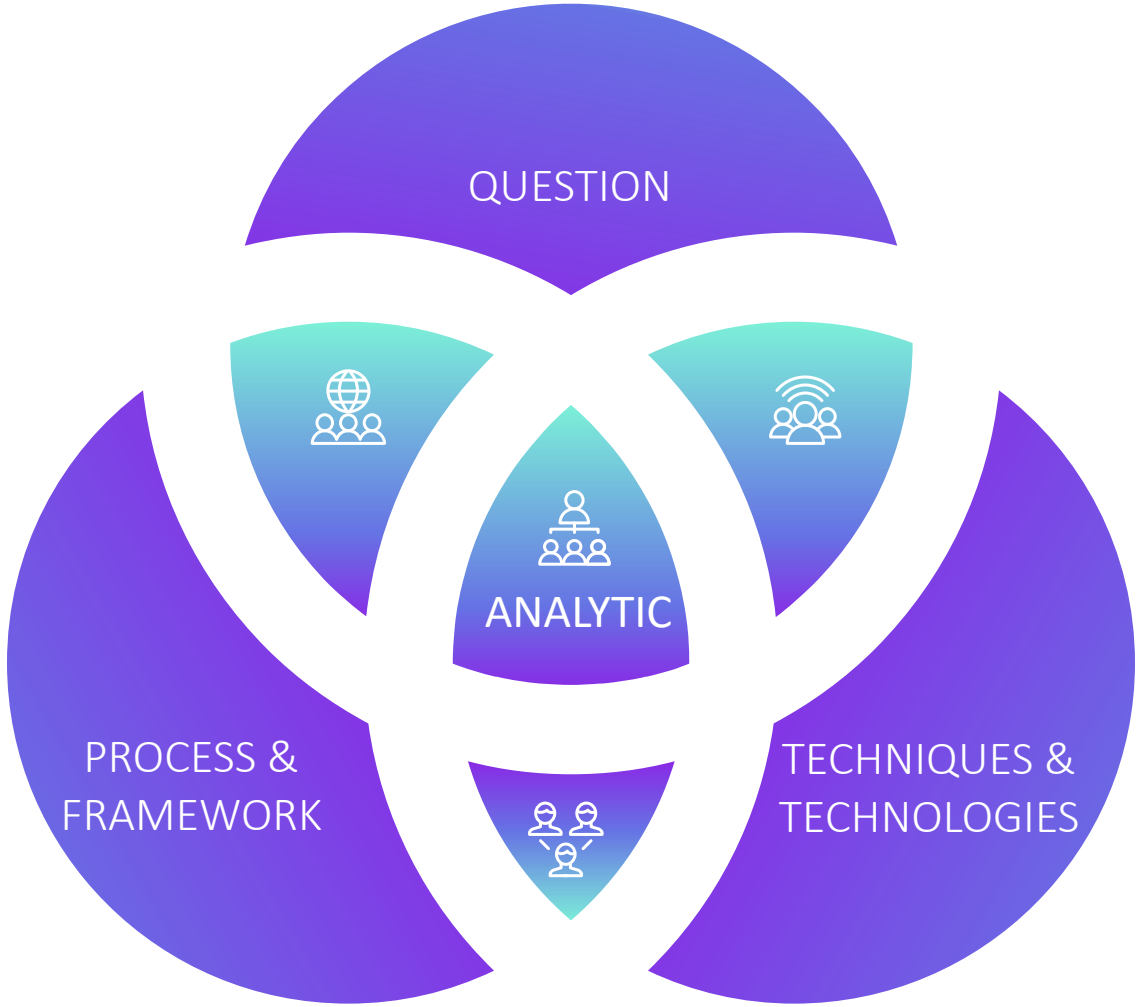
DATA ANALYTIC

ITX3002 CSX2001 INTRODUCTION TO INFORMATION TECHNOLOGY

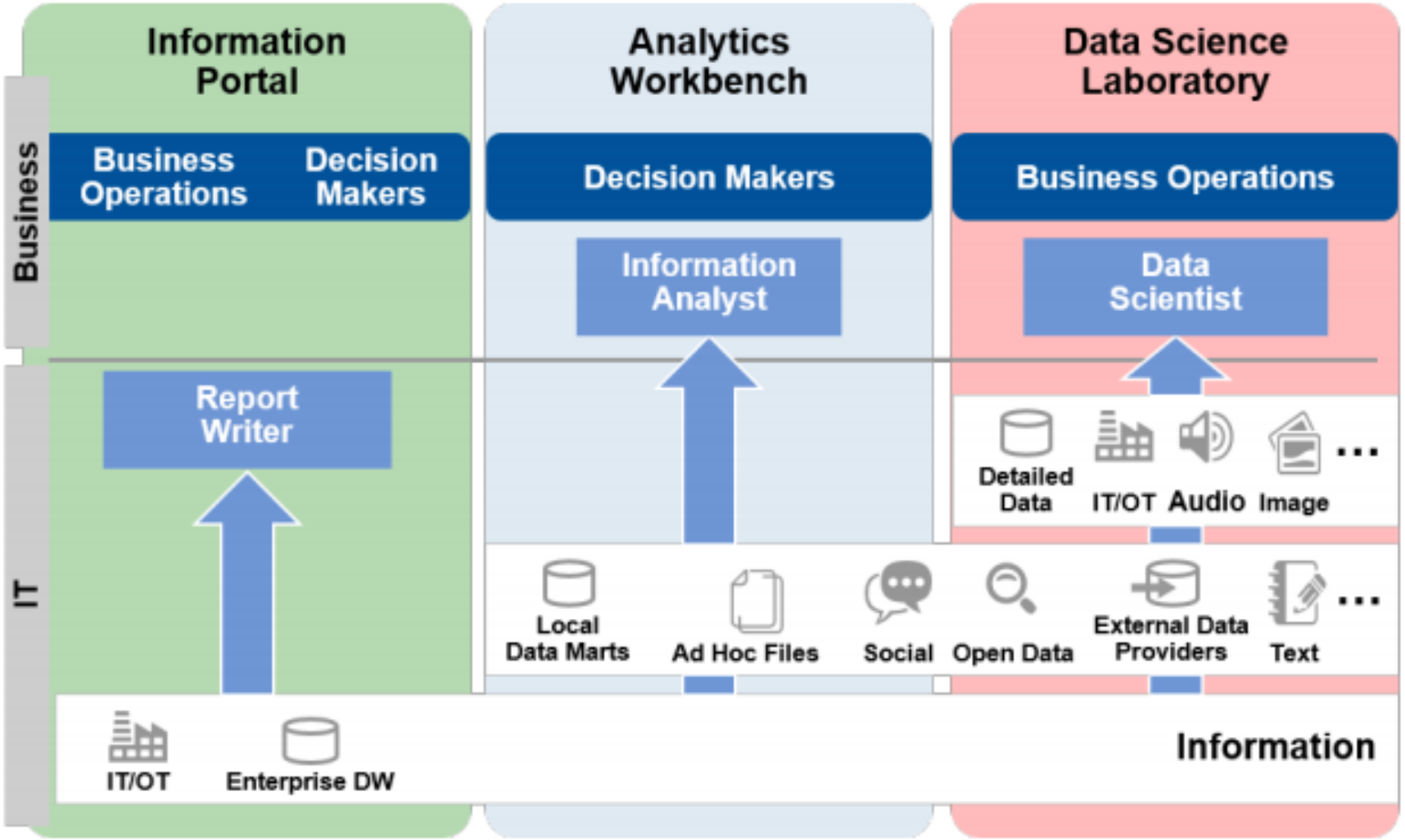


Data Analytic

A framework of finding a general or business solution from the data

- Understand the data
- Analyze the data
- Find the best solution

Figure 5. Tiered Business Analytics Environment



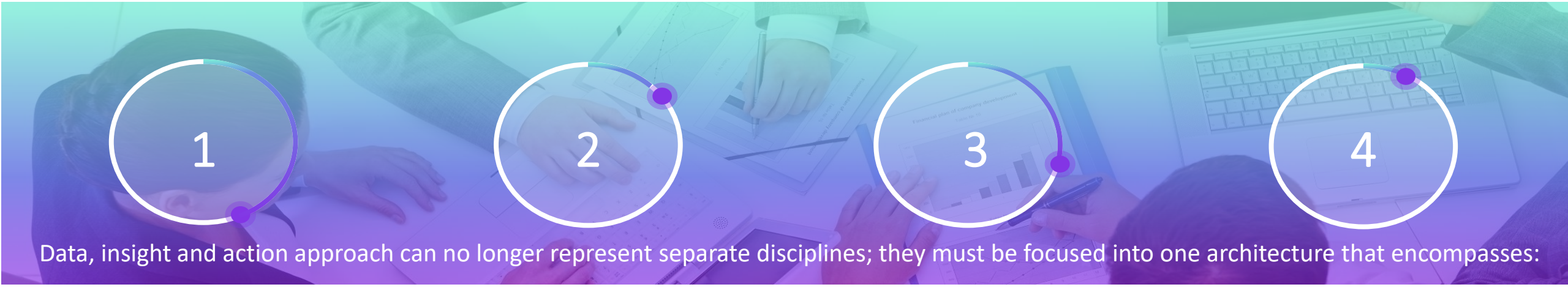
DW = data warehouse; IT/OT = information technology/operational technology

Source: Gartner (October 2016)

3-Tiered Business Analytic Environments 1

1. The information portal, an environment like a traditional business intelligence (BI) environment. It includes trusted, structured sources for repeatable, relatively slow and expensive descriptive reporting processes.
2. The analytics workbench, which provides an agile, flexible analytics environment. This environment is easy to use in an exploratory, autonomous way to generate the quick insights required of a diagnostic approach.
3. The data science laboratory, which caters to advanced analytics (predictive and prescriptive), for heuristic analyses that are often detailed, complex and unique. The process can be somewhat slow and laborious but can ultimately result in high-impact results.

Data Analytic Processes



Data, insight and action approach can no longer represent separate disciplines; they must be focused into one architecture that encompasses:

ACQUISITION

Data acquisition, regardless of where the information is generated

ORGANIZATION

Organization of that data, using a LDW at the core to connect to data as needed, rather than

collect it all in a single source

ANALYSIS

Analysis of data when and where it makes most sense — including reporting and data

visualization, machine learning and everything in between

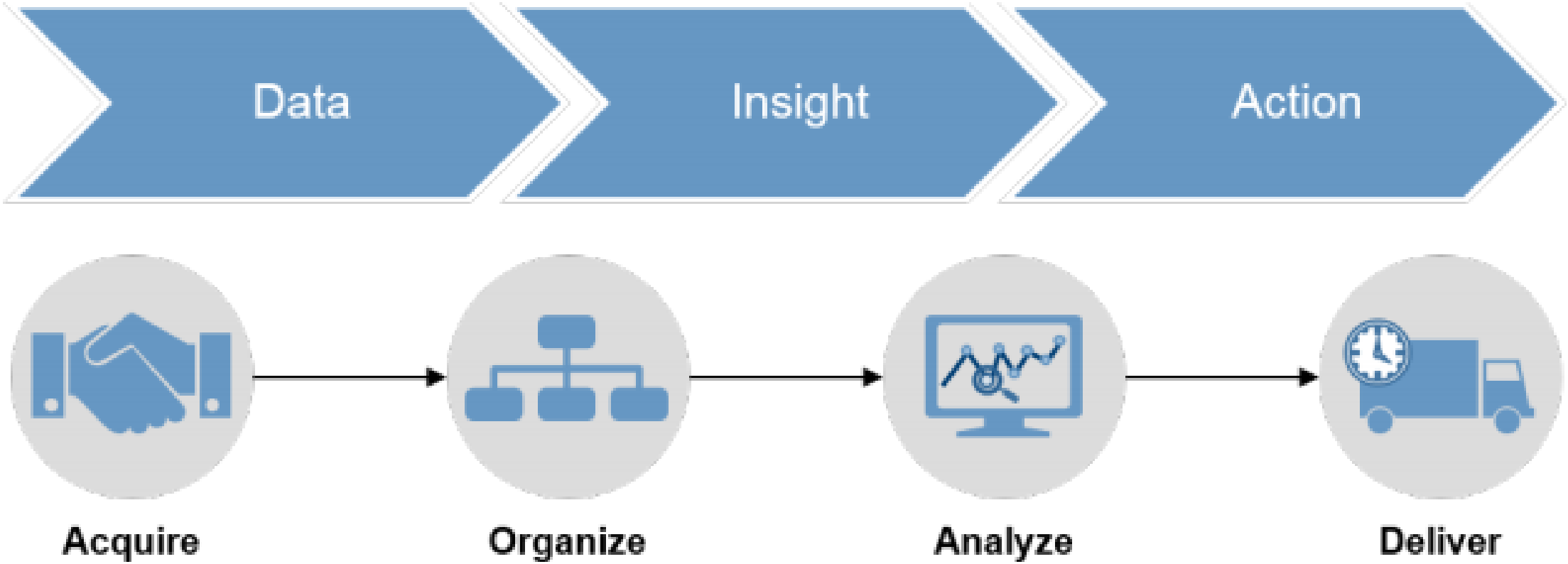
DELIVERY

Delivery of insights and data at the optimal point of impact, whether to support human

activities with just-in-time insights, embed analysis into business processes, or feed algorithms

that analyze data as it streams into the enterprise and automatically take action on the results

Figure 2. The Revitalized Data and Analytics Continuum



Source: Gartner (October 2016)

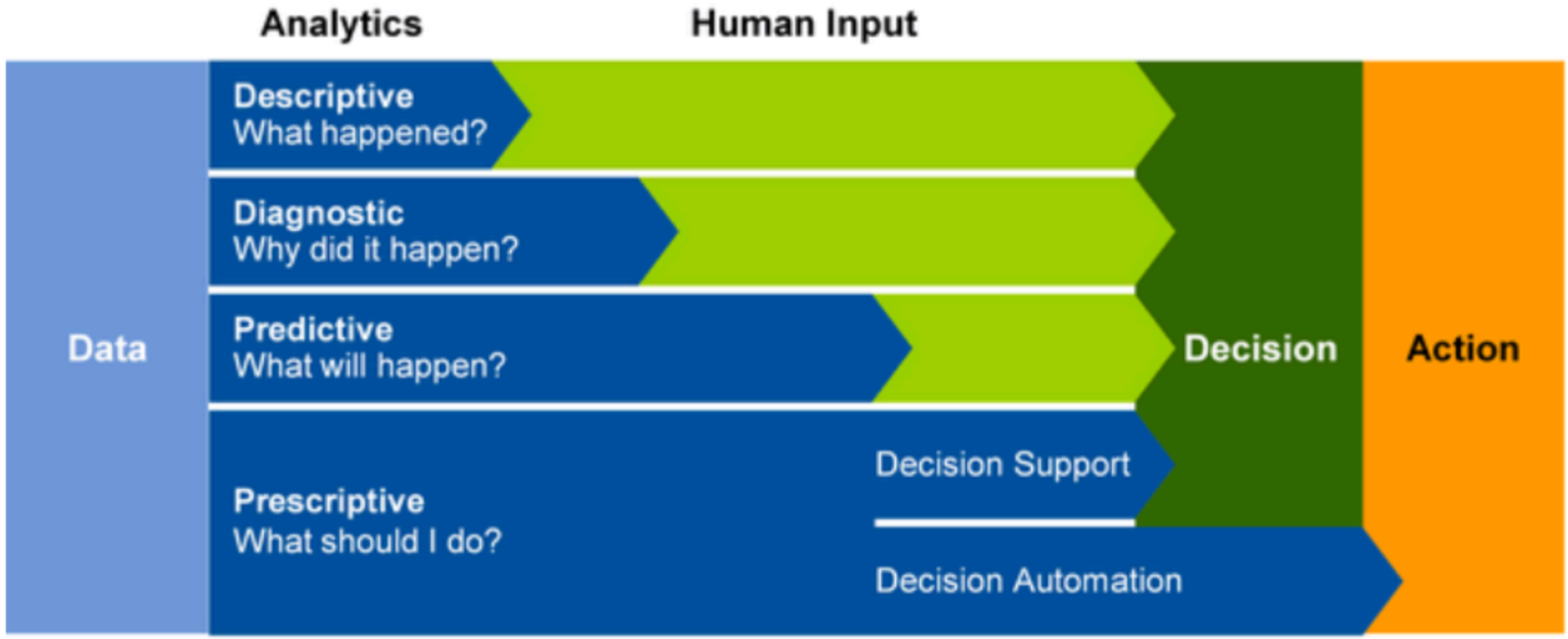
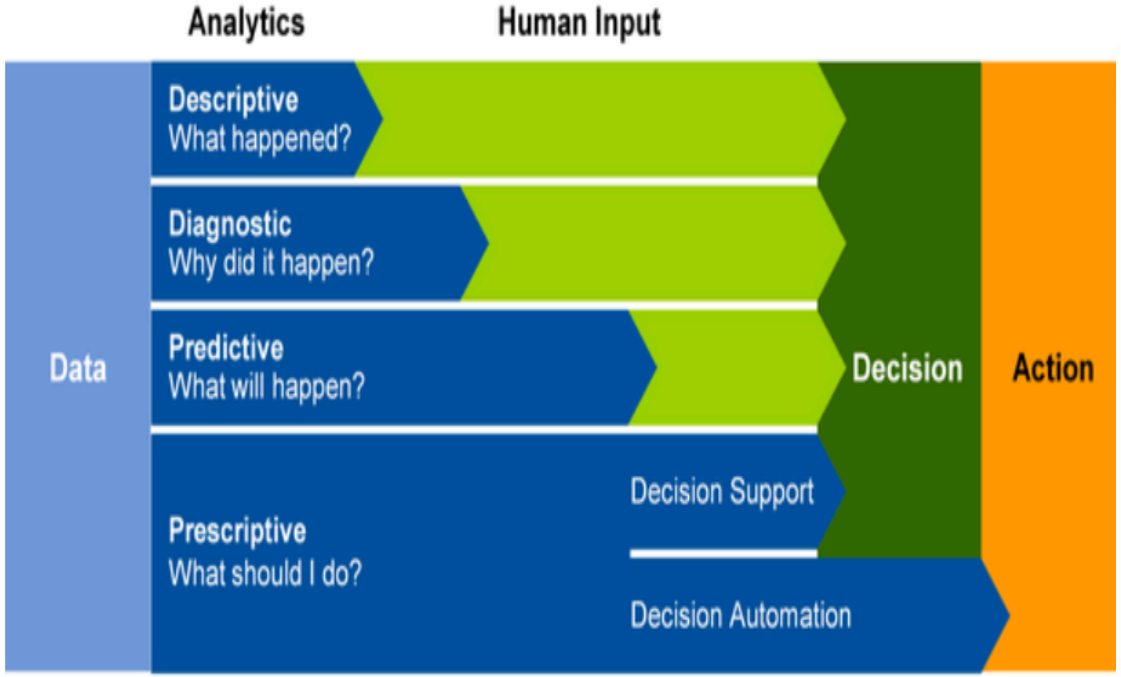


Figure 1: Four Types of Analytics Capability

Source: Gartner (October 2014) [2]



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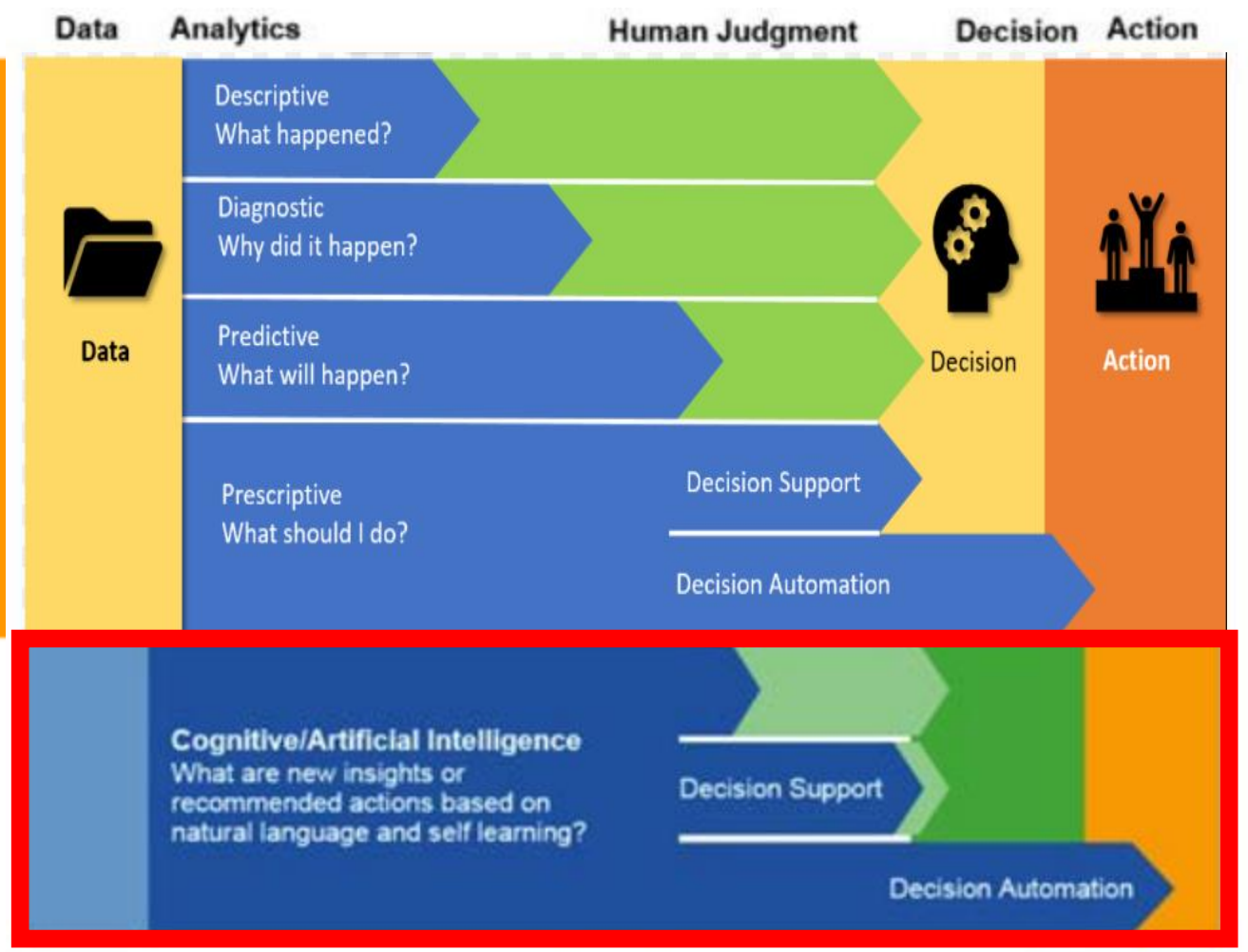
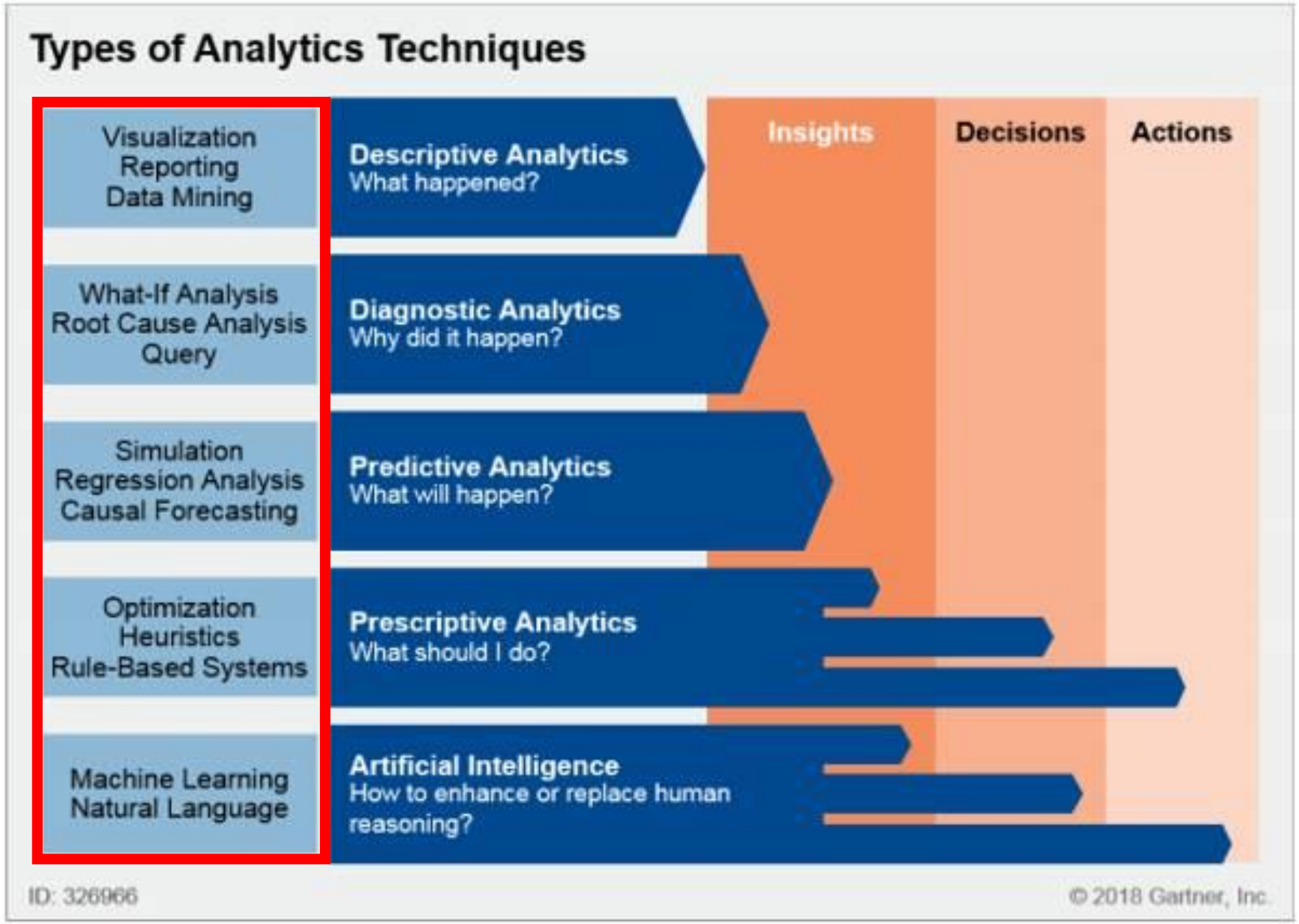


Figure 1. Types of analytics techniques (Gartner, 2017)

[3]


Types of Analytics Techniques
Visualization
Reporting
Data Mining
What-If Analysis
Root Cause Analysis
Query
Simulation
Regression Analysis
Causal Forecasting
Optimization
Heuristics
Rule-Based Systems
Machine Learning
Natural Language
Descriptive Analytics
What happened?
Diagnostic Analytics
Why did it happen?
Predictive Analytics
What will happen?
Prescriptive Analytics
What should I do?
Artificial Intelligence
How to enhance or replace human reasoning?
Insights
Decisions
Actions
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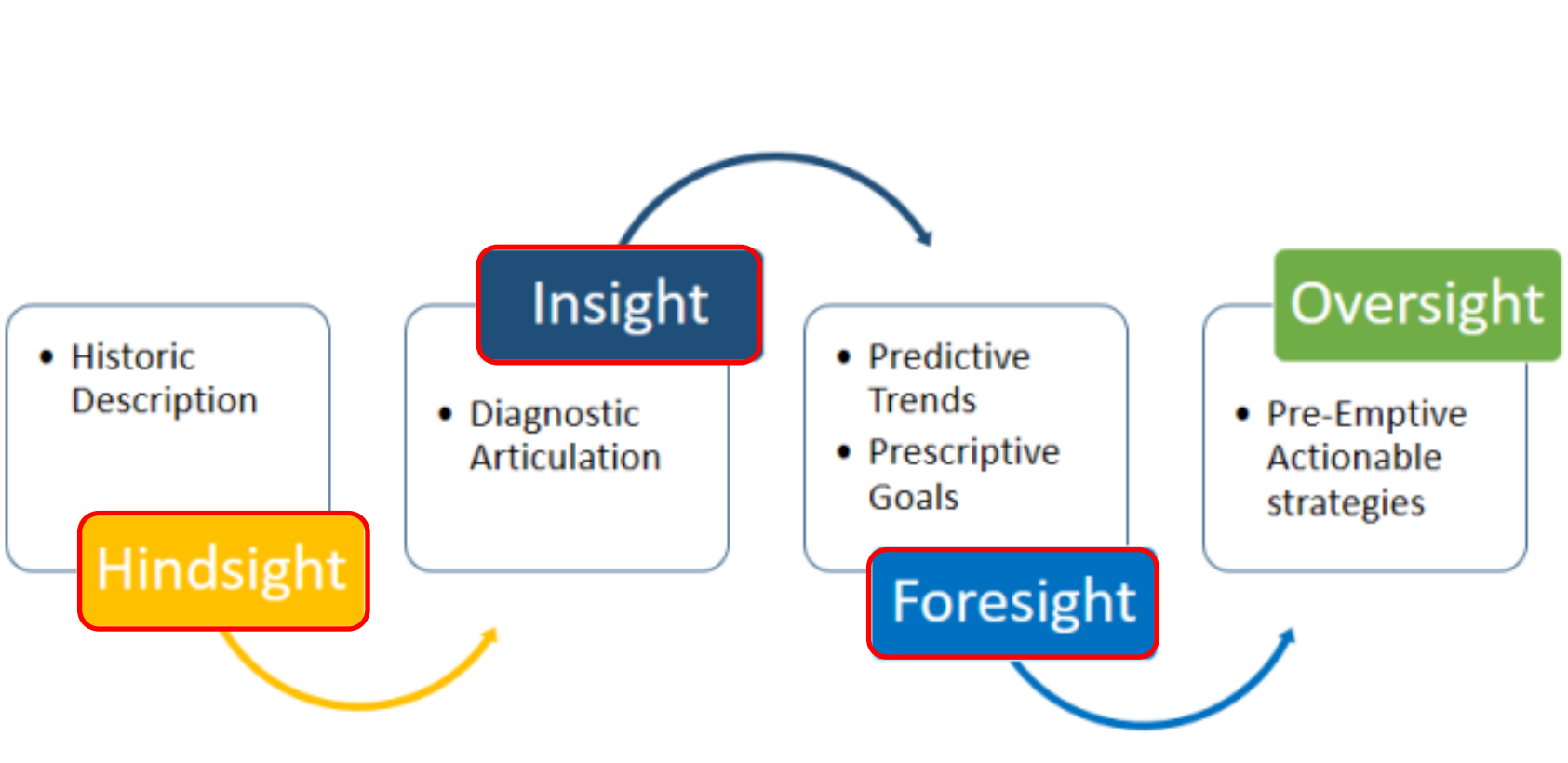
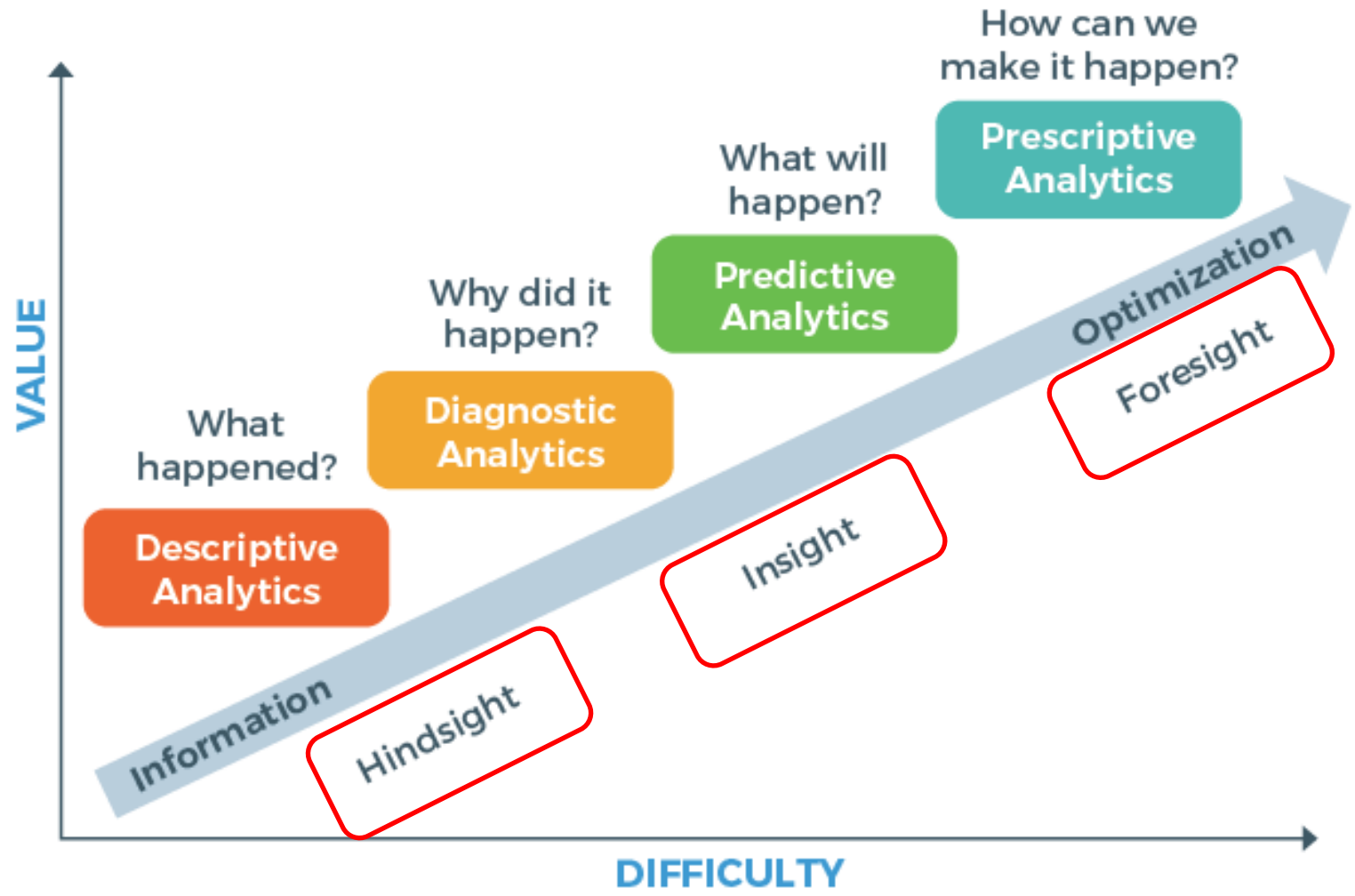


Key takeaways

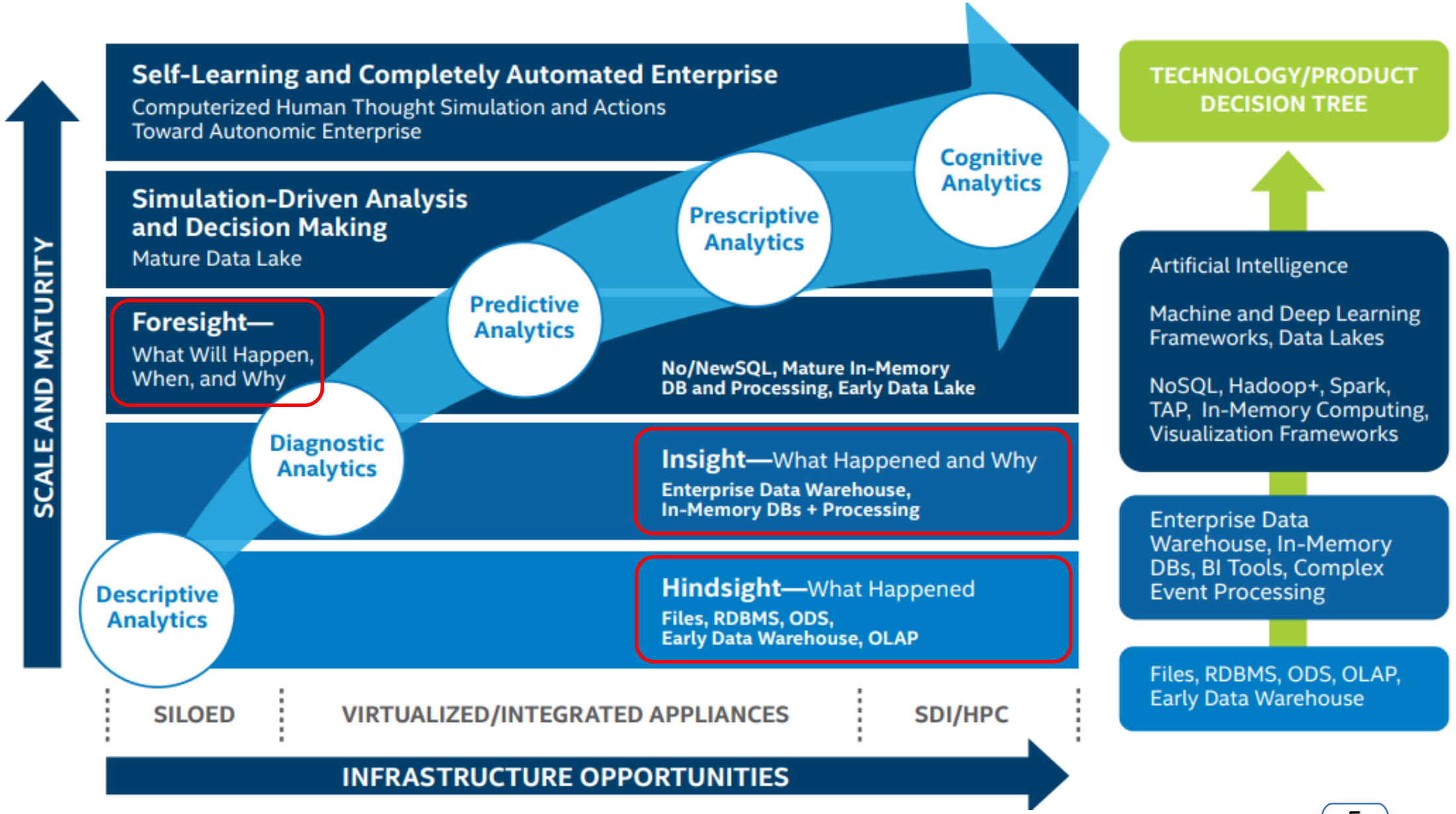
Improved Competitive Advantage

Enable deeper insights and discovery that will challenge business assumptions

Analytic Value Escalator



Gartner


SCALE AND MATURITY
Self-Learning and Completely Automated Enterprise
Computerized Human Thought Simulation and Actions
Toward Autonomic Enterprise
Simulation-Driven Analysis and Decision Making
Mature Data Lake
Foresight—
What Will Happen, When, and Why
No/NewSQL, Mature In-Memory DB and Processing, Early Data Lake
Insight—What Happened and Why
Enterprise Data Warehouse, In-Memory DBs + Processing
Hindsight—What Happened
Files, RDBMS, ODS, Early Data Warehouse, OLAP
Descriptive Analytics
Diagnostic Analytics
Predictive Analytics
Prescriptive Analytics
Cognitive Analytics
SILOED
VIRTUALIZED/INTEGRATED APPLIANCES
SDI/HPC
INFRASTRUCTURE OPPORTUNITIES
TECHNOLOGY/PRODUCT DECISION TREE
Artificial Intelligence
Machine and Deep Learning Frameworks, Data Lakes
NoSQL, Hadoop+, Spark, TAP, In-Memory Computing, Visualization Frameworks
Enterprise Data Warehouse, In-Memory DBs, BI Tools, Complex Event Processing
Files, RDBMS, ODS, OLAP, Early Data Warehouse

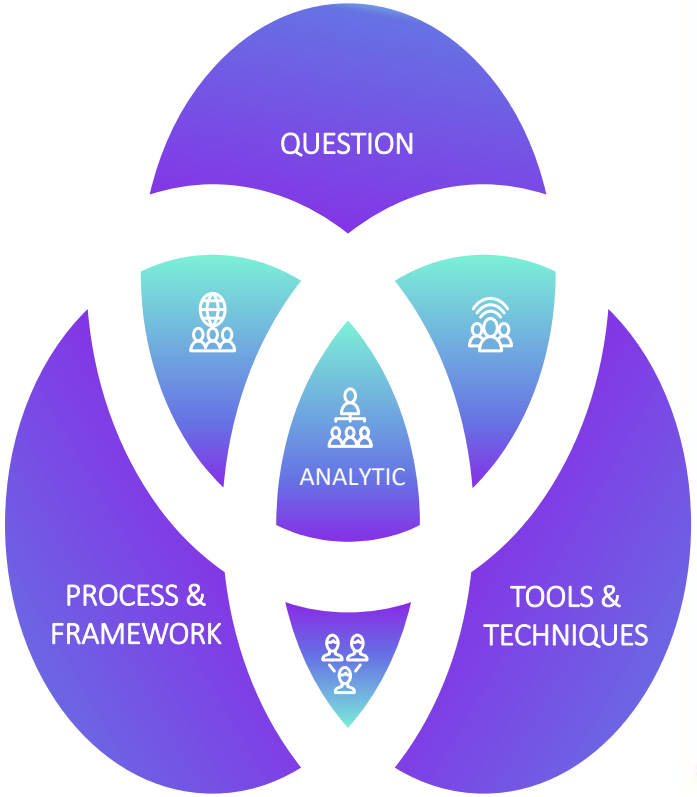


Figure 1: Evolution of Analytics

Evolution of Analytics from the 1980's					
	DESCRIPTIVE ANALYTICS (Foundational)		DIAGNOSTIC ANALYTICS (Operational)	PREDICTIVE ANALYTICS (Insightful)	PRESCRIPTIVE ANALYTICS (Strategic)
Question	1. What happened in the past?	2. What is happening now?	3. Why did it happen and what are the relationships?	4. What will happen in the future?	5. How should we act in the future?
Process Focus	Reporting	Measuring/ Monitoring Key Performance Indicators	Trend Analysis, Situational Analysis, Root Cause, Cause and Effect & Cluster Analyses	Forecasting, Probability Assessment, Risk Management, Prediction	Scenario Based Planning, Strategy Formulation & Simulation, Option Optimization
Tools & Techniques	Static & Interactive Reports	Dashboards, Performance Scorecards	Data Mining, Modeling Statistics, Query Tools, Spreadsheets, OLAP Tools, Decision Trees	What-if Analysis, Machine Learning, Predictive Modeling, Neural Networks, Data Visualization	Discrete Choice Modeling, Linear and Non-linear Programming, Value Analysis

Retrospective

Prospective

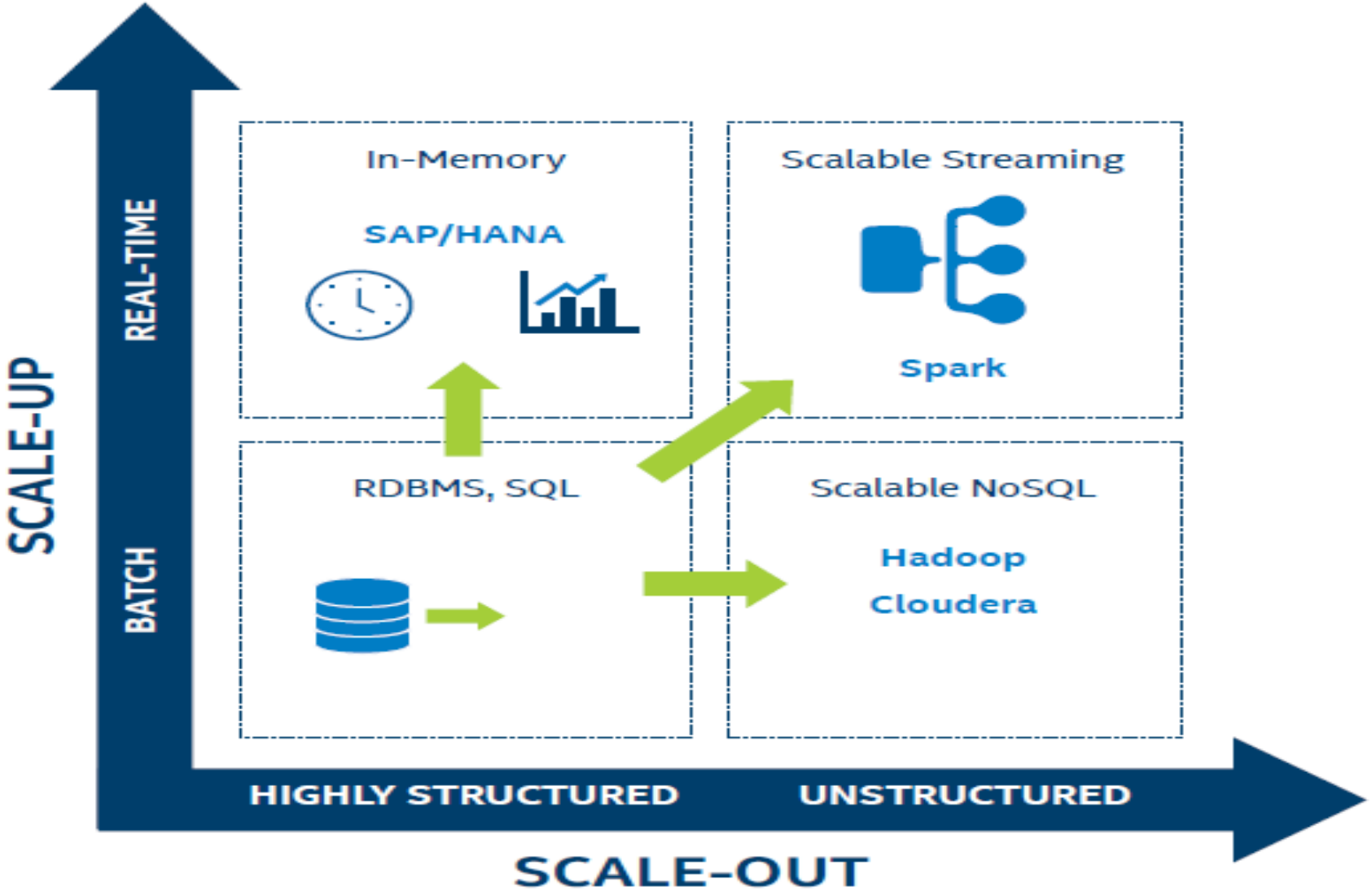
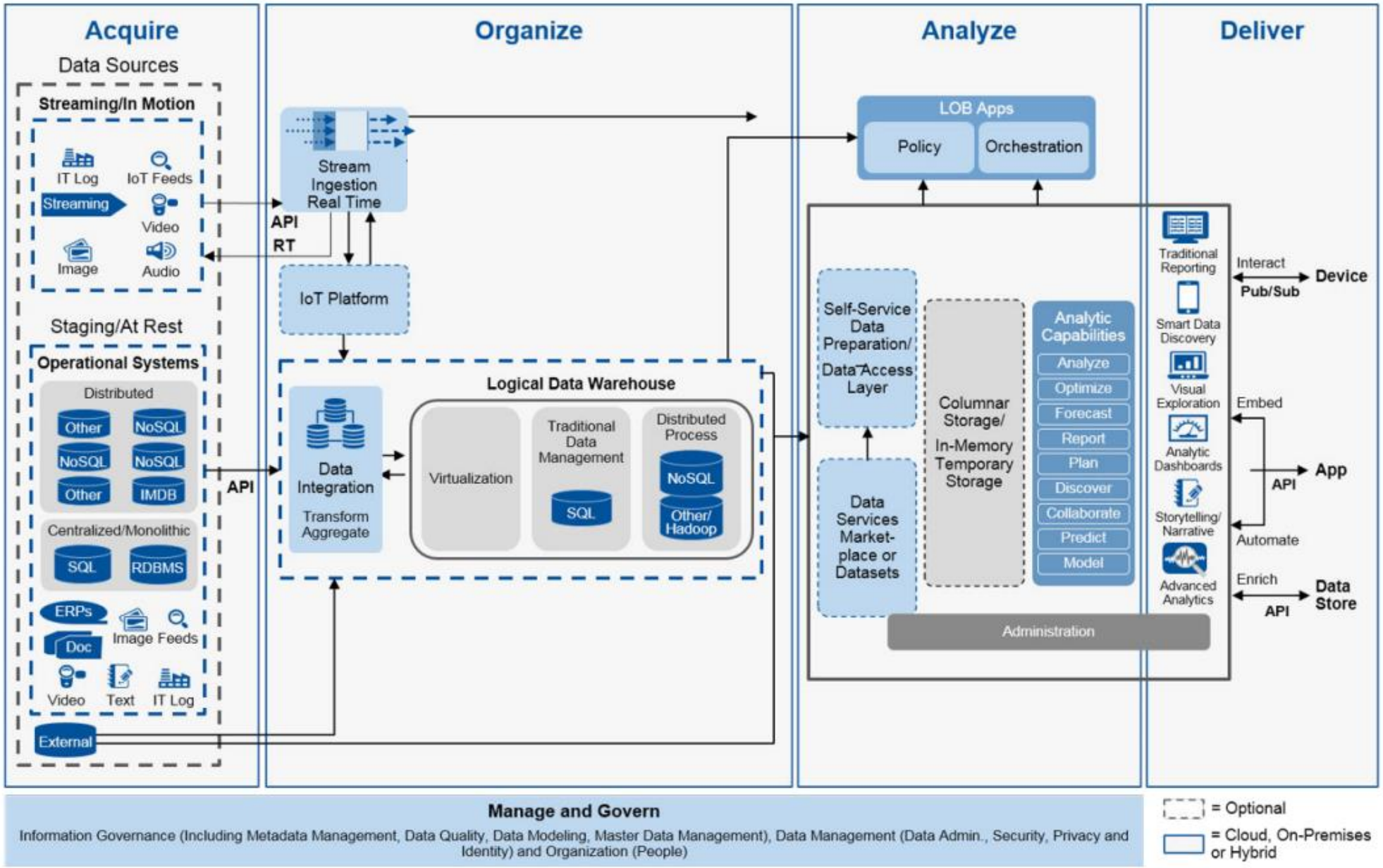


Figure 2. Analytics solutions can scale out or scale up to accommodate the variety, volume, and velocity of data.

Figure 3. A Comprehensive, End-to-End Data and Analytics Architecture



LOB = line of business; RDBMS = relational database management system; RT = real time

Source: Gartner

References:

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