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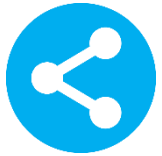

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Preparing and Architecting for Machine Learning

Carlton E. Sapp
Research Director

1 year at Gartner, 20 years industry experience

Carlton provides guidance on data ingestion strategies, streaming analytics, data integration, machine learning and cognitive analytics. He provides data-driven insights based on practical project experience and research. He is known for using systems thinking approaches to solve complex technical and business challenges.

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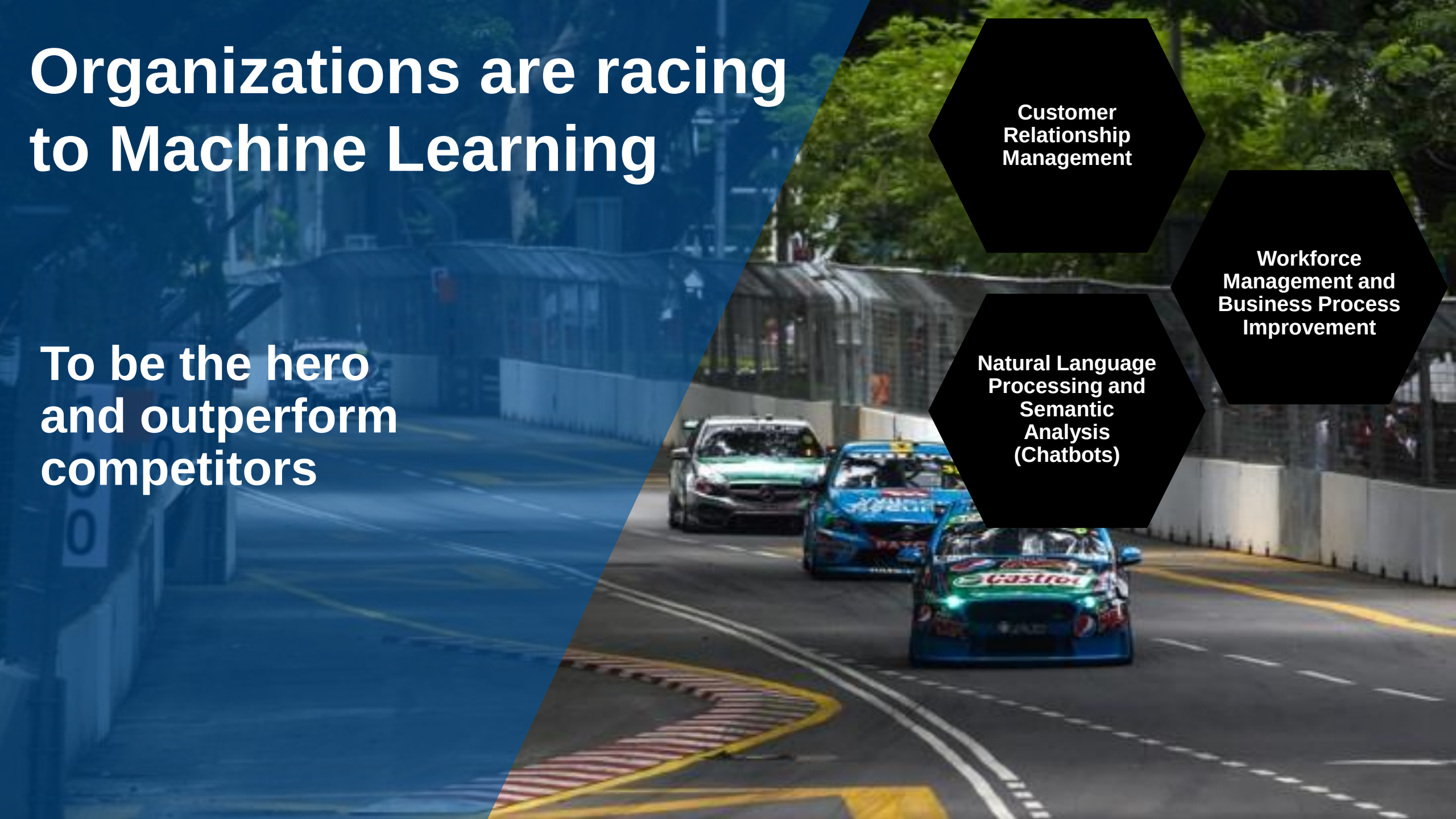
Competitive edge only inches away…

…means we must be more responsive to our customers, more innovative, higher quality, and more efficient

Organizations are racing to Machine Learning

To be the hero and outperform competitors



Path to Being the Hero

- What is machine learning and why is it important?
- What is the impact to our architectures and how do we build for machine learning capabilities?
- How can I get started?

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Defining Machine Learning

- Machine learning (ML) — a subset of artificial intelligence (AI) — is more than a technique for analyzing data. It's a system that is fueled by data, with the ability to learn and improve by using algorithms that provide new insights without being explicitly programmed to do so

Note: There are many types of intelligence (swarm, learning, etc.)

AI vs. Machine Learning vs. Deep Learning vs. Data Mining

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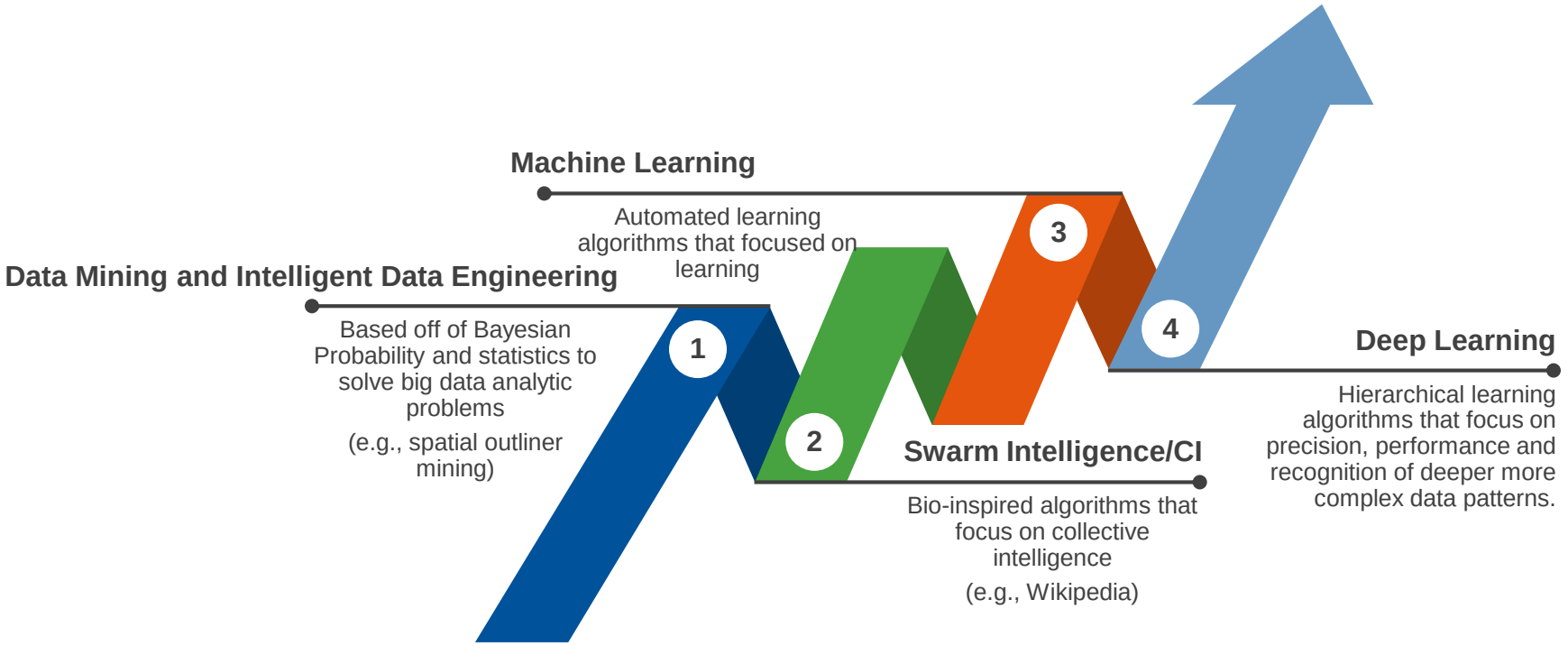
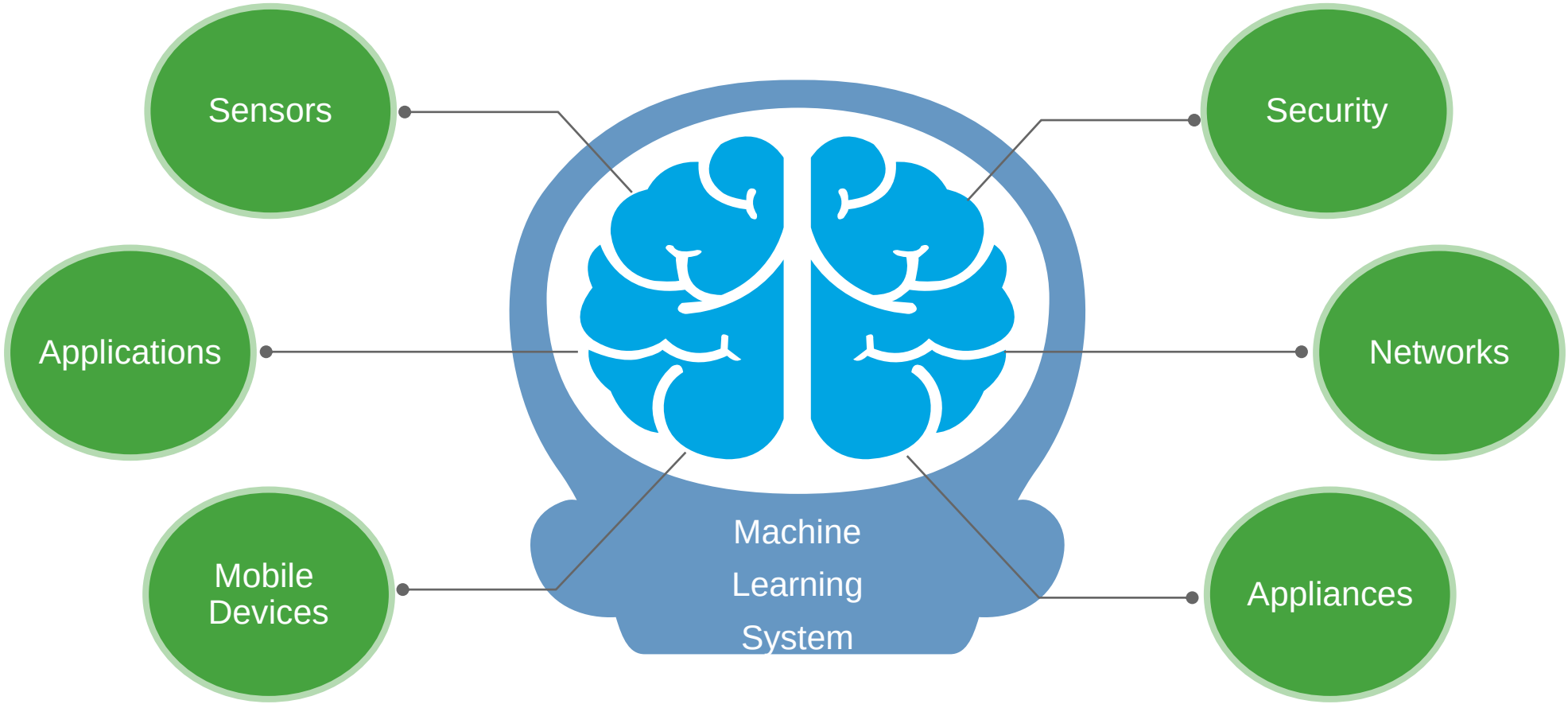
Machine Learning Lineage



Machines Learning From Data Without Being Explicitly Programmed

Extracts Knowledge From Data to Transform Simple Machines Into Smart Machines:



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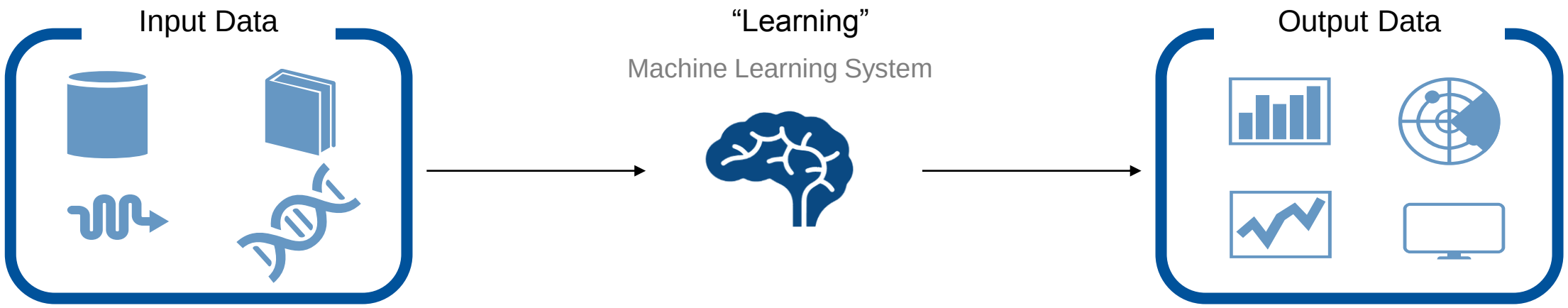
The Basics of Machine Learning Technology



Feed Learner Various Data

(e.g., structured and unstructured)

Align Appropriate Type of Learning System

Train Data

(e.g., supervised and unsupervised)

Present Results

(e.g., exploratory, predictive, classification)

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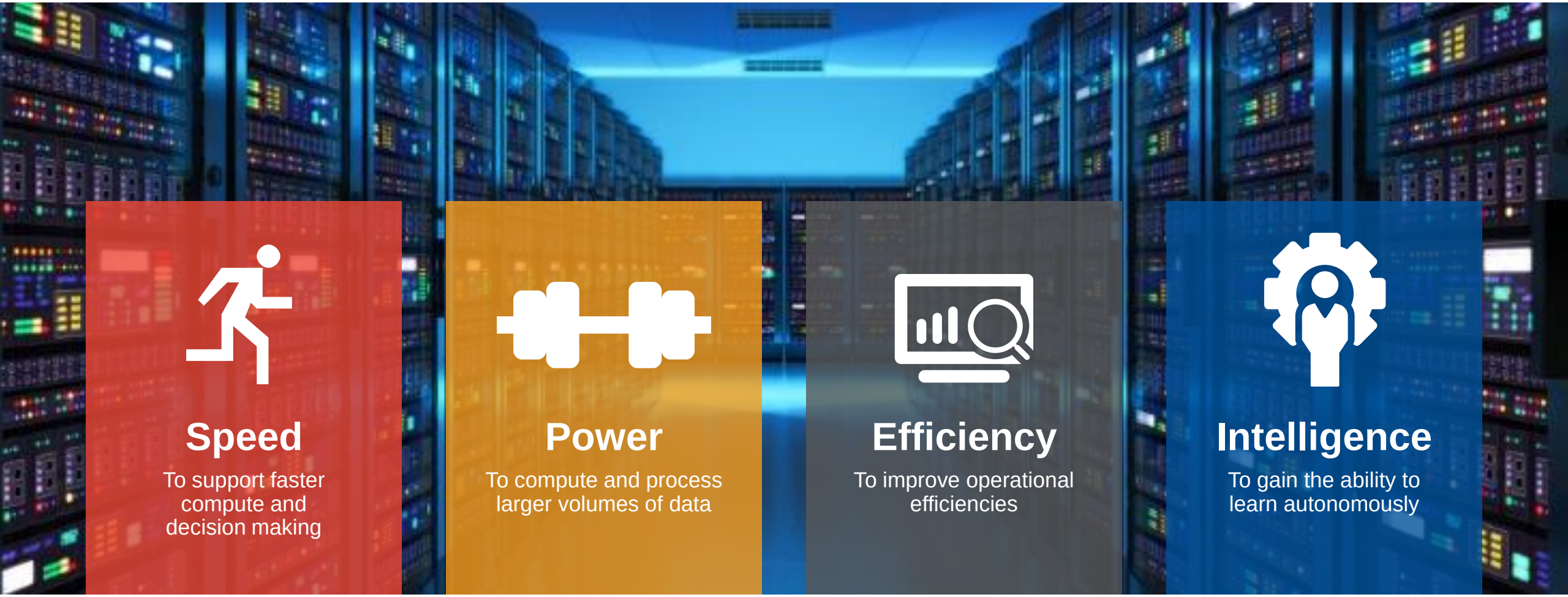
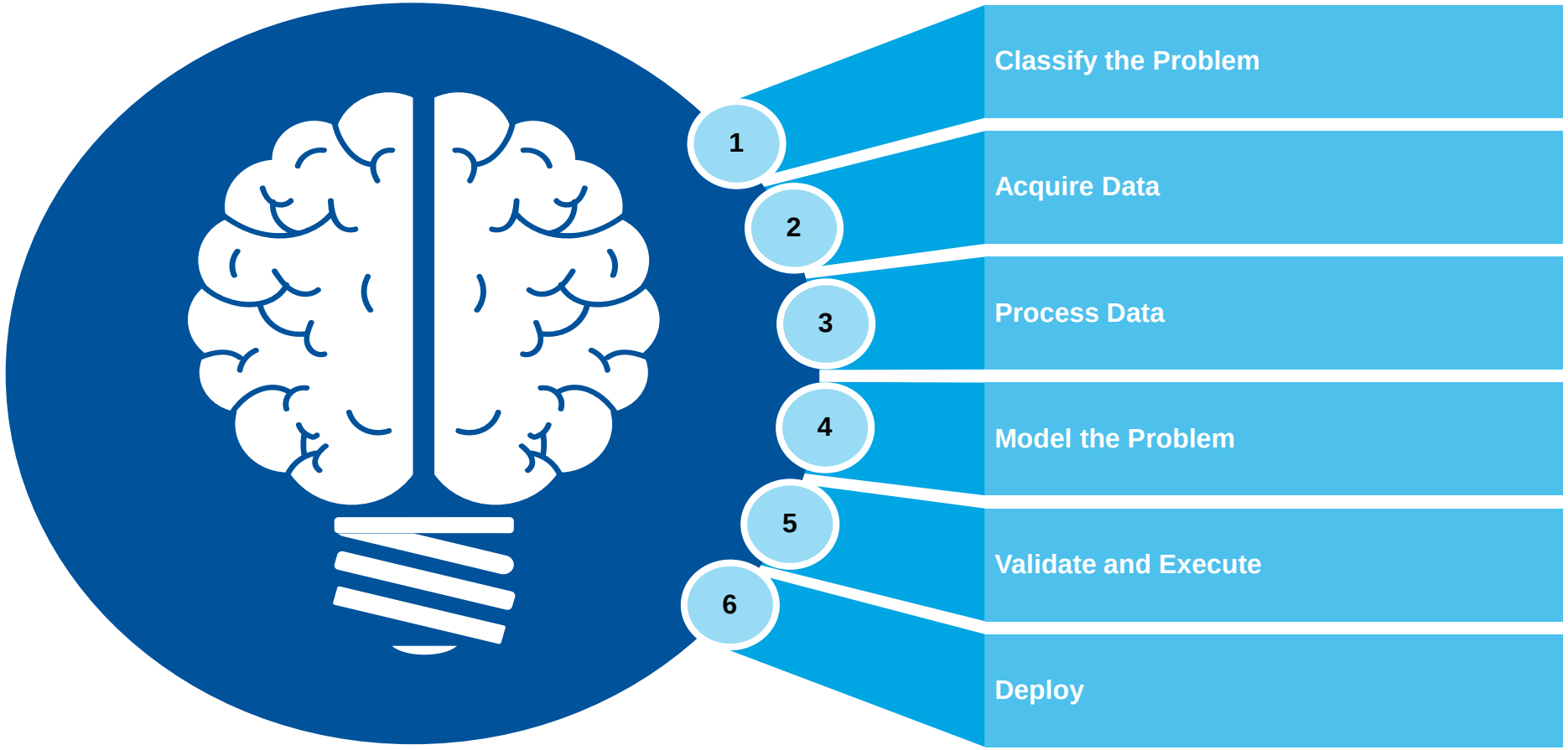
Given Big Data, Machine Learning Offers:



Learn the Basics of Machine Learning Stages



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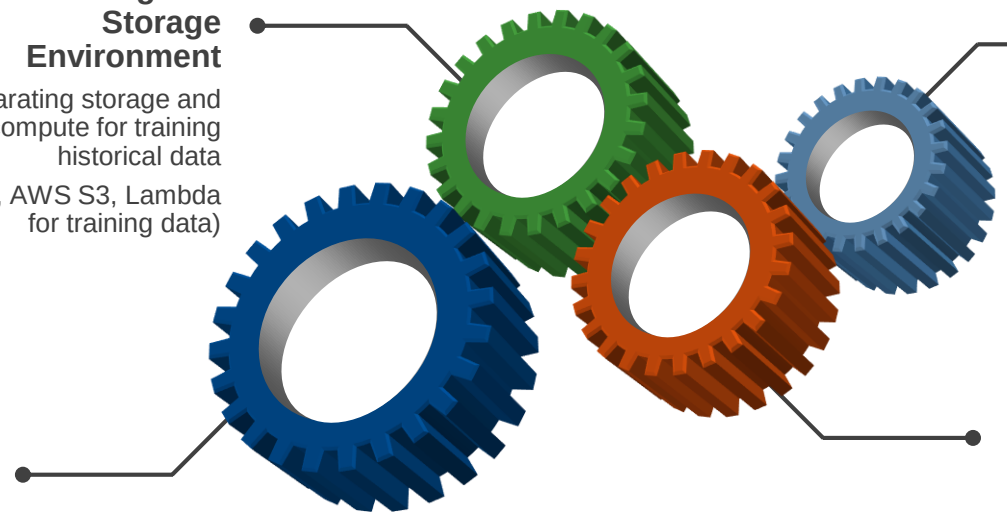
What is the impact of Machine Learning to our architecture?

How do we build for Machine Learning capabilities?

Impact of AI on the Data and Analytics Architecture

What changes should I make to my architecture to prepare for AI?

Top concerns from technical professionals (n=148)



Processing and Storage Environment

Separating storage and compute for training historical data

(e.g., AWS S3, Lambda for training data)

Deployment and Operationalization

Management capabilities that support swapping models/algorithms into production systems with ease

Ingestion Strategy

API Libs to support Cloud and hybrid cloud architectures

(e.g., from source to cloud)

Model Engineering

Repositories and platforms that support behind the scenes development lifecycles

(e.g., AI DevOps)

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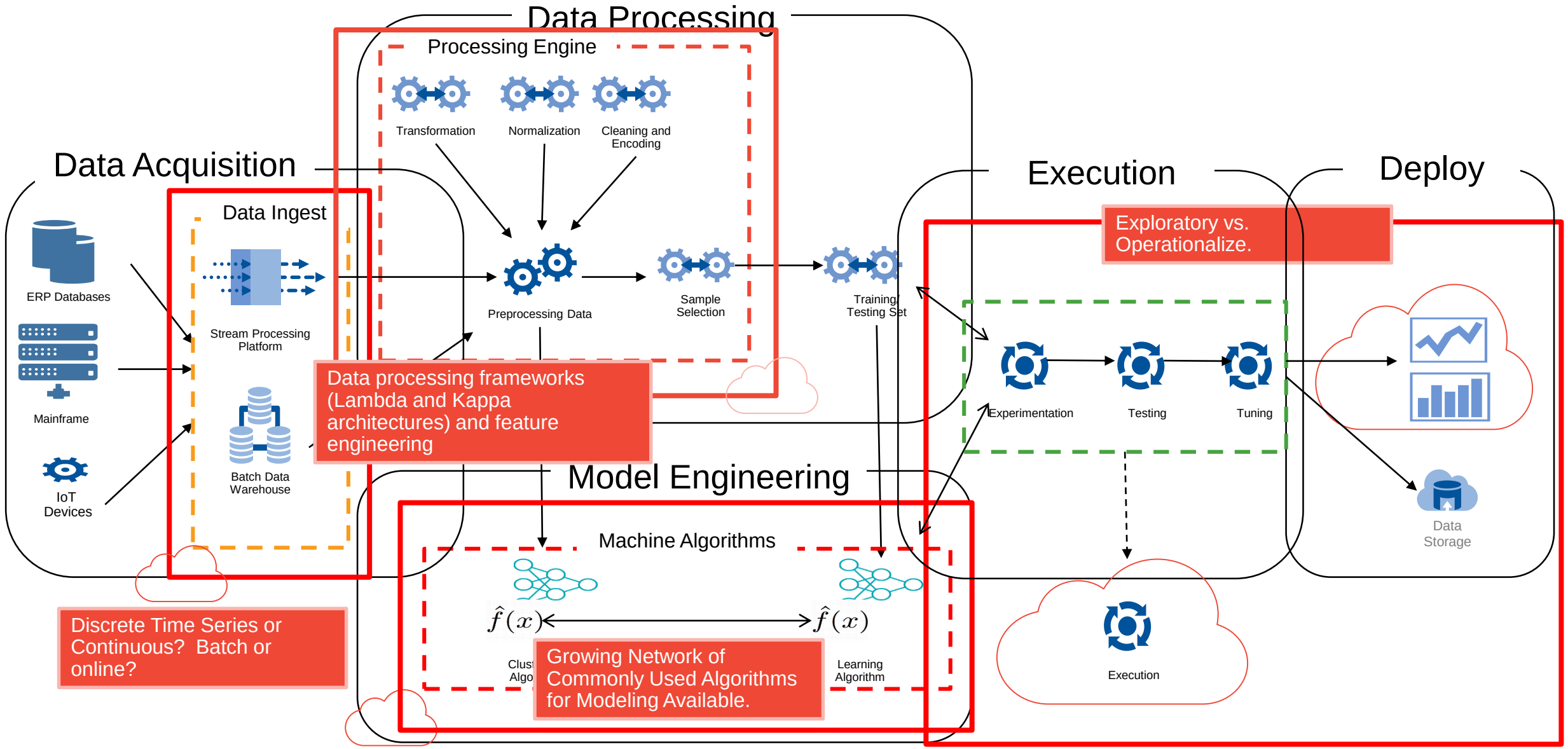
Evaluate Basic Machine Learning Architecture



Critical Architecture Components Exposed

Goal: Flexible integration policies that cross data and ML platforms

Integration of streaming data with data at rest

Goal: Model repository with metadata

Model Development Life Cycle used to standardize and evaluate machine learning models (model management)

Goal: Function as a Service (Serverless)

Training environments will separate storage from compute; on HDFS and cluster computing framework

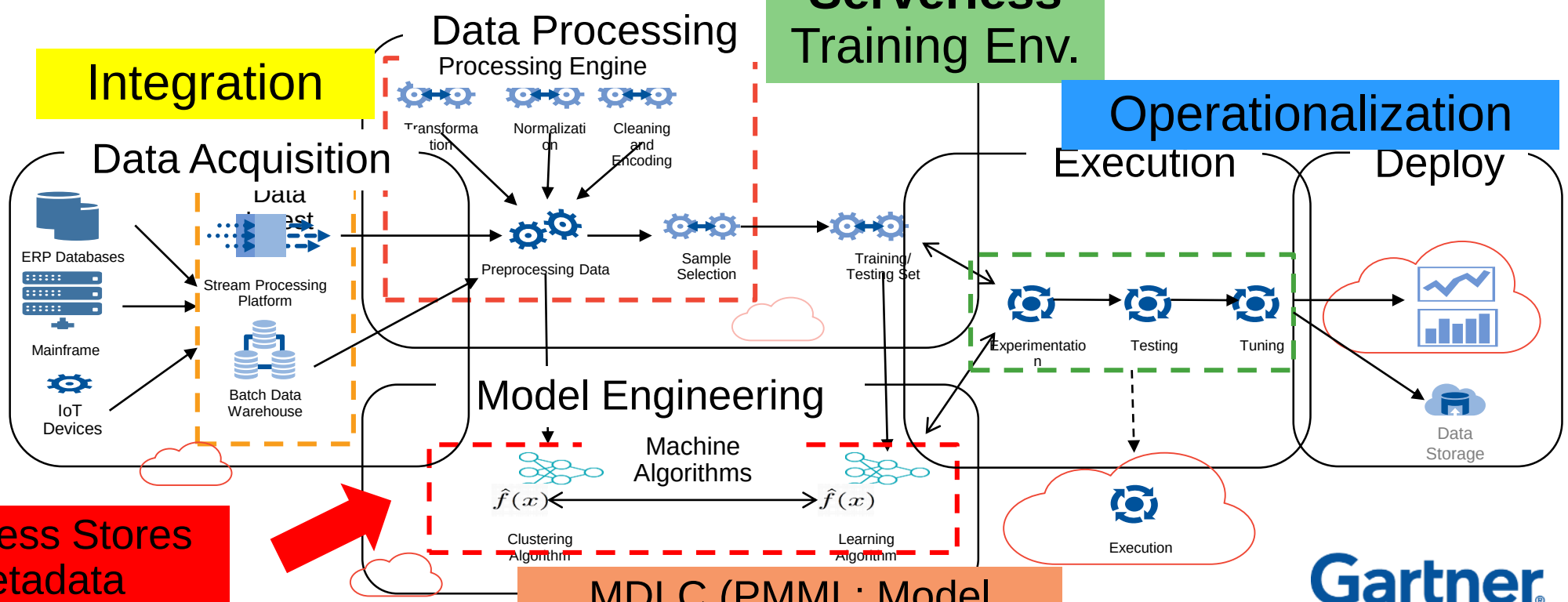
Goal: Seamless entry into production

Deploying algorithms/models in production

Function as a Service

Will also need to interoperate with different ML platforms

Serverless Training Env.



Distributed Process Stores for model metadata

MDLC (PMML; Model Management)

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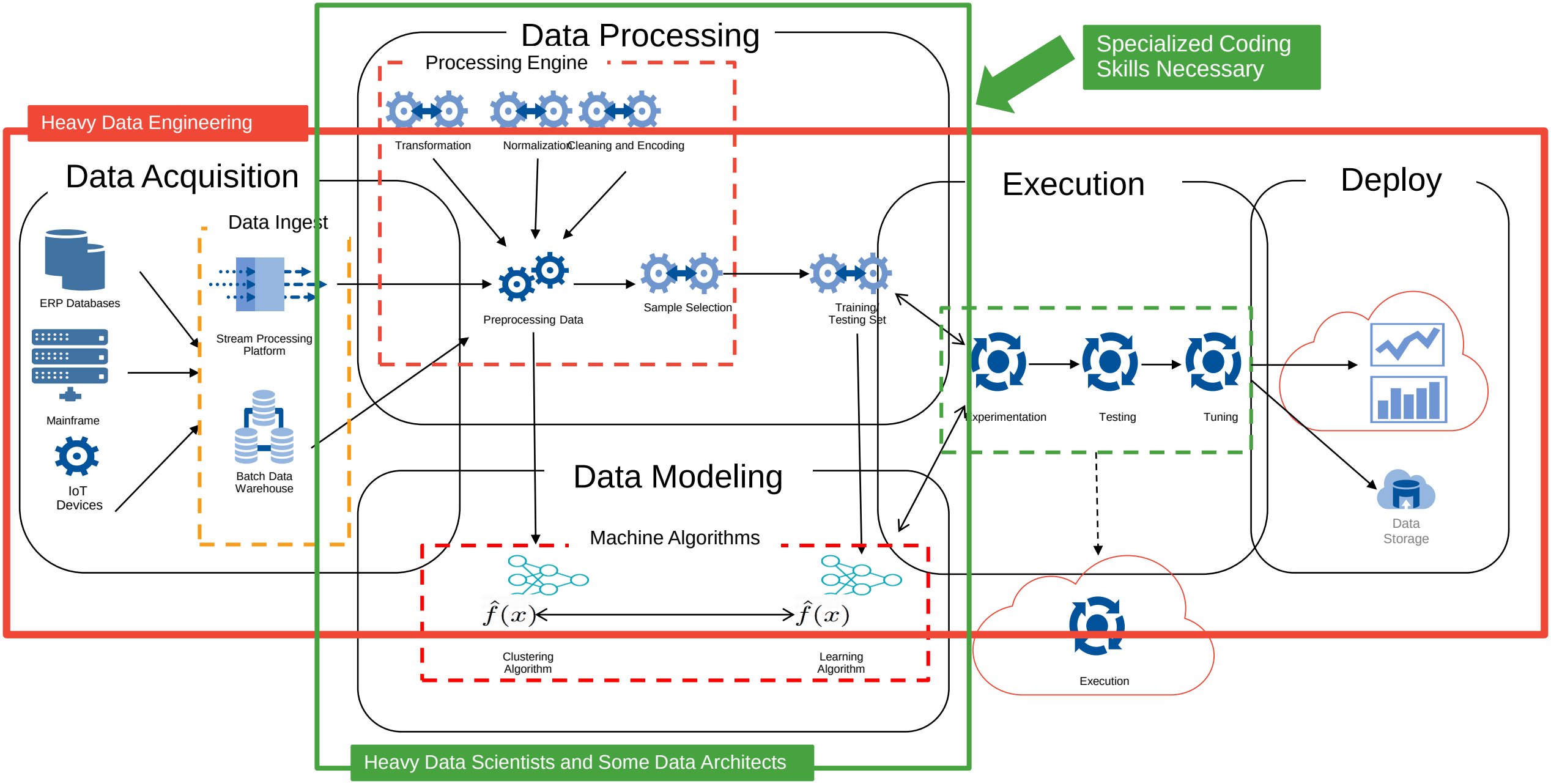
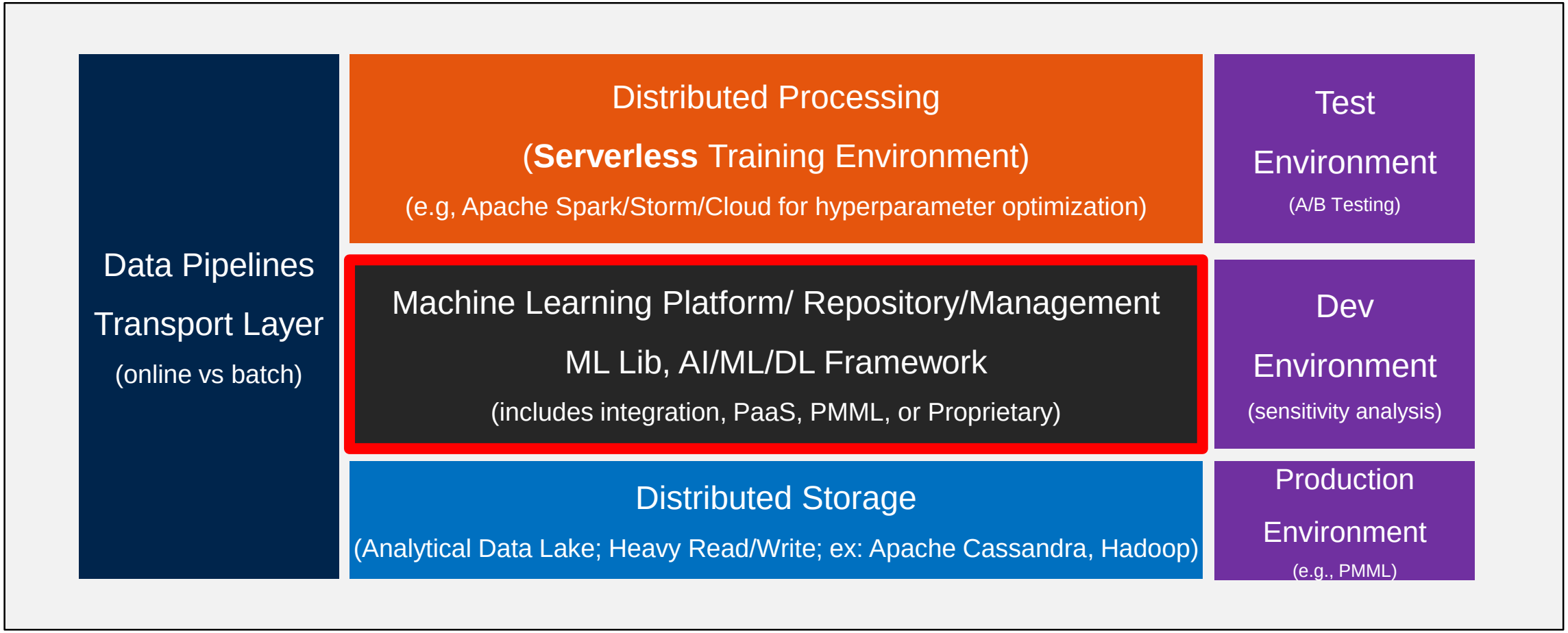
Understand the Enterprise Roles Involved



Build A Machine Learning Stack



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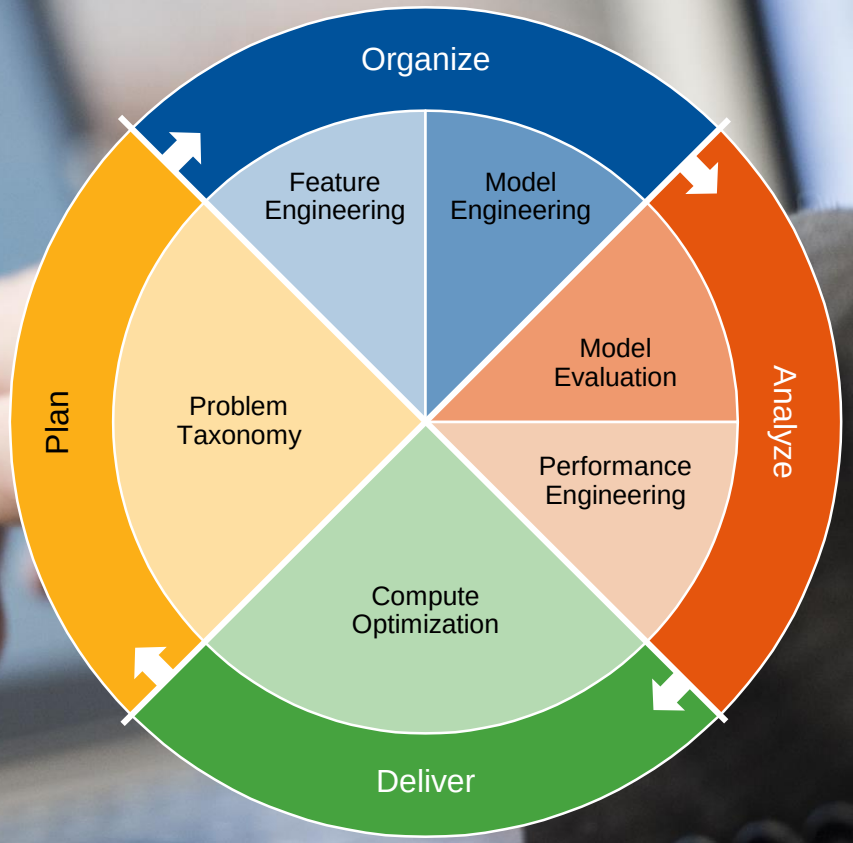
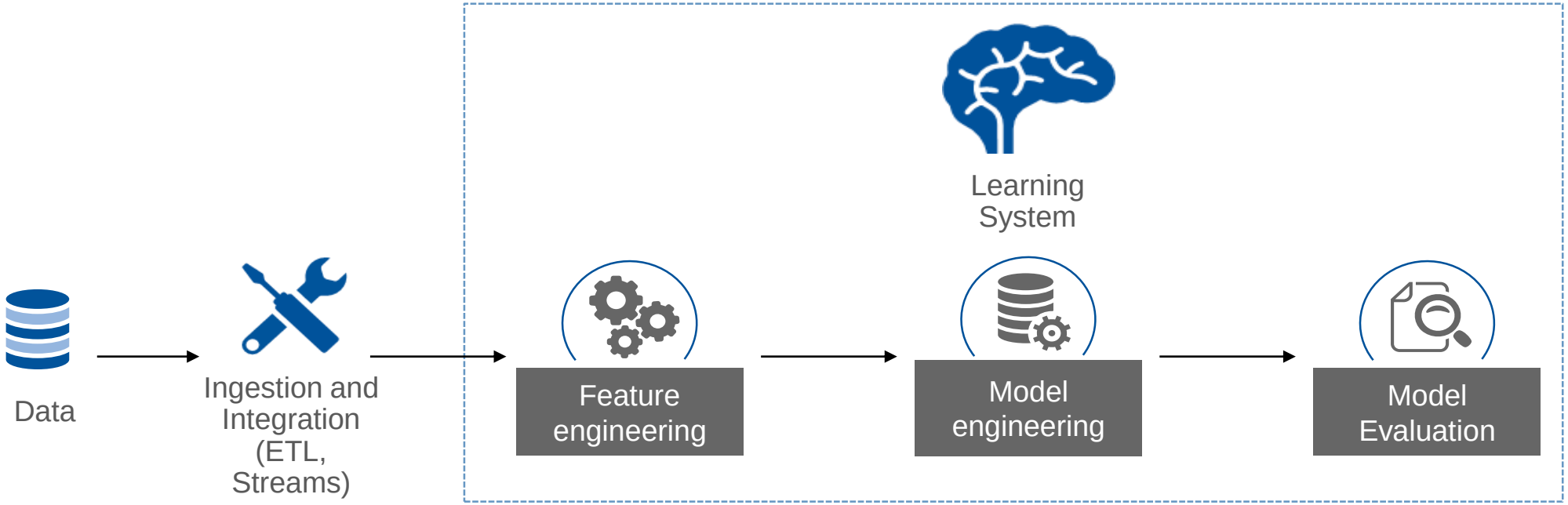
Establish a data and analytics lifecycle model for machine learning



Example: Model Development Lifecycle for Platforms



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Opportunities for ML within the IT Organization

Interoperations

Growing tools and platforms mean we need more interoperability between analytic platforms

Integration

Integrating a variety of different data types is more important today than yesterday

Search and Optimization

Combinatorial optimization problems in querying and accessing data

Interaction

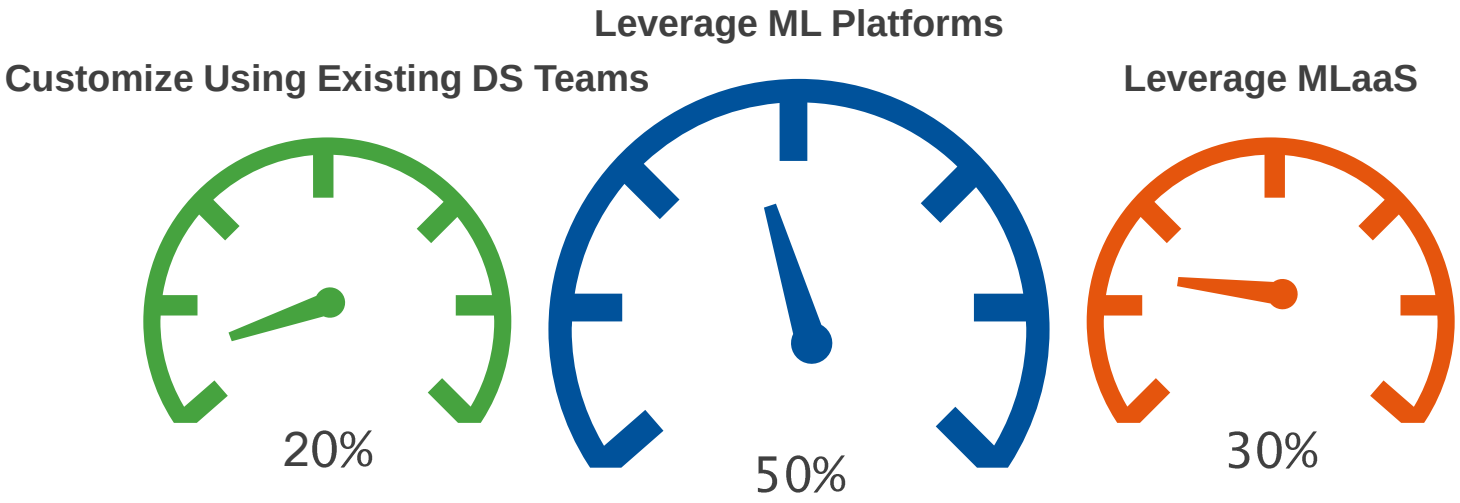
Human Computer Interaction provides new ways to interact in gathering and processing information

How to get started?


Leverage Machine Learning Platforms
Customize Solutions Using Existing Data Science Teams
Leverage Machine Learning as a Service
Getting Started

Getting Started

Clients initiating Machine Learning initiatives (n=148)



Customizations

Customized solutions with existing data science teams leverage existing knowledge in quantitative statistics leveraged by machine learning

Leveraging ML Platforms

Many ML platforms currently on the market provide pre-build toolkits that can be leverage by data science teams

Leveraging MLaaS with API and SDK

Leveraging ML as a service provides API and SDK for environments where integrating numerous services is required

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Polling Question 1 of 1

Rate your level of interest in developing or coding machine learning algorithms from scratch:

A. Very interested
B. Somewhat interested
C. No opinion
D. Not really interested
E. Absolutely not interested

Roadmap To Success

Clients initiating successful Machine Learning initiatives (n=148)

Four Steps To Success

Step 01

Collaborate

Work closely with data science teams and business analysts to identify use cases

Step 02

Leverage Cloud and Platforms

Build use cases in the public cloud or using toolkits to avoid excessive systems engineering work

Step 03

Iterative Rollout

Iteratively expand your ML platform and services over time

Step 04

Integrate with DevOps

Develop a process for operationalizing ML applications

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Examples of Machine Learning Delivering Value

Case Studies by SRS

Utilities (Gas and Power)

To predict power consumption and reallocate power, when needed

Healthcare

To improve patient care and preventative medicine

Financial

To evaluate adaptive trading strategies

Retail

To learn customer buying behavior

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Recap

1. Machine learning is about acquiring knowledge through data
2. Machine learning technologies offers us speed, power, efficiency and intelligence
3. **Machine learning is the next-generation analytic tradecraft for the digital business architect**
4. We build for machine learning by understanding the problem, acquiring data, processing data, modeling, executing and deploying
5. Start with a business challenge, build sample programs, and execute use cases iteratively

Recommendations

Recommended Gartner Research

- Solution Path for Evolving Your Business Analytics Program
  Carlie J. Idoine (G00292685)
- Big Data Analytics Failures and How to Prevent Them
  Svetlana Sicular (G00272497)
- Advancing Business With Advanced Analytics
  Alexander Linden (G00277713)
- Machine Learning Drives Digital Business
  Alexander Linden, Noha Tohamy and Others (G00263964)

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