



# PACT AI SERVICES & SOLUTIONS - Playbook

February 2020

Dinesh Chandrasekar

DISC



# AGENDA

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- INTRODUCTION TO AI
- HOW WE DO AI
- DATA SCIENCE IS AN ART
- INTELLIGENCE IS THE CORE
- XPERIENCE IS THE TRUE DIFFERENTIATOR
- AI ENABLED GLOBALIZATION
- OUR AI SOLUTION ACCELERATORS
- SUCCESS STORIES
- GLOSSARY





**PACTERA EDGE  
SPECIALIZES IN DATA,  
INTELLIGENCE AND USER  
EXPERIENCE  
TO DELIVER INNOVATIVE  
PRODUCTS AND  
SOLUTIONS  
THAT TRANSFORM  
BUSINESSES**

# FACTS + FIGURES



**12**

Global  
Offices

**5k +**

Employees

**100+**

Fortune 500  
Clients



# THE VALUE WE BRING

pactera **EDGE**

OUR SERVICES, PRODUCTS AND SOLUTIONS  
LEVERAGE **DATA + INTELLIGENCE**  
TO ADD VALUE IN TWO WAYS:

## RUN FASTER

Achieve new levels of performance that reduce cost and improve operational efficiency.

## RUN DIFFERENT

Add **EXPERIENCE centric digital capabilities** to drive greater relevance, revenue + growth.

# WHAT WE DO

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What we have done for our clients to help them thrive.



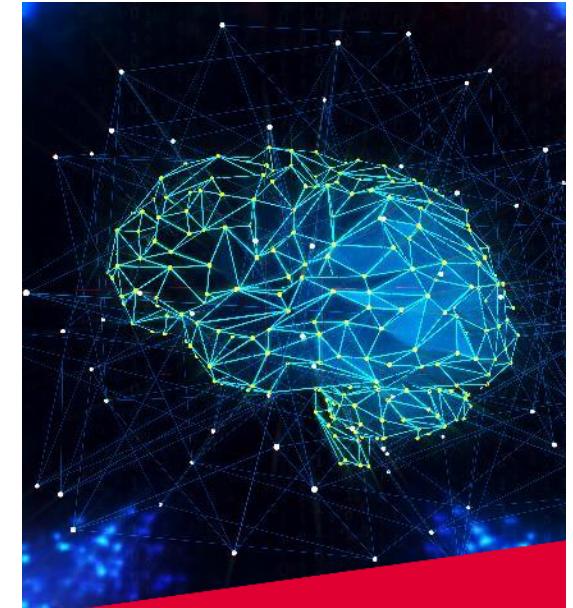
B2B and B2C DIGITAL  
PRODUCT  
DESIGN + DEVELOPMENT



ENTERPRISE  
APPLICATION  
MODERNIZATION

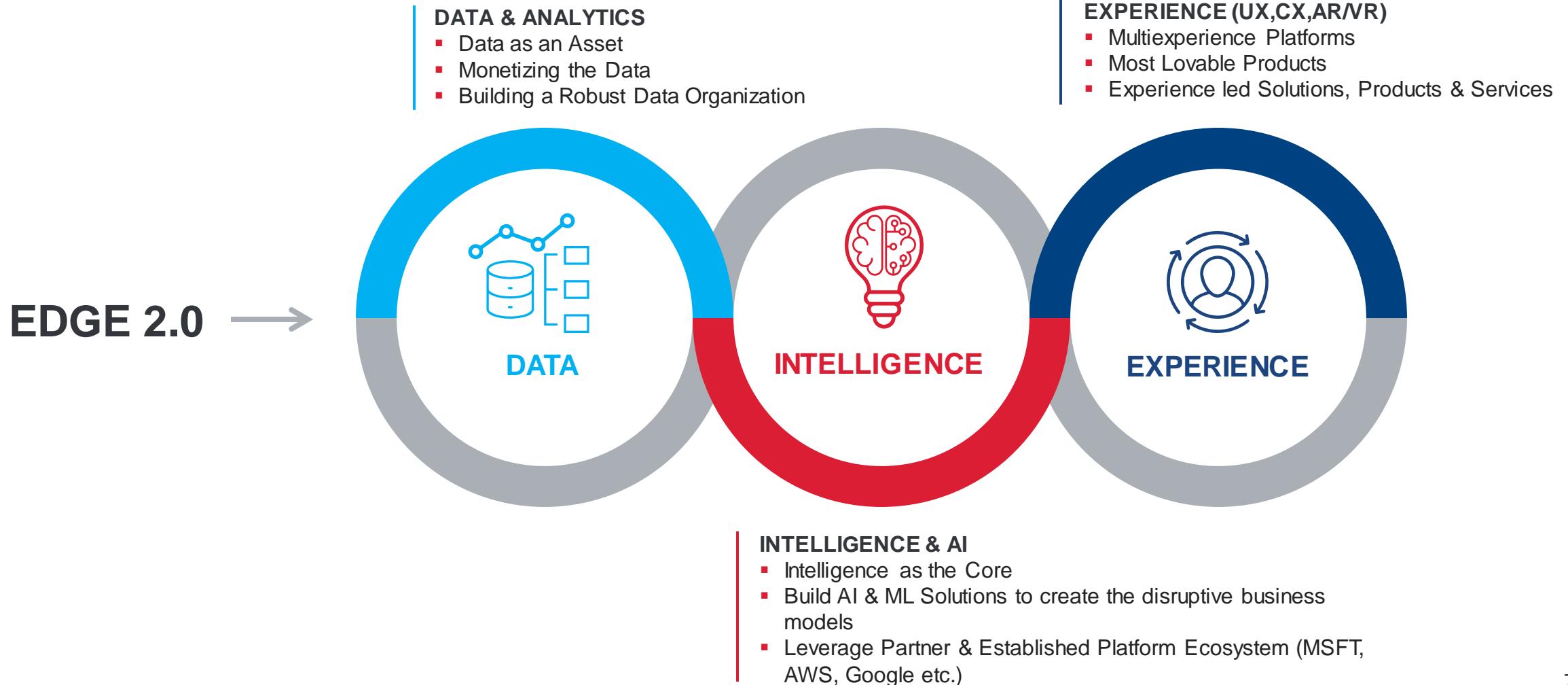


DATA SCIENCE +  
ADVANCED  
ANALYTICS/BI



AI & AUTOMATION  
DRIVEN  
SMART SOLUTIONS,  
PRODUCTS & SERVICES

# EDGE 2.0 Fuelled by DATA, INTELLIGENCE & EXPERIENCE



# THOUGHT LEADERSHIP & INDUSTRY RECOGNITION

## Global Recognition



AICRA (All India Council for Robotics & Automation) Global AI Summit - January 17, 2019

- Special Achievement Award in the field of AI
- Best use of AI in Financial Services.



AICRA STEM Summit New Delhi - April 2019 "Excellence in Automation"



Recognized in the Best Technology Innovation - HYSEA SUMMIT 2018



Awarded for Fastest growing AI and Digital Transformation Company at India Excellence Awards 2019

## Microsoft Inspire



Pactera Technology International Named 2019 Microsoft China System Integrator of the Year.



## Analyst Reports

Nimdzi 100 Ranking 2019 -

- Pactera at number 18 on top 20 Language Service Providers
- rank of 24 among the Top-30 fastest growing LSPs above USD 10 million



Zinnov Zones For Digital Service 2019 - Recognized as Execution Leader in the Zinnov Zones for Digital Services 2019



# THOUGHT LEADERSHIP INSIGHTS

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## DATA

Data Support



**How Small Data Supports Capabilities in an Agile Organization**

<https://bit.ly/2FM0Vil>

## DATA

CPG



**Path to Purchase 2.0: Data Driven Digital Experiences**

<https://bit.ly/2uTThkl>

## INTELLIGENCE

Innovation & Sustainability



**Why Business need to Embrace Sustainability Ecosystems**

<https://bit.ly/2uHGAck>

## INTELLIGENCE

DevOps



**Why DevOps Needs a Strategy**

<https://bit.ly/2R30PZi>

## EXPERIENCE

Voice AI



**Improving Operational Efficiency with Voice**

<https://bit.ly/36YByGo>

## EXPERIENCE

Augmented Reality AI



**Amazon's Bet: Augmented Reality will increase Operational Efficiency**

<https://bit.ly/2iZLqgw>

# INTRODUCTION TO AI

# ARTIFICIAL INTELLIGENCE (AI)

## Artificial Intelligence

Ability of machines to perform functions similar to that of human mind like perceiving, learning, and problem solving

### Machine Learning

Machine learning refers to ability of computer systems to improve their performance by exposure to data without the need to follow explicitly programmed instructions

### Deep Learning

A type of machine learning which sets up basic parameters about the data and trains the computer to learn on its own by recognizing patterns using multiple layers of processing

## Supervised Learning

In Supervised Learning, the machine is trained on data which is labeled and tagged. The learning algorithm can also compare its output with the correct, intended output and find errors in order to modify the model accordingly. Ex: Regression Analysis

## Unsupervised Learning

In Unsupervised Learning, data used by machine is neither classified nor labeled allowing the algorithm to act on that information without guidance. The system doesn't figure out the right output, but it explores the data and can draw inferences from datasets to describe hidden structures from unlabeled data. Ex: Clustering Analysis

## Reinforcement Learning

Reinforcement learning is more of an experience based learning in which decisions are made sequentially. In this, the learning method interacts with its environment by producing actions and discovers errors or rewards.

## Why AI?

AI is the need of the hour for efficient and effective industrial, economic and social growth



AI promotes innovation which is must for the growth in today's era

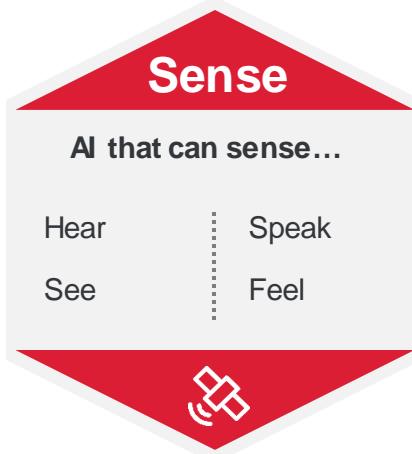
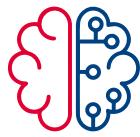


AI enhances workforce skills and abilities making them to be more powerful



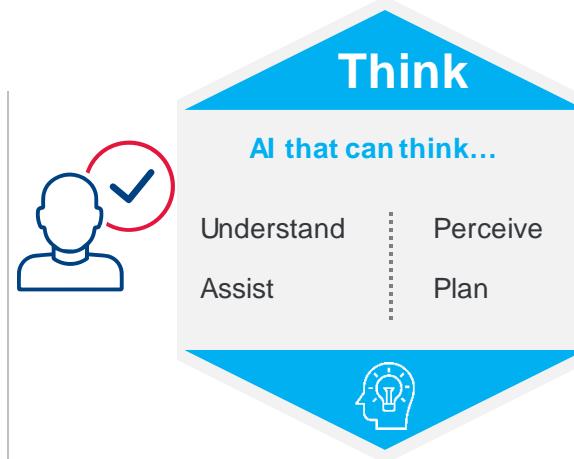
AI helps automating complex solutions intelligently for better efficiency

# WHAT CAN AI DO?



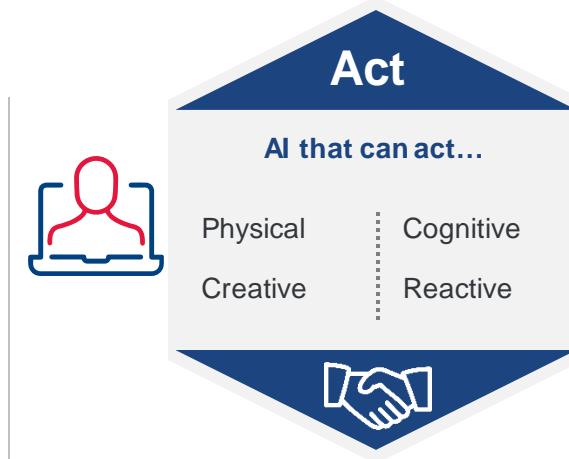
AI can see, hear, speak, smell, feel, understand gestures and interface with your brain, and dream

- Natural language
- Audio and Speech
- Machine vision
- Navigation
- Visualisation



AI is helping us **make better decisions** – and doing it faster, better, more cheaply and more accurately

- Knowledge and representation
- Planning and scheduling
- Reasoning
- Machine learning
- Deep learning



AI is **equaling or surpassing humans** in all sorts of tasks

*- playing games, driving cars and making recommendations*

- Robotic process automation
- Deep question and answering
- Machine translation
- Collaborative system
- Adaptive systems

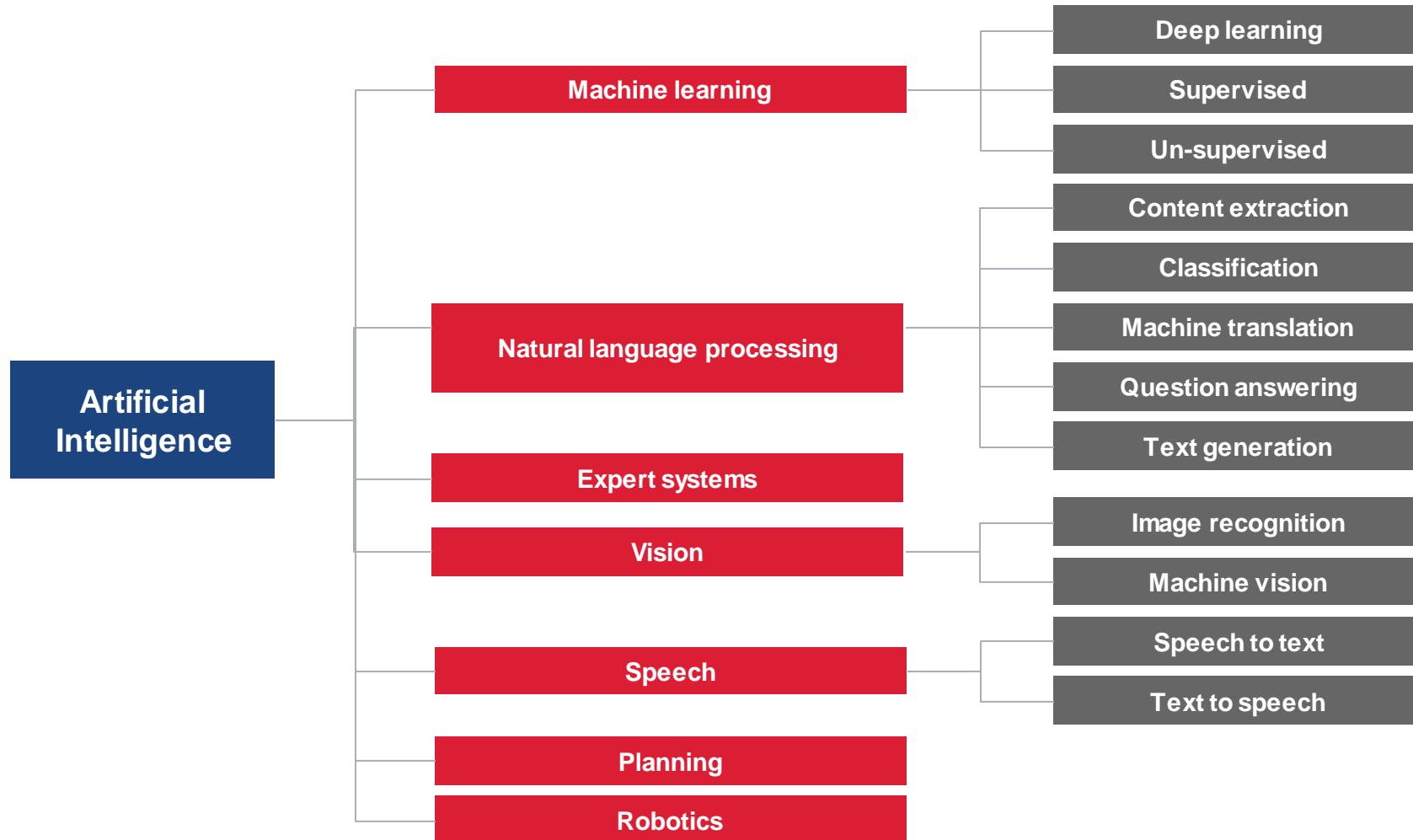
ENABLING TECHNOLOGIES

DATA SCIENCE & ANALYTICS

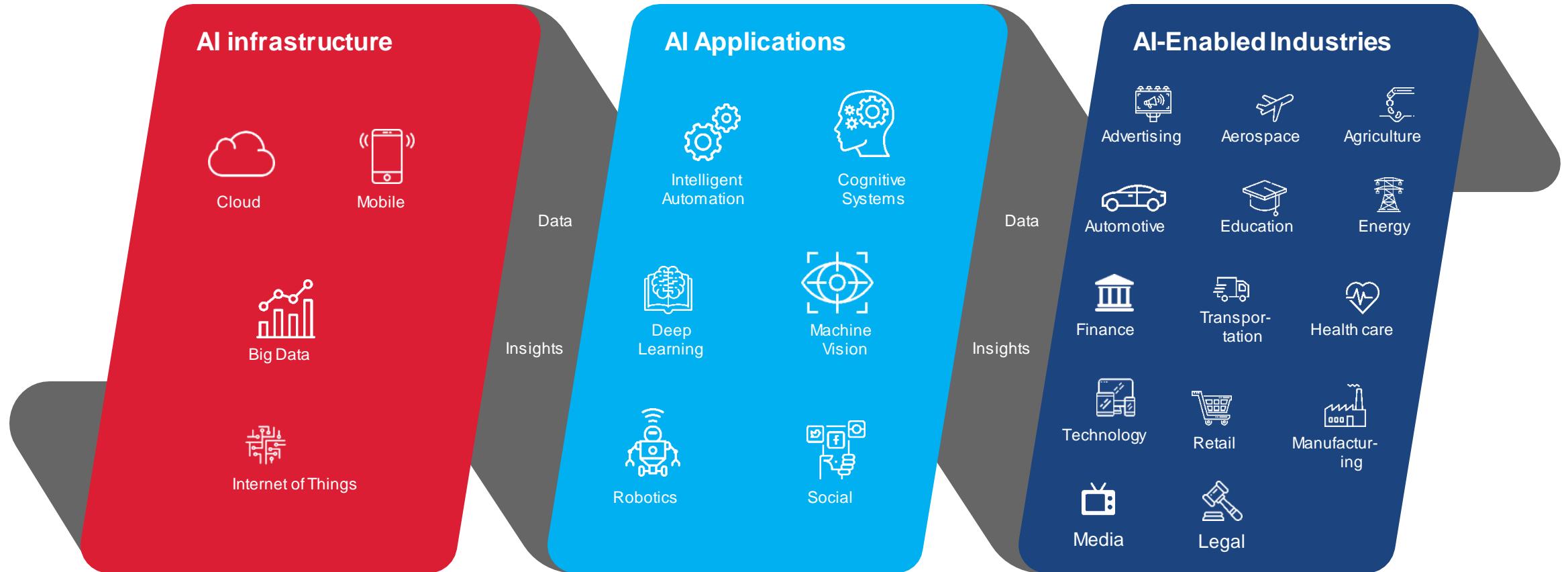
CLOUD INFRASTRUCTURE

UI & UX

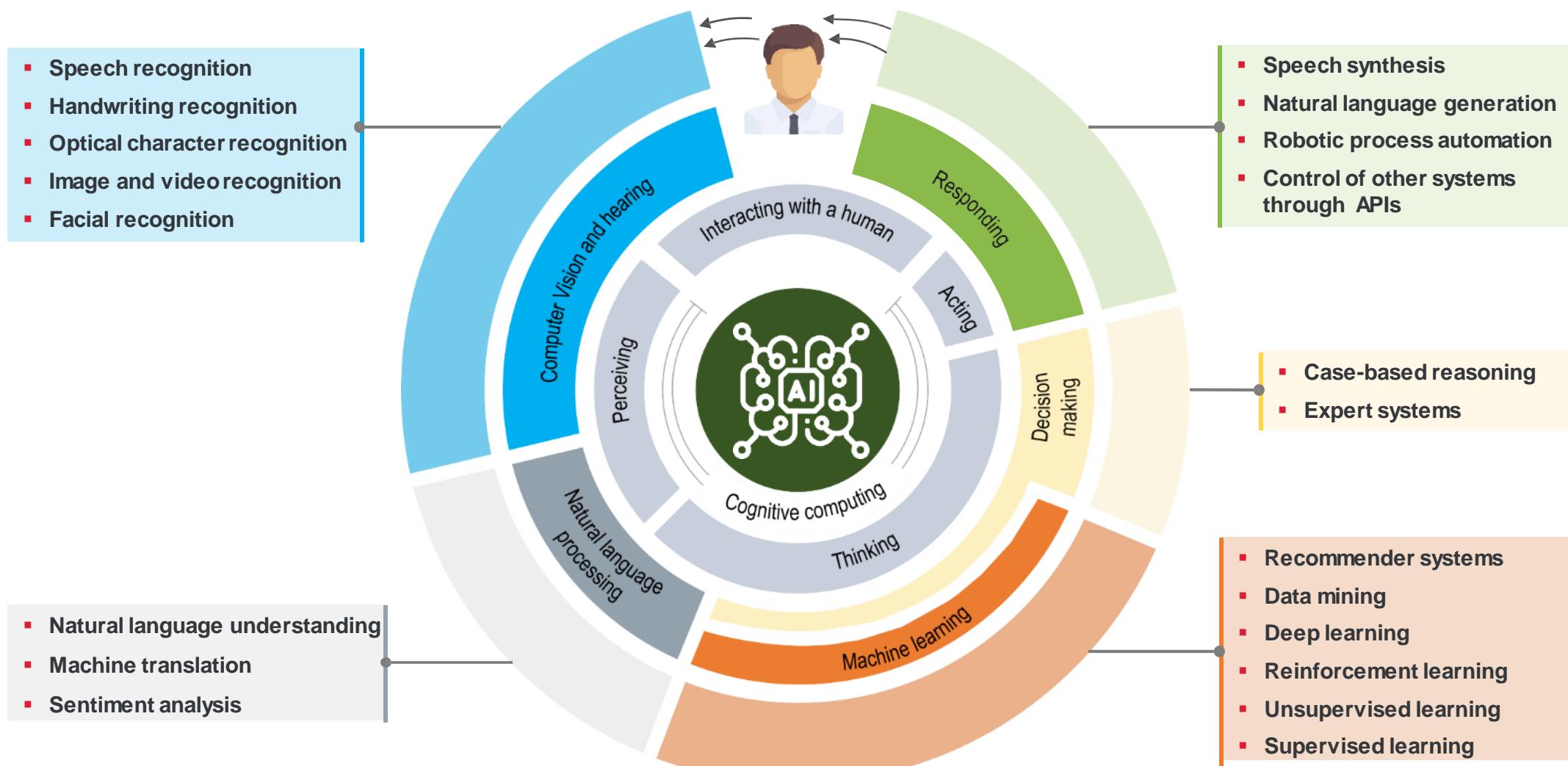
# ARTIFICIAL INTELLIGENCE (AI) SIMPLIFIED



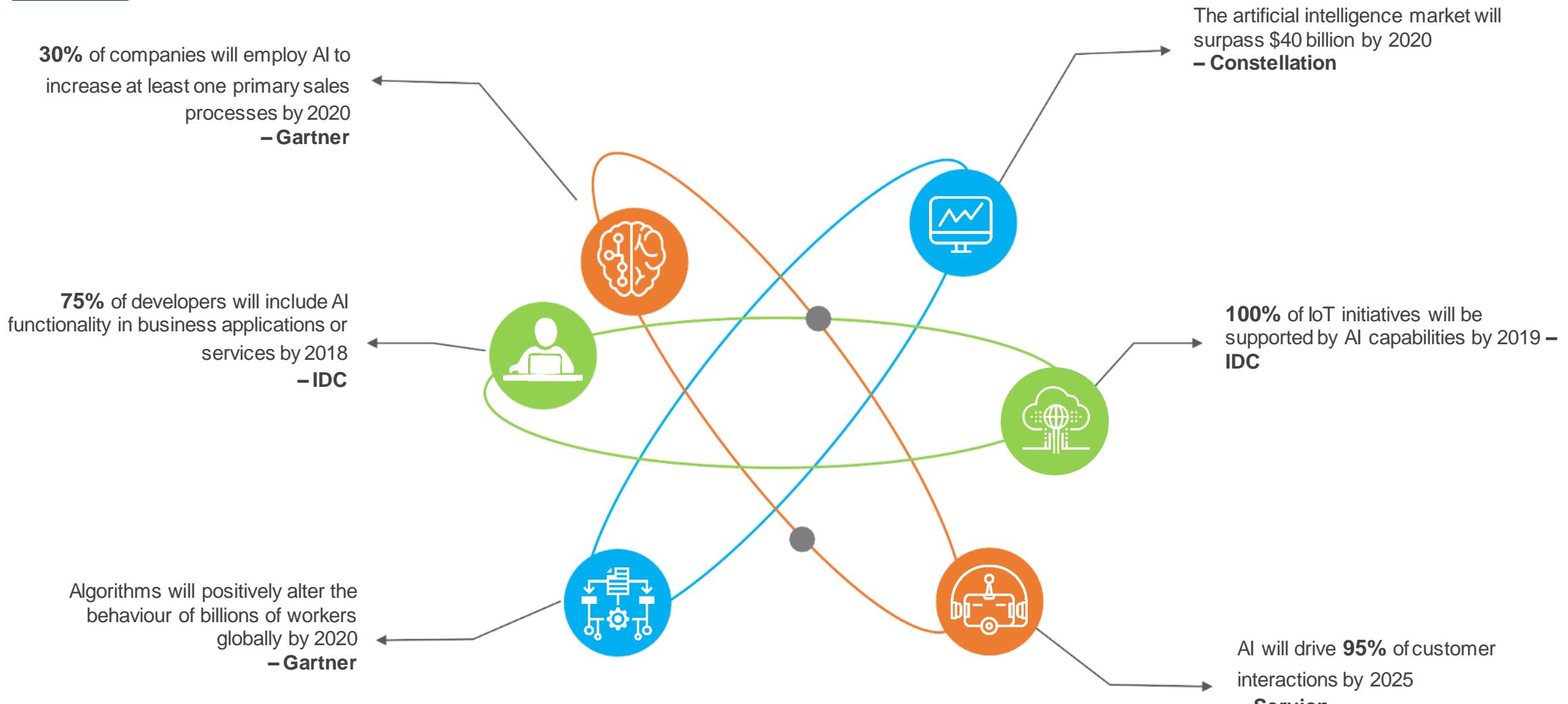
# AI STACK BUILT ON DATA AND INSIGHTS



# DIFFERENT FORMS OF AI, VARIED APPLICATIONS



# RECENT AI PREDICTIONS



# TYPES OF AI SOLUTIONS TODAY

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## Humanlike Engagement

- Chatbots, Virtual Assistants
- Natural Language Processing
- Computer Vision



## Automating & Optimizing

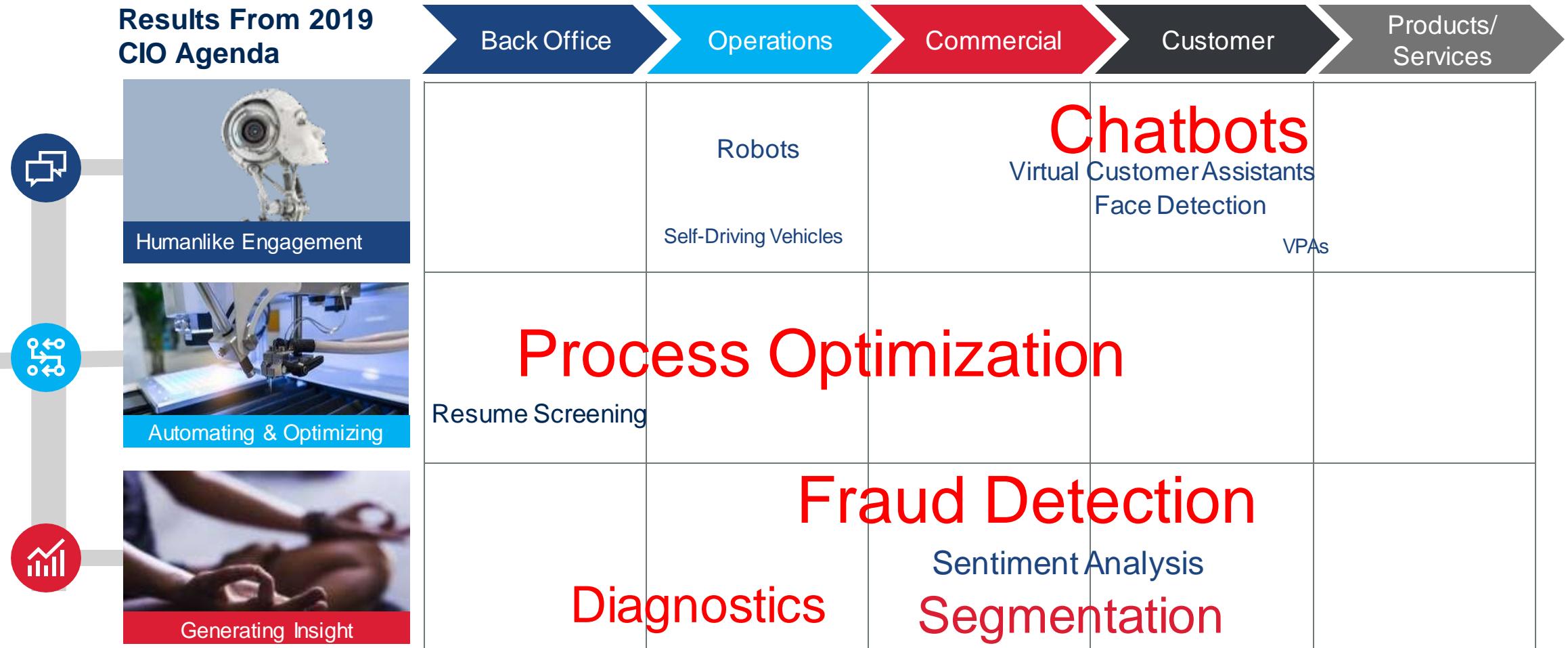
- Process Optimization
- Automating Tasks



## Generating Insight

- Forecasting
- Classification
- Find and Interpret Patterns

# WHERE IS AI BEING IMPLEMENTED?



# TOP USE CASES FOR AI ARE OPTIMIZATION-FOCUSED

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**39%**

Fraud  
Detection



**35%**

Process  
Optimization



**35%**

Chatbot



**31%**

Market  
Segmentation



**23%**

Call Center  
Assistance



**22%**

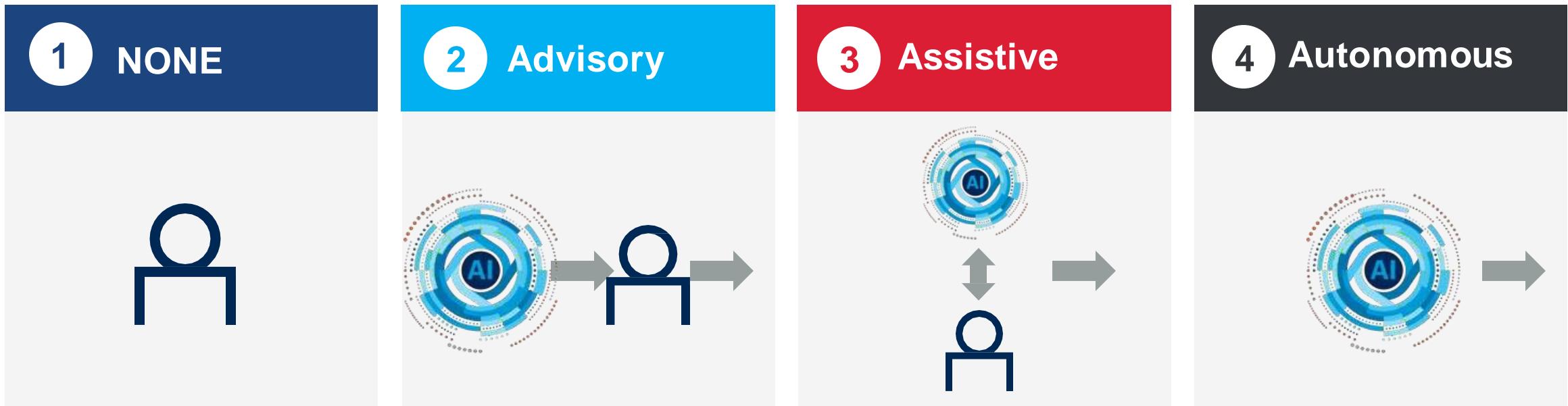
Computer-Assisted  
Diagnostics



**21%**

Sentiment  
Analysis

# A MORE GENERAL WAY OF DESCRIBING LEVELS OF AUTOMATION



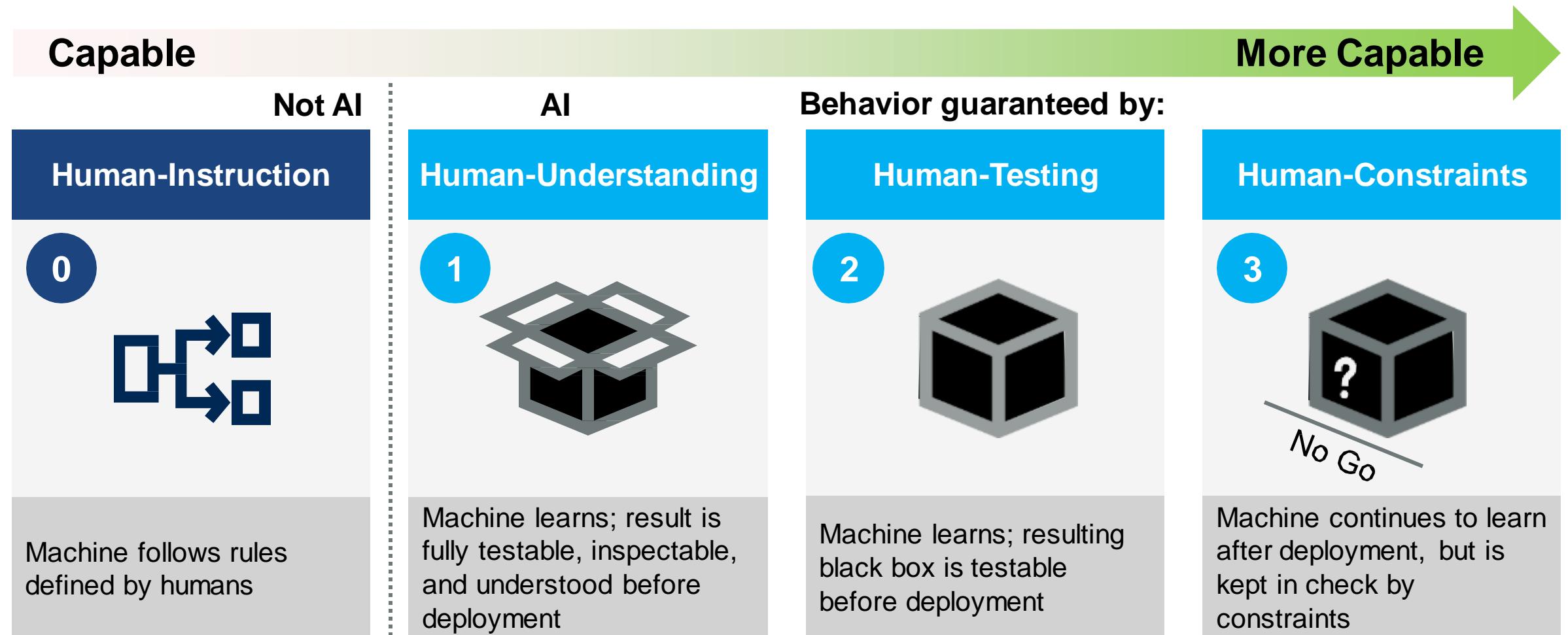
No machine

Machine provides  
insight, humans  
decide and act

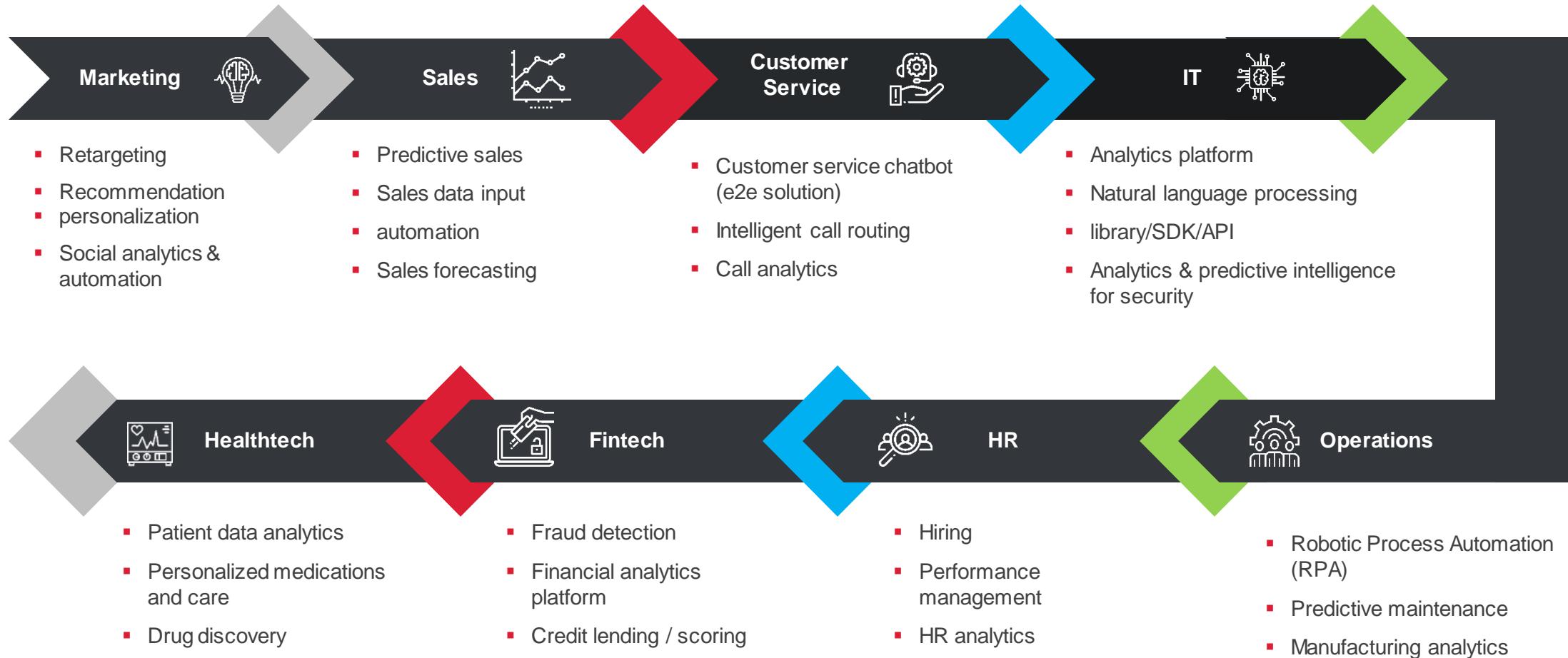
Machine and  
humans work and  
act together

Machine decides  
and acts  
independently  
of human

# BUT THE MORE CAPABLE THE AI, THE ‘BLACK-ER’ THE BLACK BOX



# TOP USE CASES BY FUNCTION



# KEY FOCUS AREAS IN ARTIFICIAL INTELLIGENCE

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## Natural Language

- Natural Language processing and text mining
- Natural Language generation
- Chatbots and discourse understanding
- Sentiment & emotion analysis
- Speech-to-text and text-to-speech

## Machine Learning

- Regression & classification
- Bayesian learning
- Probabilistic programming
- Anomaly detection
- Optimization techniques
- Support Vector Machines
- Various supervised, semi-supervised, and unsupervised techniques

## Automated ML

- Automated data preparation
- Automated feature engineering
- Automated algorithm selection
- Automated explanation generation
- Meta-model inference

## Simulation & Digital Twins

- Agent-based simulation
- Reinforcement learning
- Augmented and synthetic data generation
- System dynamics modeling
- 'Digital Twins'
- Calibration of models

## Deep Learning

- Convolutional Neural Nets
- Recursive Neural Nets
- Capsule Networks
- Generative Adversarial Networks
- Deep reinforcement learning
- Hybrid learning models

## Data Eng./Model Ops

- Big data architecture
- Big and Fast data
- Apache tools
- Cloud computing
- Cloud ML – AWS, GCP, Azure
- Machine Learning deployment

## Embodied AI

- IoT and Industrial IoT – Edge computing and Smart sensors
- Drone – Autonomy & Image analytics
- Robots – Navigation & Learning
- Brain-Machine Interfaces

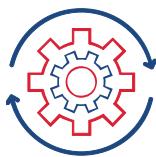
## Responsible AI

- Explainable AI
- Beneficial AI
- 'Black box' Interpretability
- Maturity models
- Ethics and Law
- AI Governance
- AI Controls framework

# A.I. LIFECYCLE

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**WHILE SIMILAR TO OTHER DIGITAL ASSETS, THE A.I. LIFECYCLE REQUIRES CAPABILITIES AND TECHNOLOGIES THAT ARE UNIQUE TO BUILDING DYNAMIC SOLUTIONS**



## DEVELOP

Models development requires the need to explore a diverse set of techniques, access historic data for validation, tools to generate synthetic data, and sometimes simulation capabilities to train agents



## CONSUME

Model deployment must consider consumption by a variety of assets, scalability on specialized hardware and frequently redeploying models as they are updated to maintain performance



## LEARN

Models will need to learn through feedback that comes from end users of enabled software or through domain experts that interact directly with models and teach them how to perform tasks

# HOW WE DO AI

# A BUSINESS CENTRIC APPROACH TO AI

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## Automation

- Automating Business Processes
- Repetitive to Expert Tasks
- Low to High Volume



## Insights

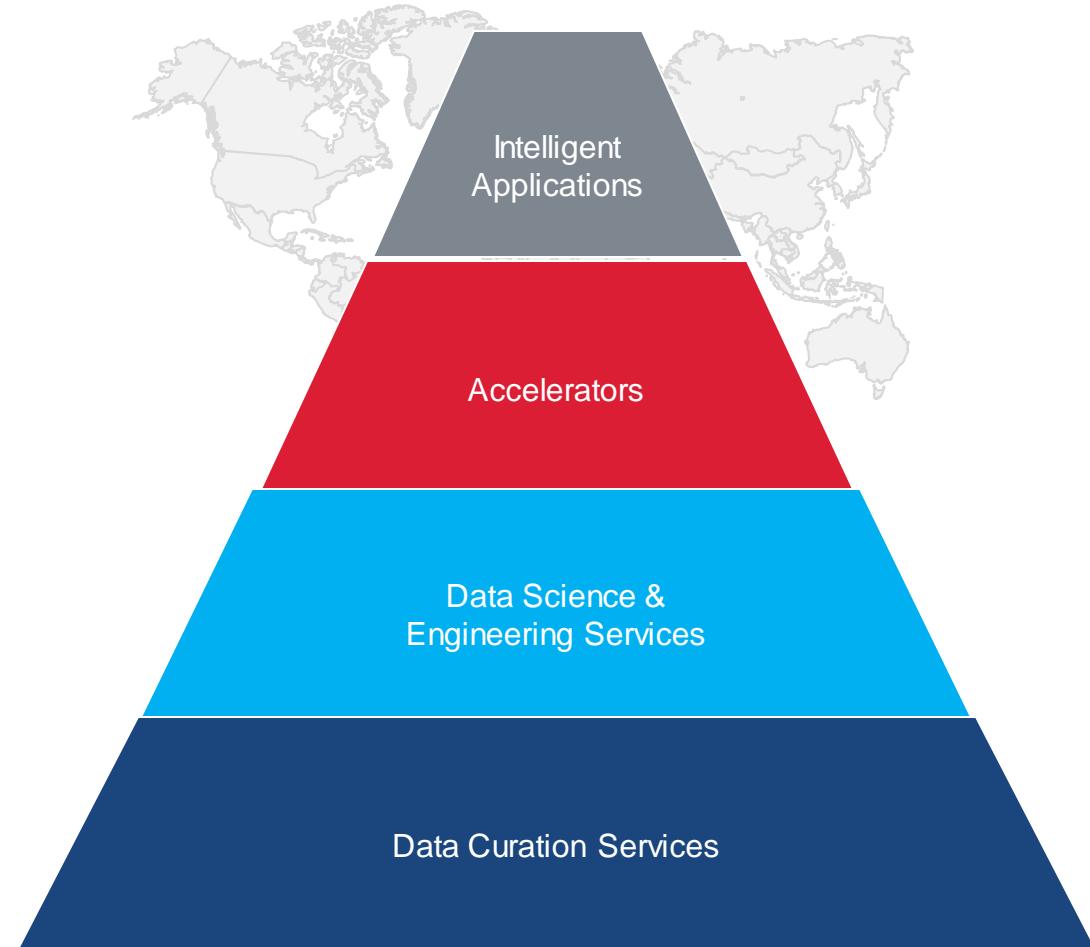
- Gaining intelligence through data analysis
- Predicting, Inferring a future outcome



## Experiences

- Enhanced interactions and engagement with B2B and B2C customers
- Enhanced interactions with and among employees

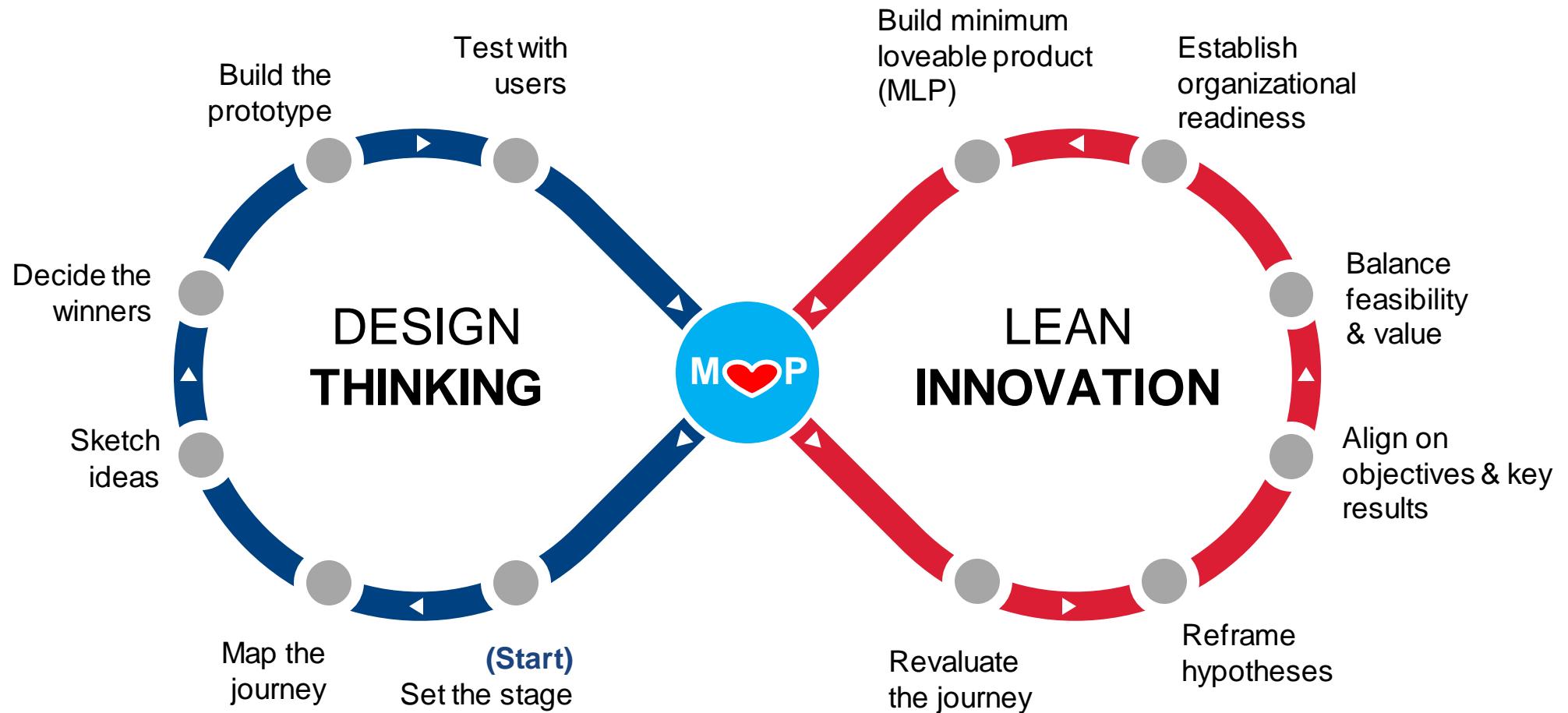
# SERVICES PYRAMID + TEAM LOCATIONS



PACTERA AI SERVICES & SOLUTIONS	Centers of Excellence
<b>Custom Intelligent Applications</b> <ul style="list-style-type: none"><li>Customer or Enterprise Facing Applications that Do, Think and Learn</li><li>Strategy + Ideation</li><li>Design + Development</li><li>Maintenance + Optimization</li></ul>	Seattle, Chicago, New York, China, India
<b>Accelerators</b> <ul style="list-style-type: none"><li>Mature, production-grade, AI applications to help accelerate your pace</li><li>Voice</li><li>Vision</li><li>Automation Solutions</li></ul>	US, Japan, China, India
<b>Data Science &amp; Engineering Services</b> <ul style="list-style-type: none"><li>Expertise and knowledge to capture, design, develop and deploy AI applications</li><li>Data Pipeline Management</li><li>Advanced Analytics</li></ul>	US, Japan, China, India, Singapore
<b>Data Curation Services</b> <ul style="list-style-type: none"><li>Training data &amp; ancillary services for machine learning</li><li>Data creation, collection, curation and annotation services</li><li>Model validation</li></ul>	Worldwide

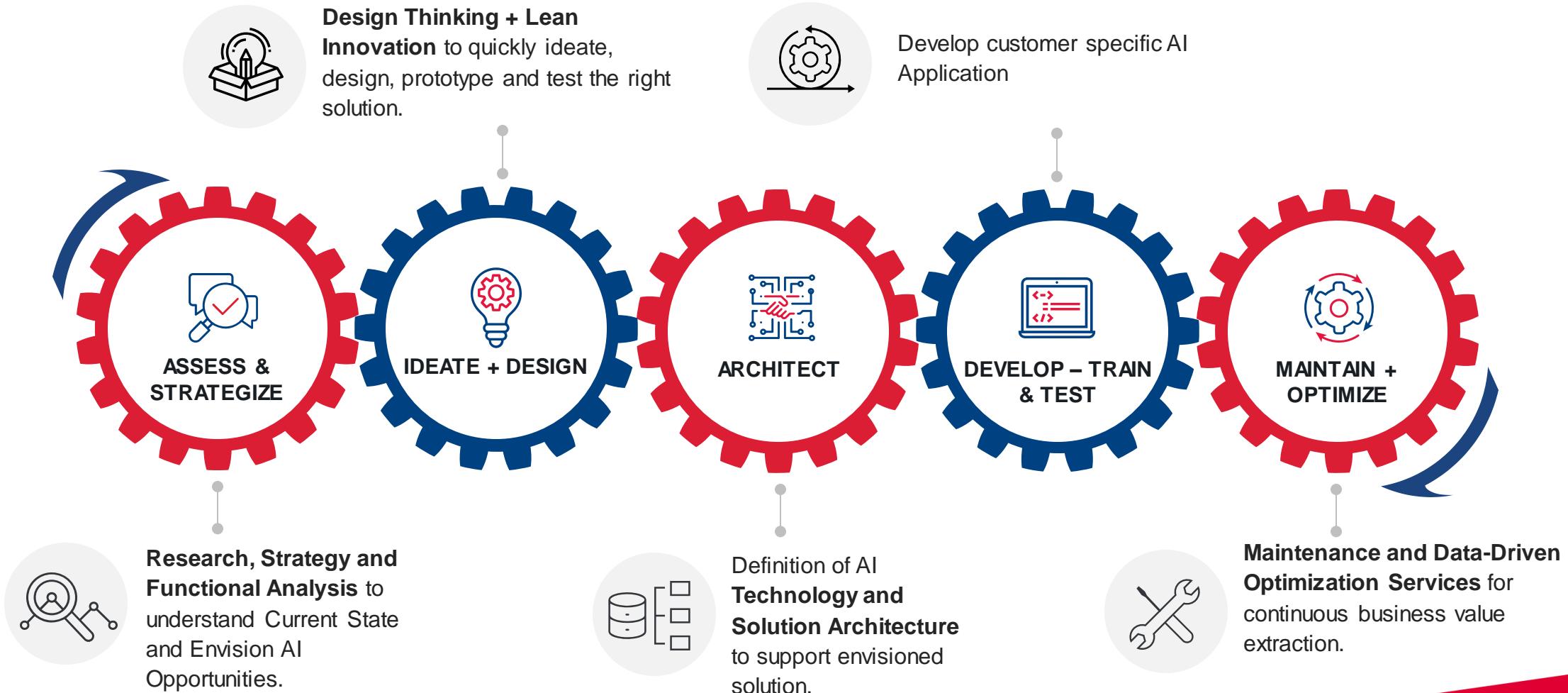
# FUEL: PROPRIETARY IDEATION METHODOLOGY

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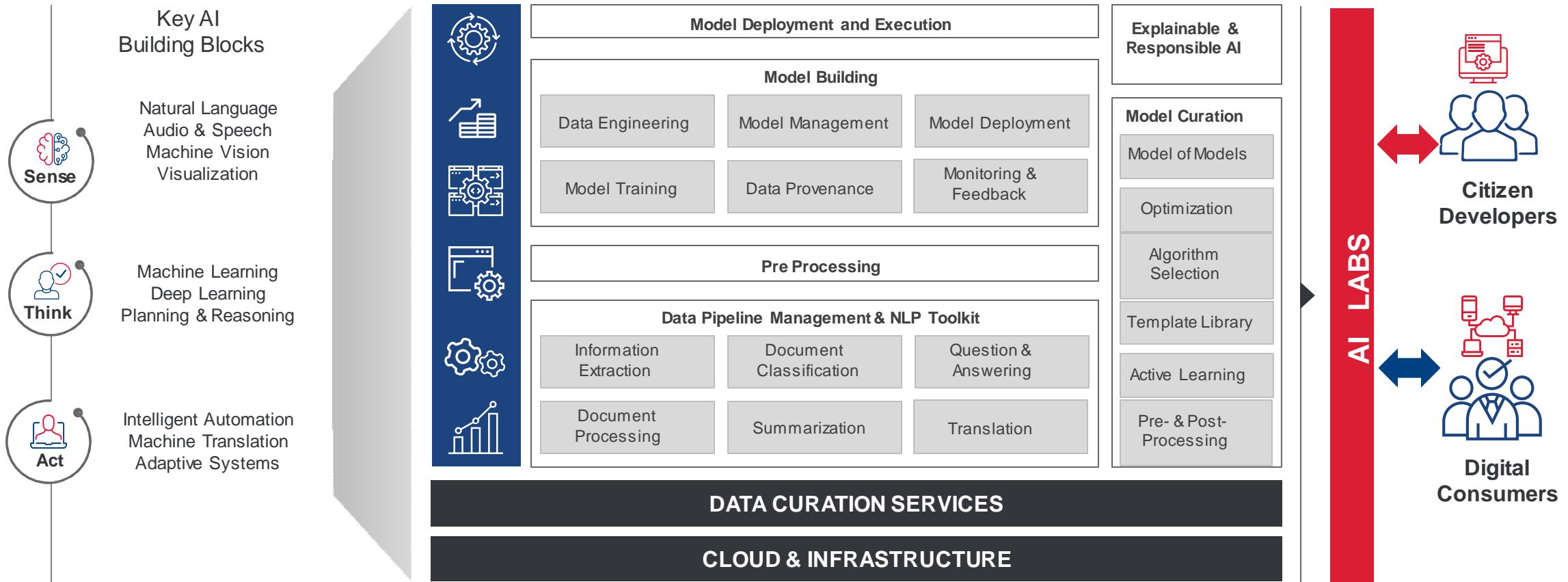


# OUR APPROACH TO BUILDING AI APPLICATIONS

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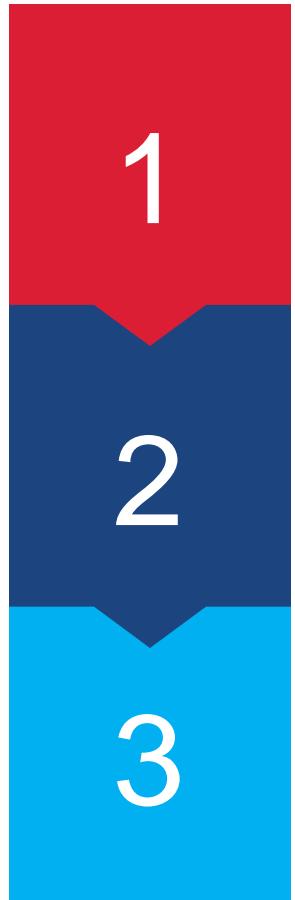


# PACT AI SOLUTION ACCELERATOR WORK BENCH



# ASSESSMENT AND USE CASE SELECTION FOR AI

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## DISCOVER

- Conduct workshop sessions with Functional/Business Heads
- Gather information on customer Core Business, Architecture, Functions, Processes, Applications, etc.
- Capture information on Business Challenges/Problem Areas

## ANALYZE

- Structure the information gathered
- Analyze, document findings, and draw inferences
- Identify areas for improvement
- Document use case specific to customer pain areas

## RECOMMEND

- Present a report on
  - ✓ Applicable Use Cases
  - ✓ Proposed AI Solution
  - ✓ Benefits to Customer
- Discuss with Customer Stakeholder / Decision Maker for the buy-in

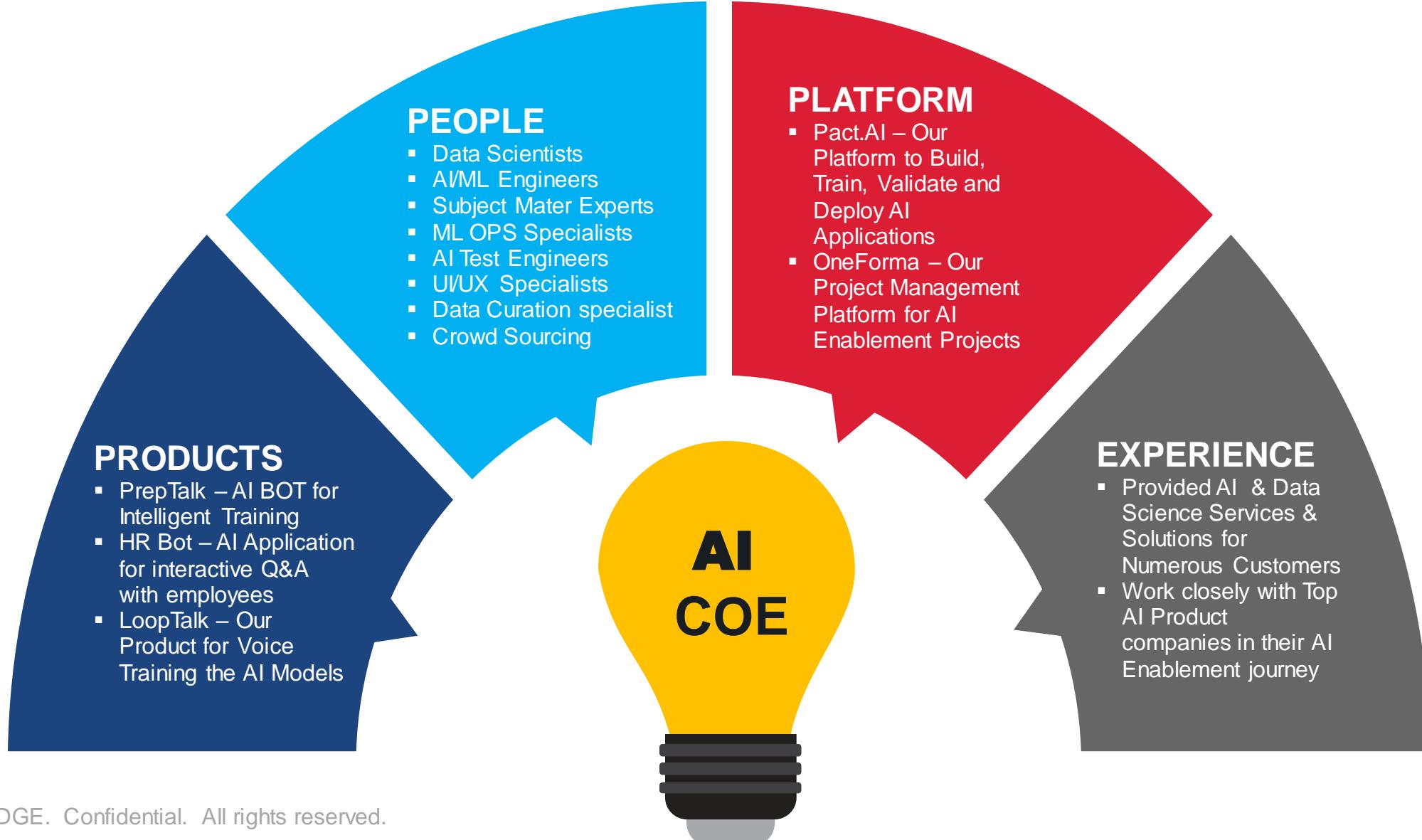
# AI BUILDING BLOCKS

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Data	Featurization	Model Training	Application	Platform
Data Ingestion	Feature Extraction	Model Building	Serving Infrastructure	Configuration
Data Exploration		Model Validation	Business Logic	Process Management
Data Transformation		Model Versioning	UI	Resource Management
Data Validation		Model Auditing	Load Balancing	Monitoring
Data Analysis		Distributed Training		Logging
Training Data Segmentation		Continuous Training		Continuous Delivery
				Authentication

# AI COE

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# DATA SCIENCE IS AN ART

# ESTABLISH DATA MASTERY

By Yr 2022, 40% of digitally Matured customers will have achieved the data mastery necessary to allow them to dominate their markets.

## Phase 1

- Pilots and IT lead
- Lack of governance
- Focus on structured data
- Lack of data standards
- Siloed BI and analytics

## Phase 2

- Growing awareness of need of data utilization and governance
- No business leadership
- Disparate data
- Project-based analytics
- Staffing challenges

## Phase 3

- Greater data utilization
- Enterprise standards
- Business-driven
- Data scientists development
- Digitalization-driven
- Growing data use and predictive analytics focused
- Universal analytics access

## Phase 4

- Enterprise information management and governance
- Creation of a data culture
- Adaptive data governance
- Big data and AI/machine learning utilization
- Data as foundation for business model transformation
- Monetization of data
- Data as an asset
- Continuous intelligence

Complexity

# CHALLENGES TO INTELLIGENT-DATA DRIVEN BUSINESS MODELS

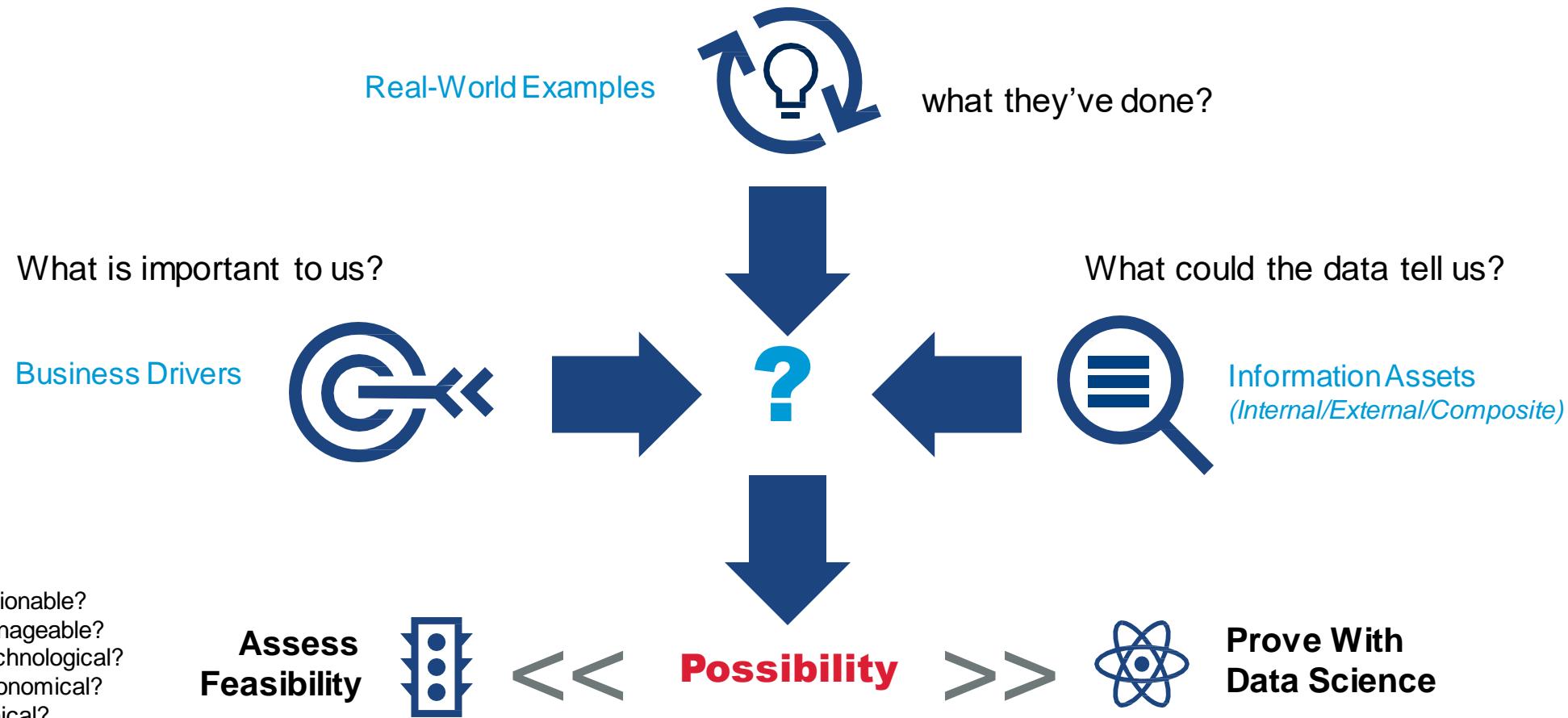
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## Challenges:

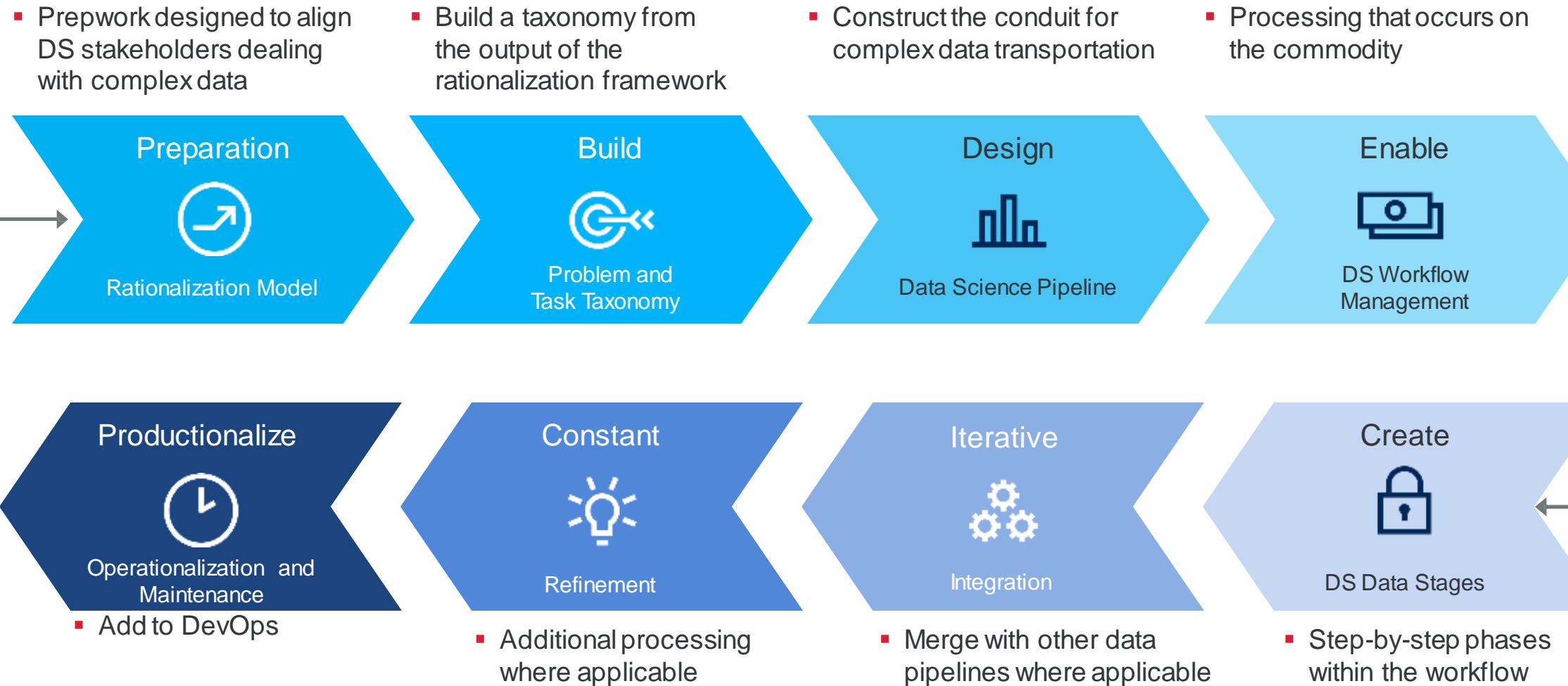
- Lack of data mastery including no leader, vision, data science capabilities or clean data
- Regulations around how data is used (e.g., GDPR)
- Ethics policies on should you use data in new and creative ways
- Brand and reputation risk



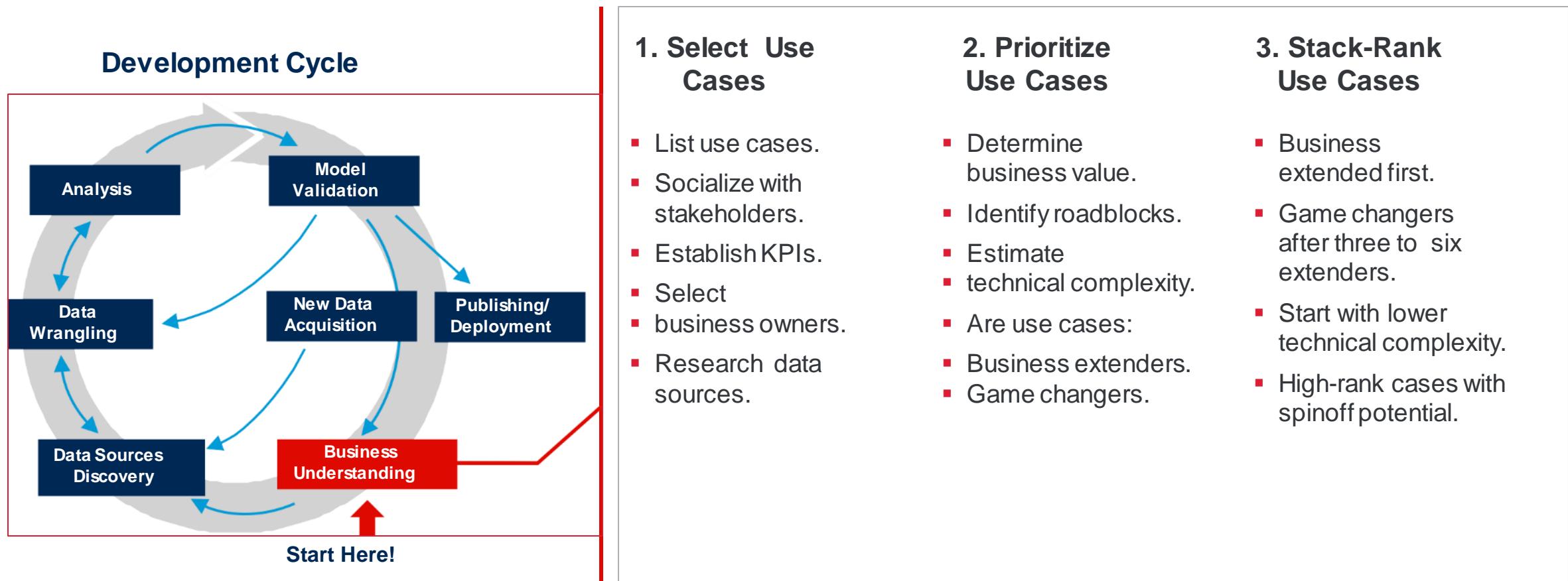
# ART OF THE POSSIBLE: A CREATIVE APPROACH TO USE CASES COULD WE ADAPT/EXTEND



# DATA IS CORE - FIND DATA THAT IS RELEVANT TO THE USE CASE



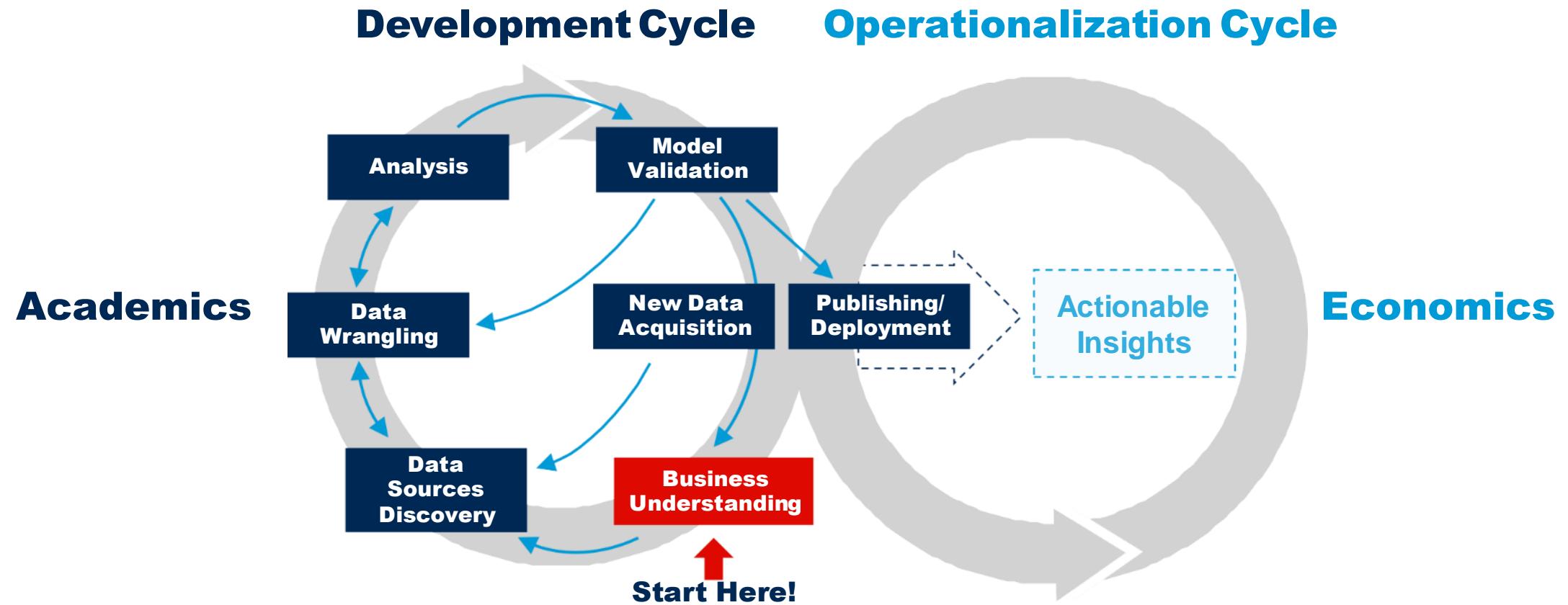
# A BATTLE-TESTED ANALYTICAL MODEL DEVELOPMENT CYCLE



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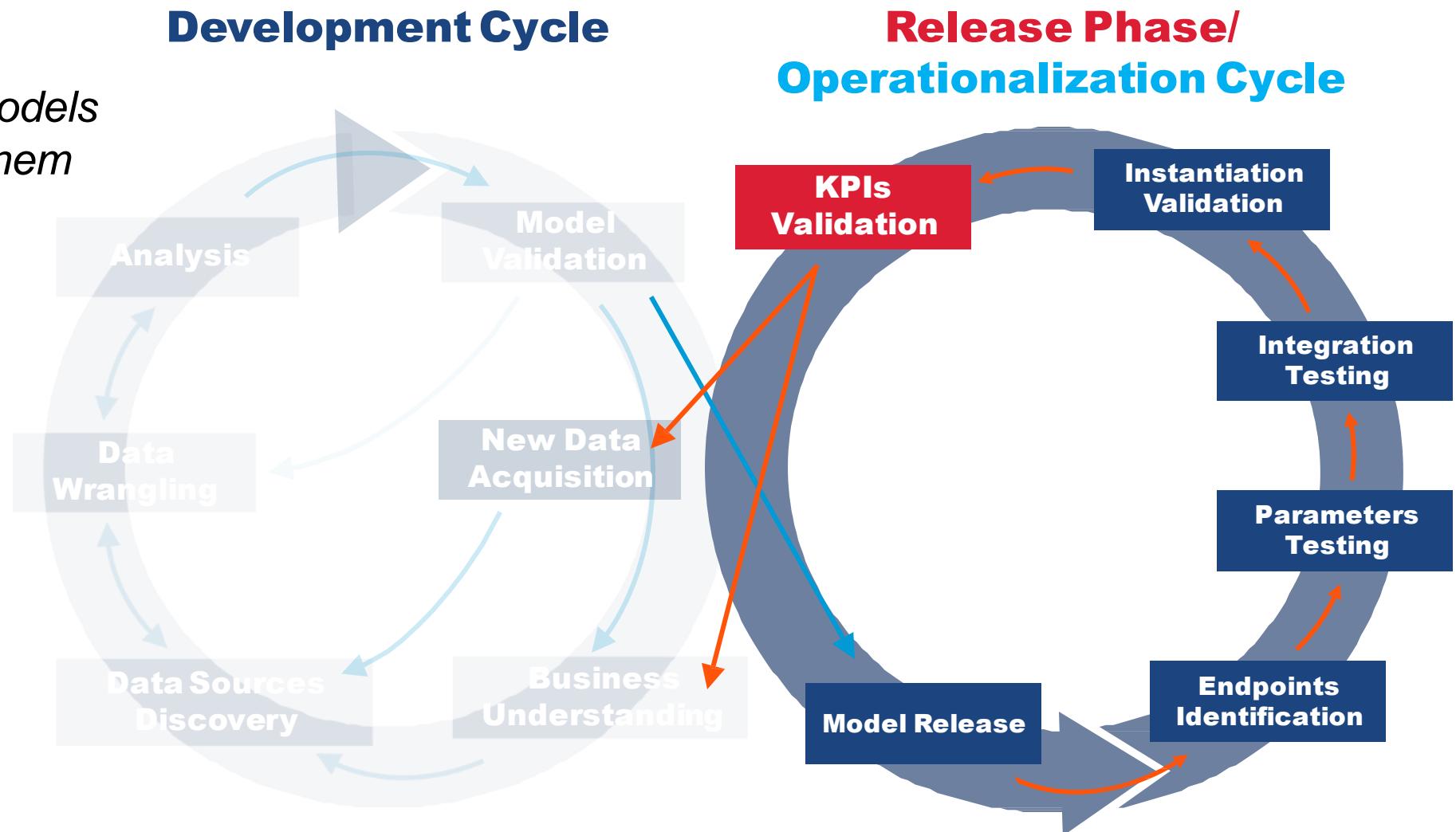
# DEVELOPMENT IS ACADEMIC, PRODUCTION IS ECONOMICS

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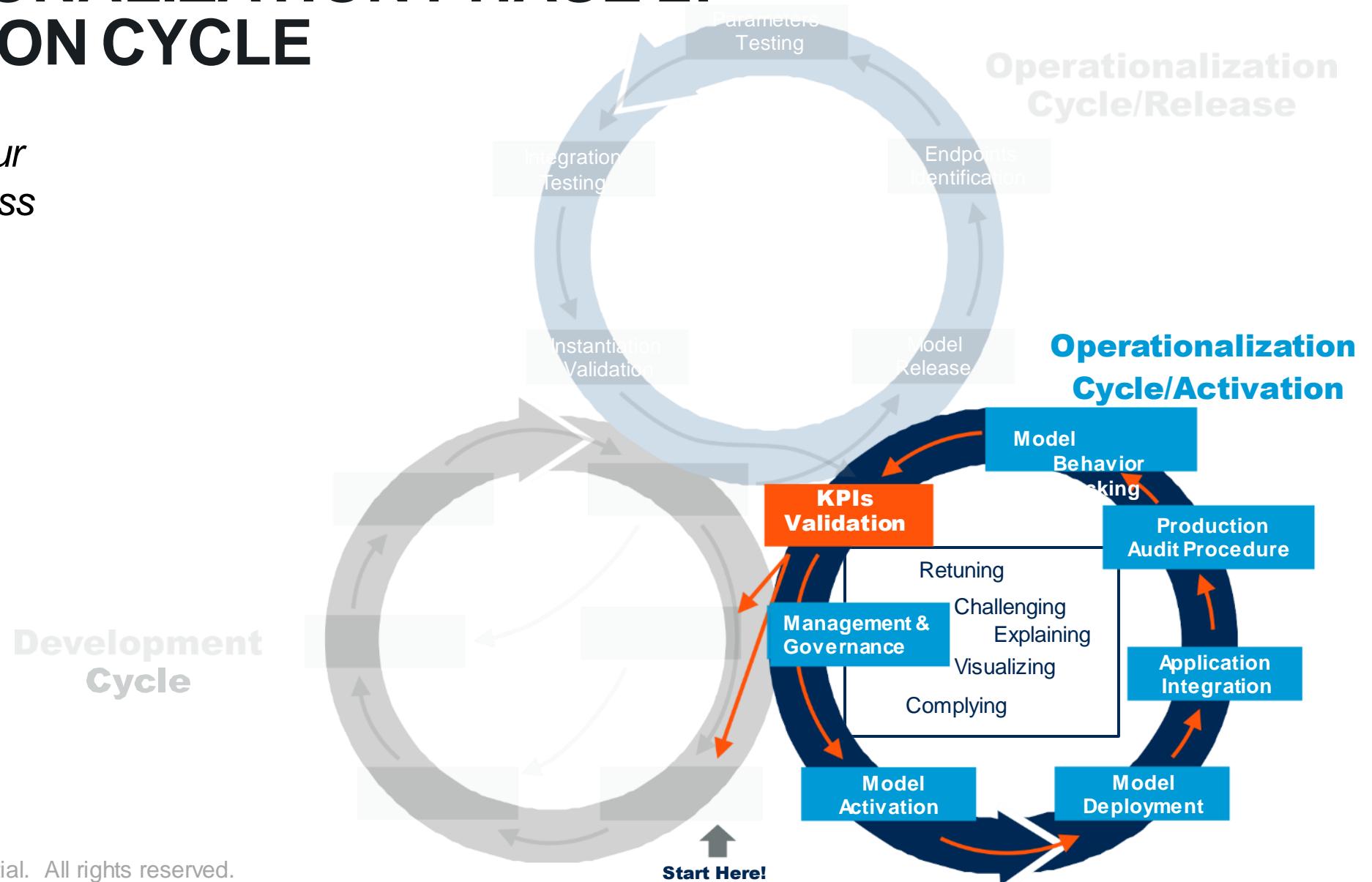
# OPERATIONALIZATION PHASE 1: RELEASE CYCLE

**OP1:** Test your models before releasing them in the wild.



# OPERATIONALIZATION PHASE 2: ACTIVATION CYCLE

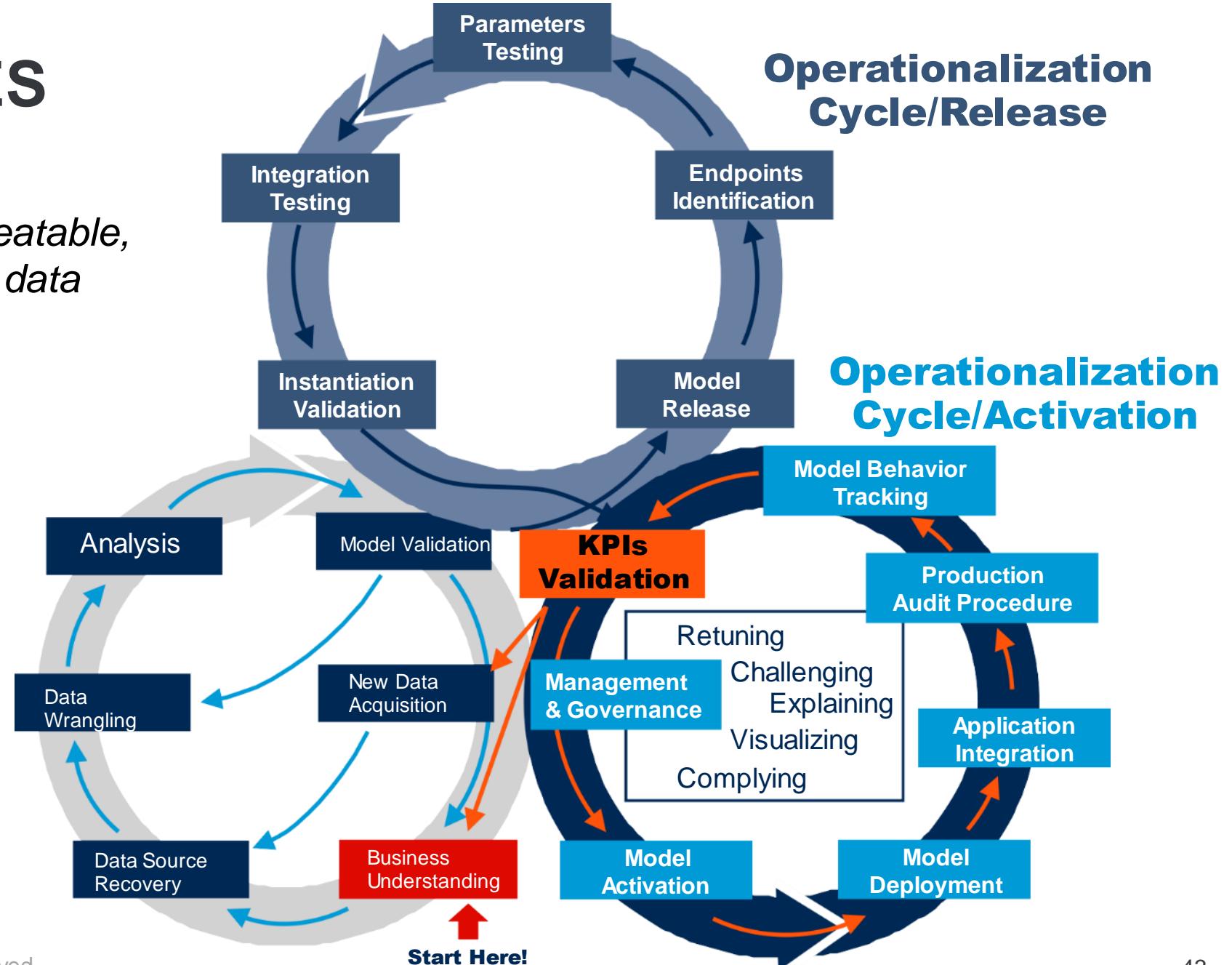
**OP2:** Embed your models in business processes.



# FULL DS CYCLES

Establish a sustainable, repeatable, measurable and continuous data science process.

## Development Cycle

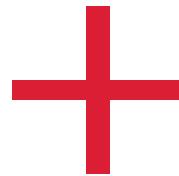


# CORE SKILLS FOR OPERATIONALIZATION

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## Core DS Development Skills

- Data scientists
- Data engineers
- Software engineers
- Business experts



i.e., combine  
DevOps and DS  
skills

## Core DS Operationalization Skills

- Source system experts
- System architects
- System administrators
- Application developers
- Process engineers

# RECOMMENDATIONS

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Build a strategy for supporting decision automation and intelligent processing by identifying the analytics that could help support the value chain.



Establish data mastery through building an investment roadmap to build vision, leadership, data and technology platforms.



Identify ways in which data and analytics can support both business optimization and transformation through a review of the value chain and highlighting short- and long-term ROI which is desired.



Work with Pactera & Ecosystem to get early access to new models and technologies. Focus on enabling innovation across the value chain.

# ROBUST DATA SERVICES OFFERING + EXPERTISE IN WIDE TECHNOLOGY STACK

## SERVICE OFFERINGS

- Actionable Insights
- Predictive Analytics
- Cognitive Analytics
- Big Data Analytics
- Business Analytics
- Business Intelligence
- Ubiquitous Visualizations
- Dashboarding
- Reporting
- Business Process Management
- Machine Learning
- Deep Learning
- Data Architecture
- Data Management
- Data Pipeline
- Data Quality
- Data Integration
- Data Marts
- Data Warehouse
- Data Lakes

## TECHNOLOGY STACK



Over **1800** data domain associates worldwide with an average of 5+ years of experience

Seamless delivery from **Onsite, Offsite, Near shore, and Offshore**

Over **10 years** executing complex Data projects worldwide

Specialized frameworks for executing **best in class** solutions

Product development services for **global product** companies

**Software** labs developing and incubating next generation products and solutions

Big Data projects with extensive **front-end data treatment** and normalization handling techniques

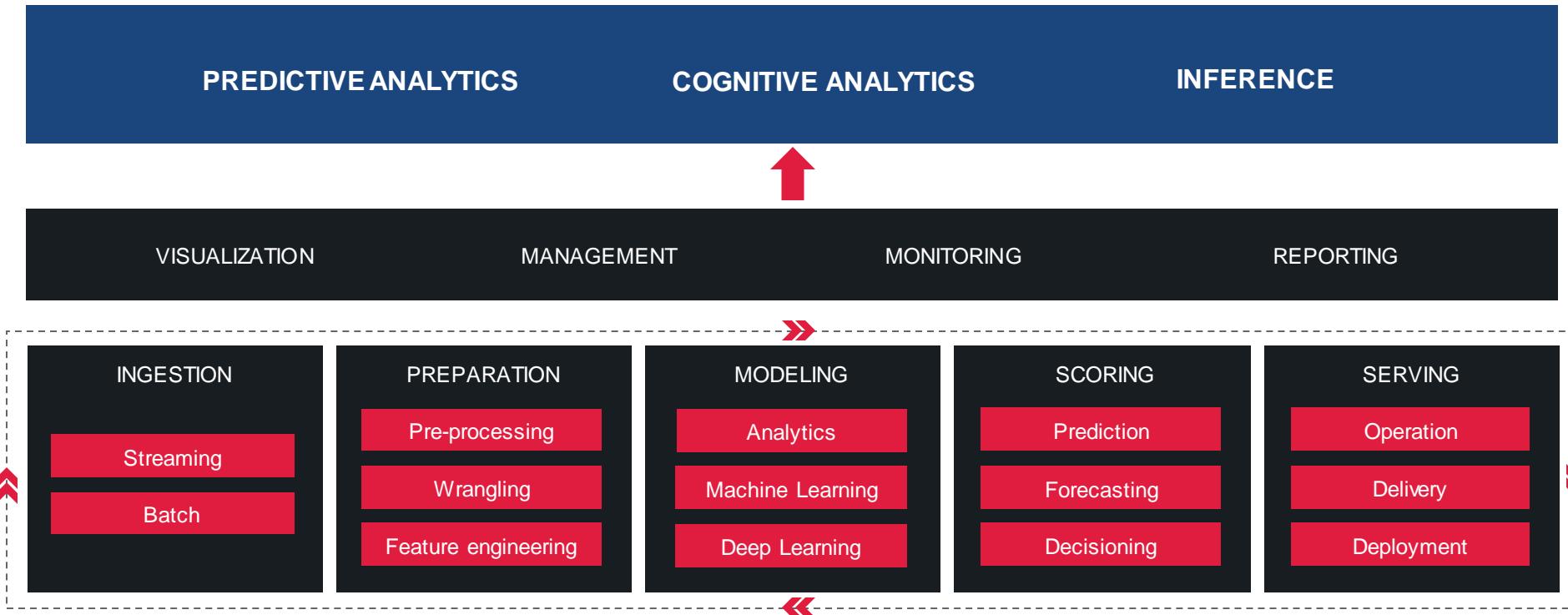
## PROMINENT CLIENTS



# DATA PIPELINE MANAGEMENT (DPM)

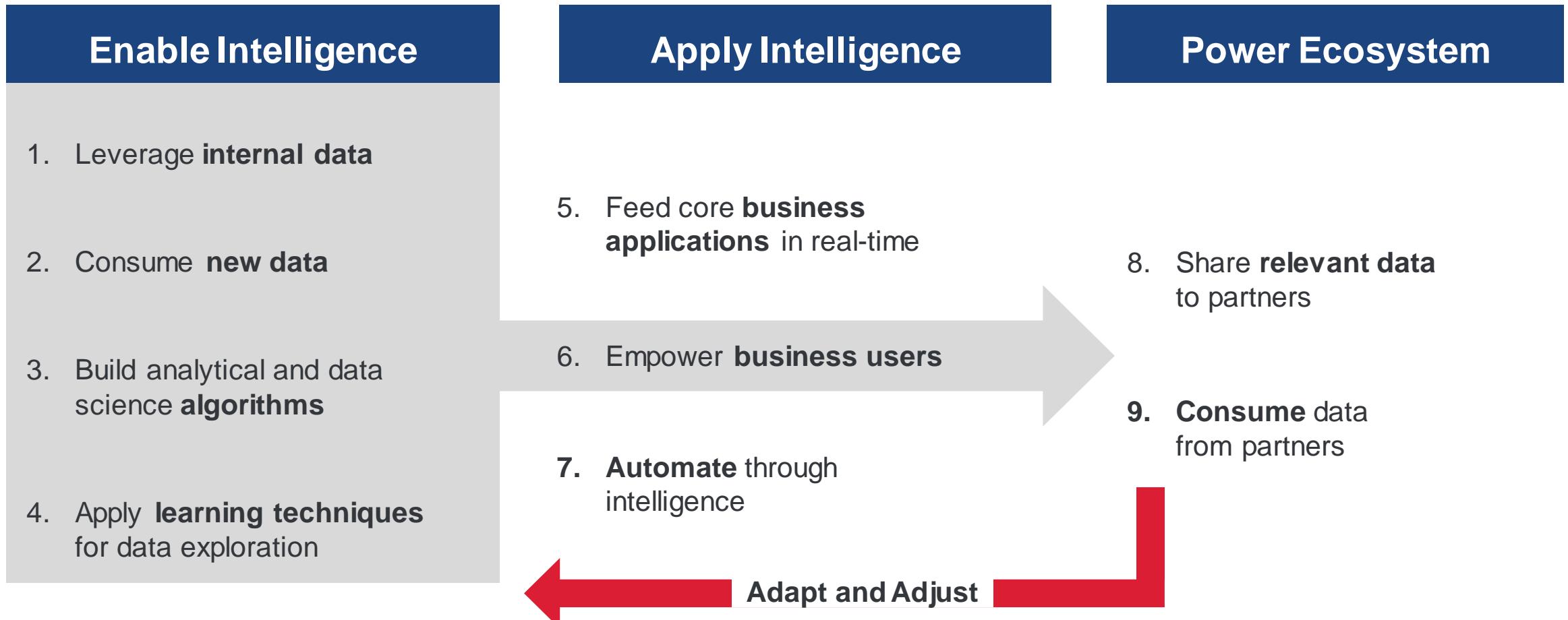
Data for your AI is like blood to the body and brain.

Pactera has expertise in managing data specifically used for machine learning environments that find applications in every industry vertical. We partner with organizations using an embedded or managed service model to scale their machine learning environments for enterprise level applications.



# INTELLIGENCE IS THE CORE

# WHAT DOES IT MEAN TO BE “INTELLIGENT”?

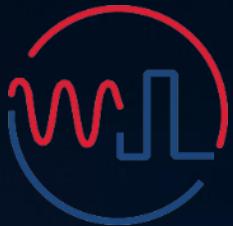


**By 2024, AI identification  
of emotions will  
influence more than half  
of the online  
advertisements you see.**

Analysis: Xue Bai, Kristina LaRocca-  
Cerrone, Janine Kelters



# PACTERA'S AI FRAMEWORK:

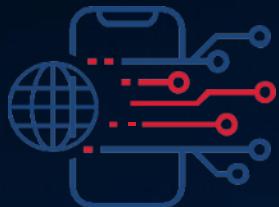


## Integrated Framework

- ML Libraries
- Algorithms
- Tools
- Partnerships

## Data Pipeline Management

- Ingestion
- Preparation
- Labelling
- Modelling + Scoring
- Serving



## Advanced + Predictive Analytics

- Predictive
- Cognitive
- Inference

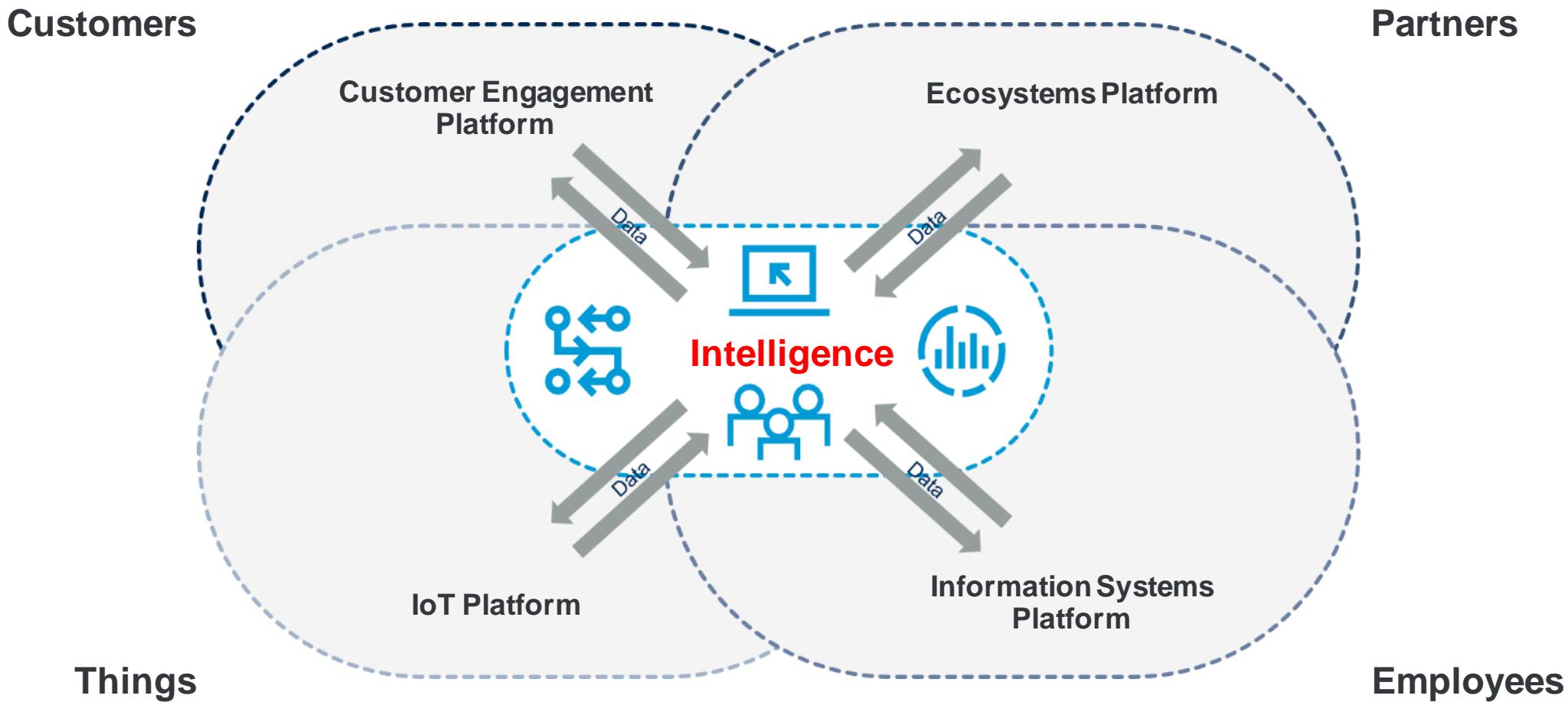


## Intelligent Applications

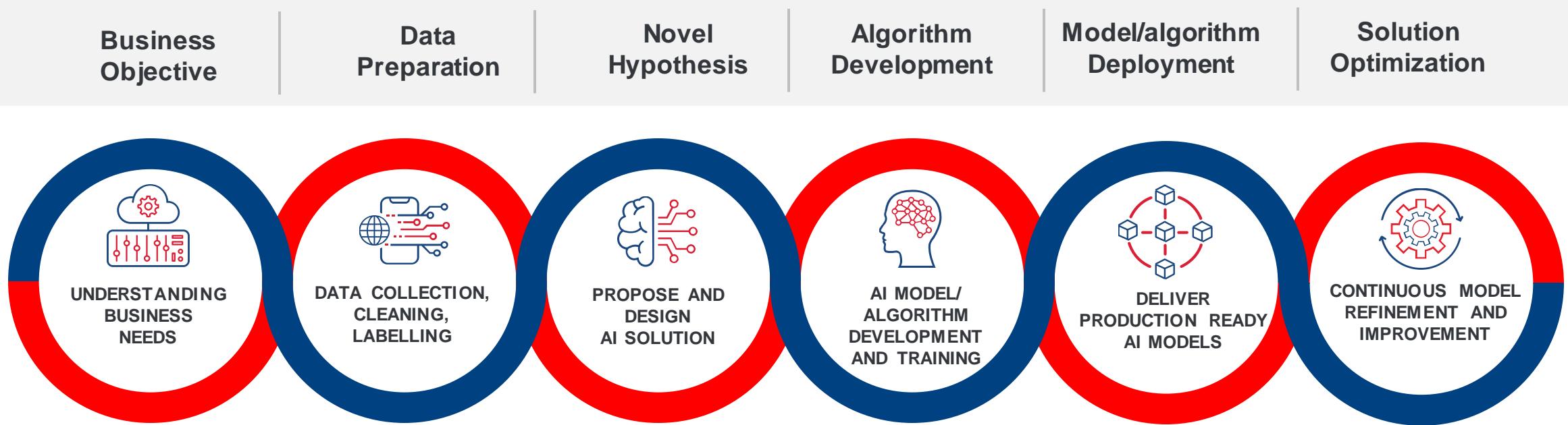
- Custom Applications
- Bot-Based Applications
- B2B2C + Enterprise
- Ideation to Implementation



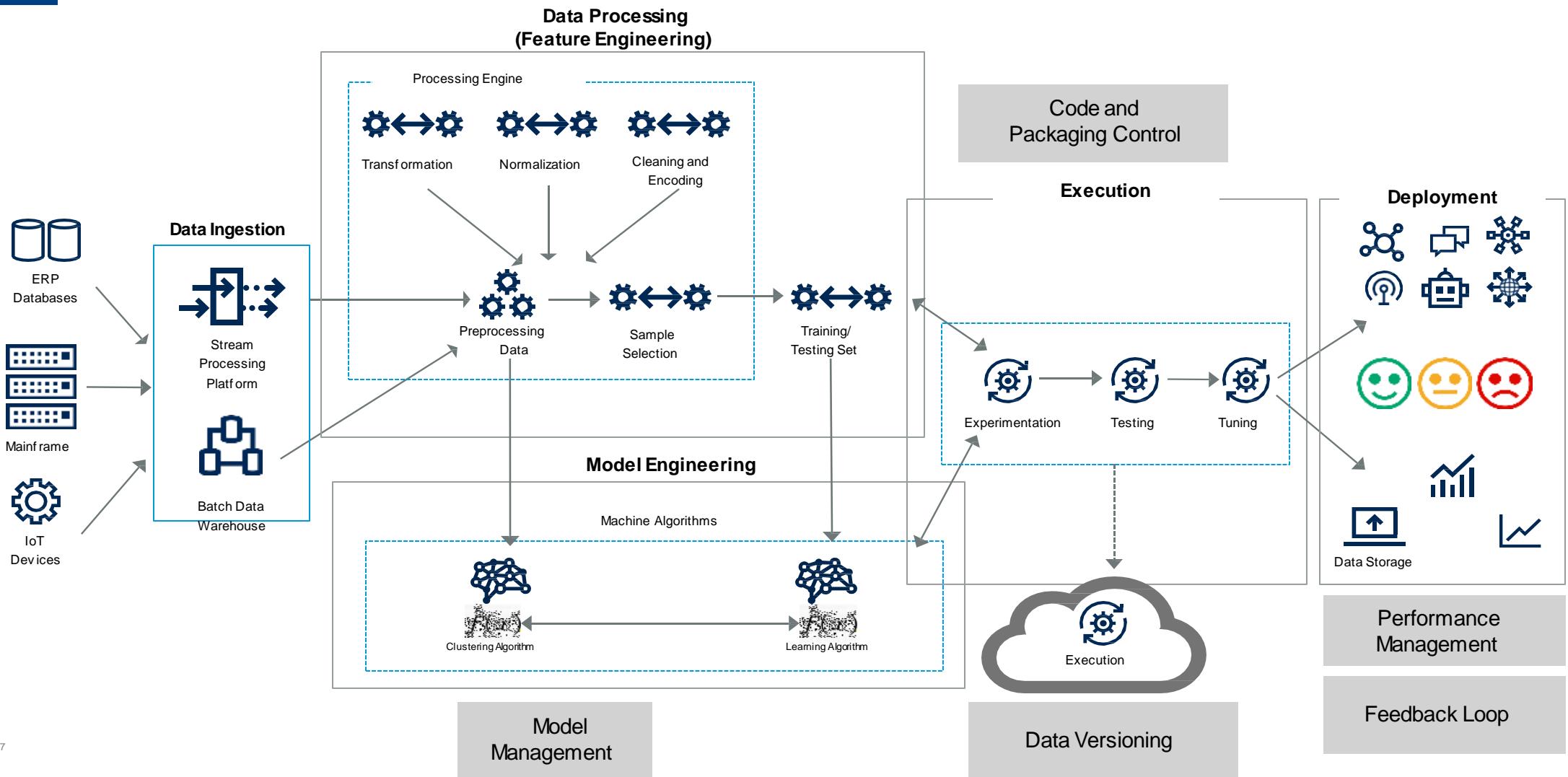
# DIGITAL PLATFORM WITH INTELLIGENCE AT THE CORE OF THE PLATFORM



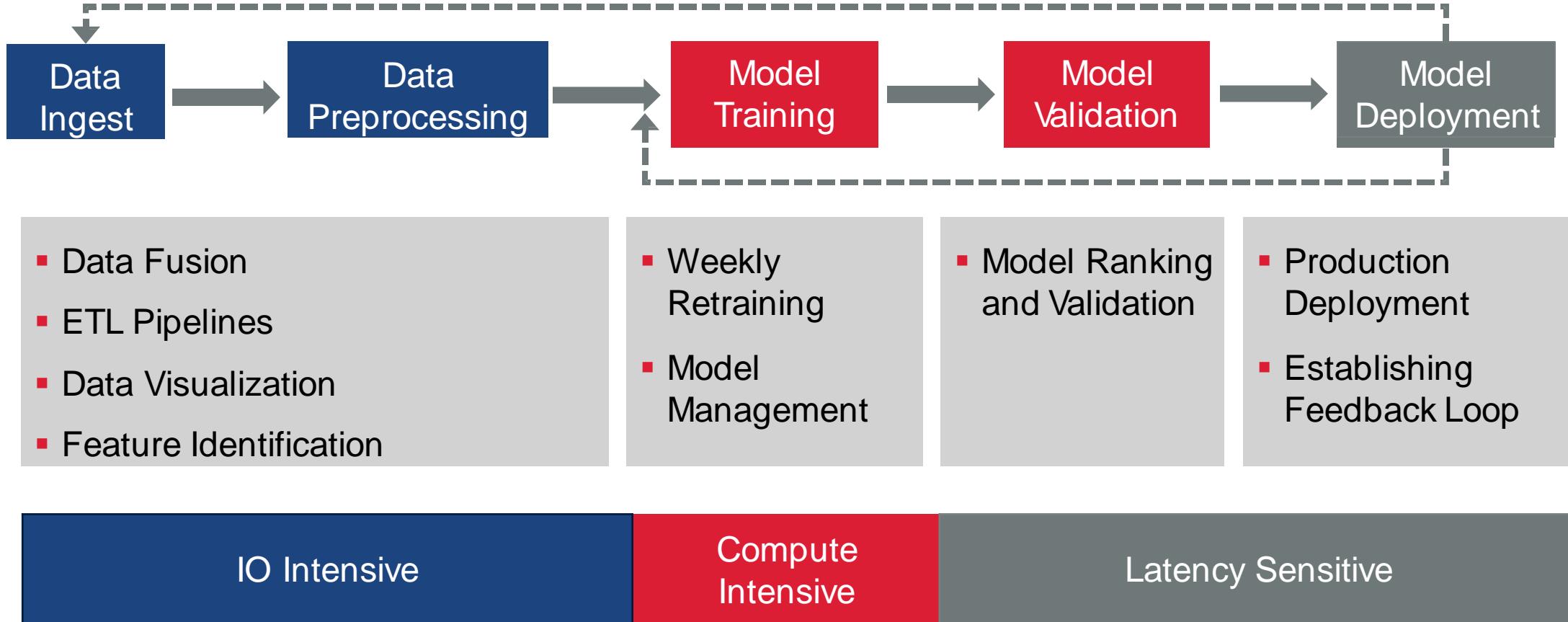
# AI SOLUTION DEVELOPMENT METHODOLOGY



# OPERATIONALIZING AI



# INFRASTRUCTURE IMPLICATIONS OF AI PIPELINES



# OPERATIONALIZING AI — TECHNOLOGY BEST PRACTICES

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## Code and Packaging

- Focus on code, environment and packaging
- Containers and Kubernetes, CI/CD, Git

## DataOps

- Access and metadata
- Data provisioning
- Governance

## Model Management

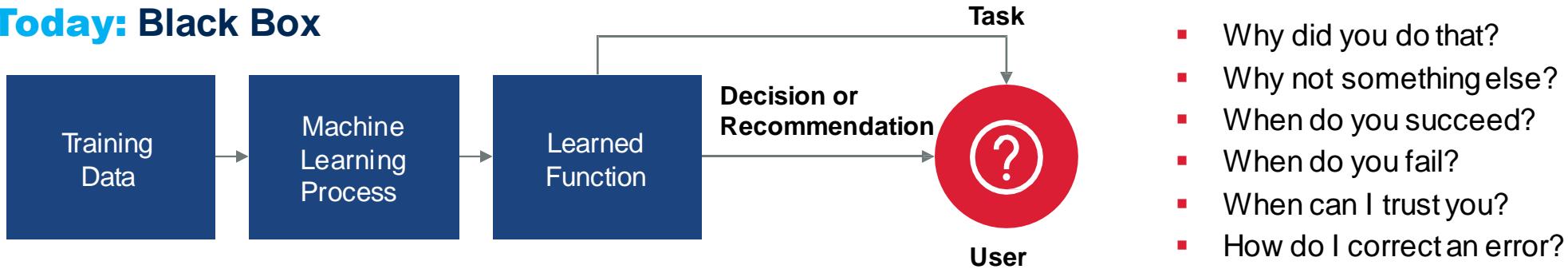
- Model storage, repository, versioning
- Track hyperparameters

## Performance Management

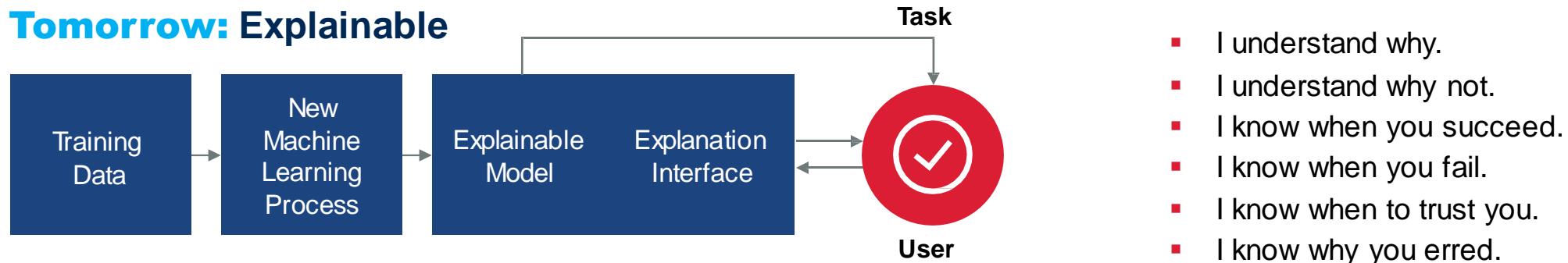
- Model watch
- Define thresholds and actions

# EVOLVE TOWARD EXPLAINABILITY — PACT.AI TOOLING BEACON

## Today: Black Box



## Tomorrow: Explainable



## Balance accuracy vs. explainability:

- Accuracy
- Accountability and fairness
- Stability and trustworthiness

# LEVERAGE AUTOMATION TOOLS

---

## Code and Packaging

- Git
- Docker
- Kubernetes
- Google Subpar
- Facebook (XARs)
- Jenkins, GitLab

## DataOps

- Palantir Foundry
- Databricks Delta Lake
- DVC
- Workflow
- Pachyderm
- Mleap
- Quilt
- Immuta

## Model Management

- ModelDB
- MLFlow
- Scared
- AWS System Manager
- Algorithmia
- ParallelM

## Performance Management

- Netflix (Meson)
- Seldon
- PredictionIO
- Tensorflow Serving
- Vertex.AI
- Numericcal
- Datatron
- Hydrosphere.io
- Alteryx Promote

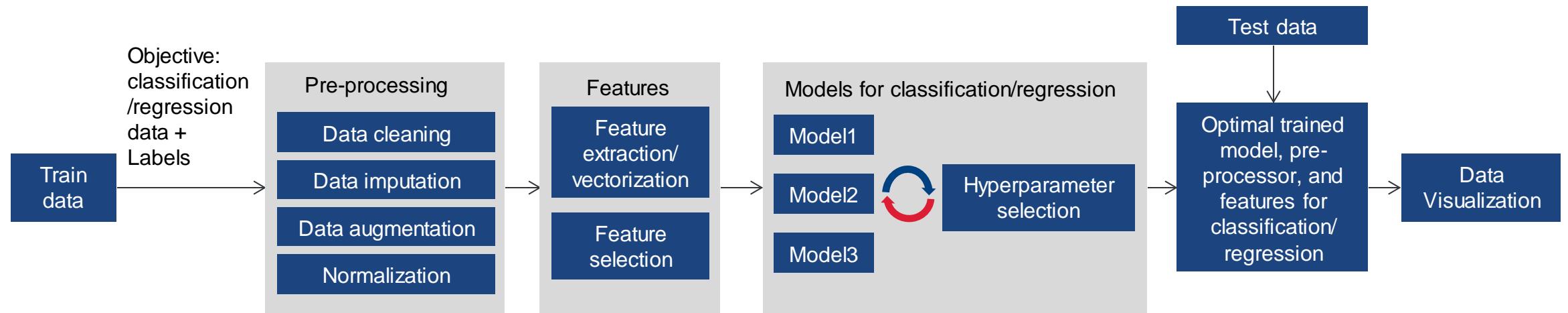
SageMaker, Databricks, TensorFlow Extended

# TRAIN YOUR OWN MODEL

## Business use case:

- Given data we can use auto ML to train model and see initial performance in less than 2-3 minutes.
- Quick POC for the client

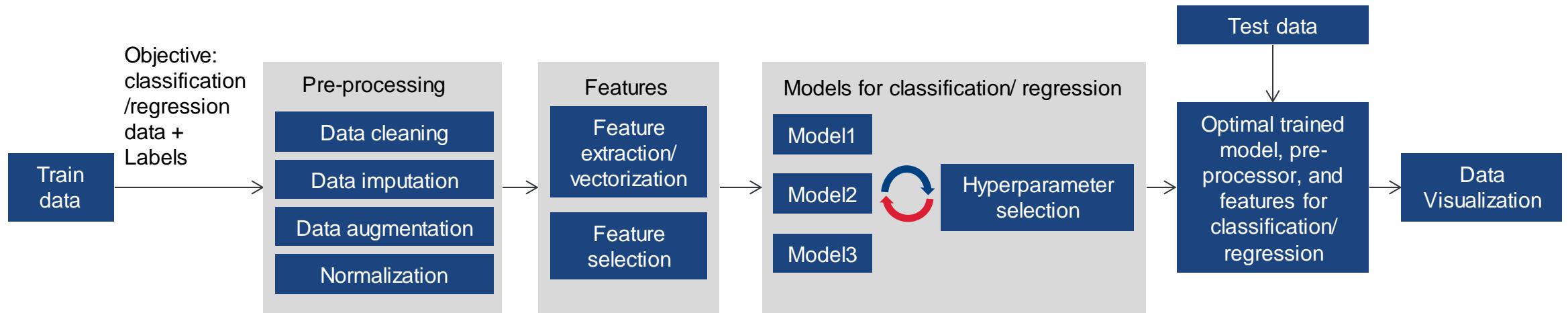
Models can be trained on any data containing either text, categorical or continuous values. Auto ML approach as shown below will be used for modelling.



Auto ML approach for text classification, data classification and data regression problems

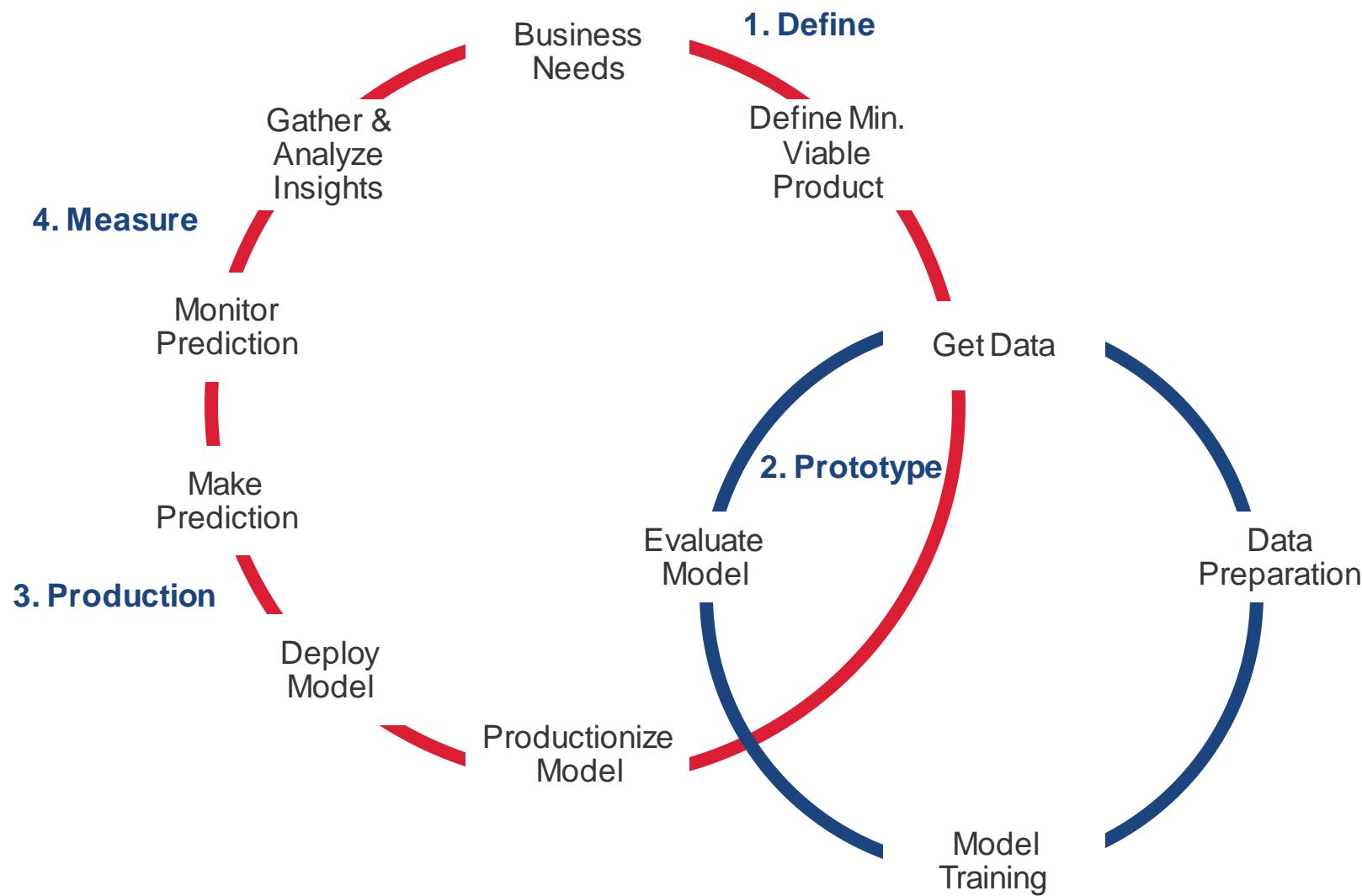
# AUTO ML APPROACH

---



# OUR FRAMEWORK AND TOOLS CLOSE THE LOOP

---



# RECOMMENDATIONS

---



Start by prioritizing simple, actionable use cases that can deliver immediate business value.



Organize for AI in your enterprise by setting up an AI lab during the early stages.



Leverage MLOps and DataOps expertise to help establish a machine learning development life cycle.



Monitor and revalidate the business value of ML models on an ongoing basis.



Organize training in ethics to create awareness that AI design and implementation require an ethical mindset and clear accountability.

**EXPERIENCE IS THE KEY  
DIFFERENTIATOR**

# BUILD CUSTOMER CENTRIC CULTURE IN IT ORGANIZATION — IMMERSE YOURSELF IN THE EXPERIENCES THAT CUSTOMERS ARE GOING THROUGH

## Immersion Level: Basic

 Review customer quantitative data

 Review customer qualitative data

 Have a one-way conversation with a customer

 Review third-party sources of customer reviews for your product/service

 Familiarize yourself with what customers of competitors are saying

 Talk to a frontline employee about your customers

## Immersion Level: Intermediate

 Familiarize yourself with non-customers and underserved customers

 Have a two-way conversation with a customer

 “Be a customer” and experience buying, using, and obtaining service for your organization’s product

 “Be a customer” for your competitors’ products by buying, using, and obtaining service for them

 Observe your customer interacting/using with your product (“Go and See”)

 Demonstrate to a customer how to interact with/use your product

## Immersion Level: Advanced

 Co-create/co-design your organization’s CX with customers

 Sponsor and organize a social event attended by both customers and employees

 Conduct an ethnography study: spend time in a customer’s everyday environment

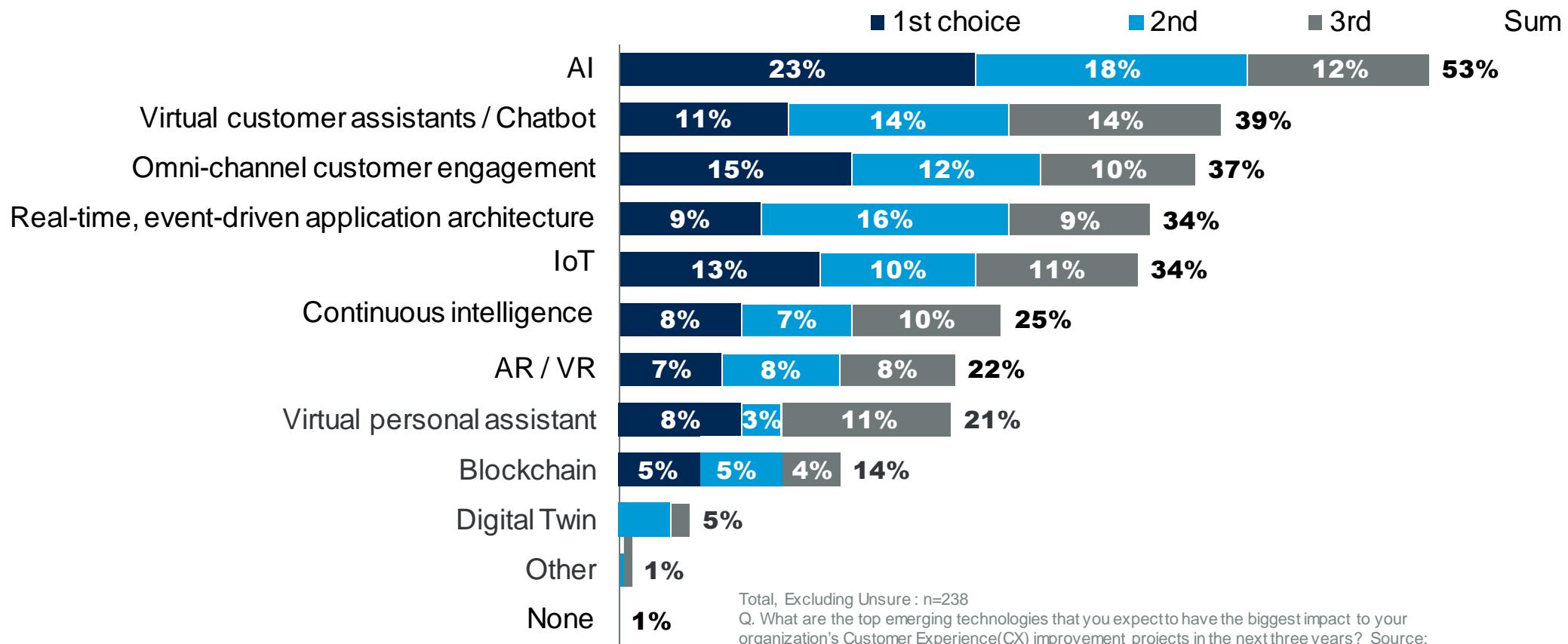
 “Go and Do”

 Immerse employees and customers in prototype experiences

 Incorporate customer visits into your staff meetings

# CUSTOMER EXPERIENCE LEADER SURVEY 2019: AI STAYS AT THE TOP AS EMERGING TECH IN CX

Emerging technologies expected to have biggest impact to CX projects in the next three years



# EVOLVING FROM WEB TO MULTIEXPERIENCE

---

## UX

- Desktop to responsive
- Static to dynamic UI
- Portable



- Apps economy
- Smart devices
- Untethered and offline



- Conversational
- Immersive
- Sensory

2000s

**Web**

2010s

**Mobile**

2020s

**Multiexperience**

- DB and web service integration
- SOA
- Hosted



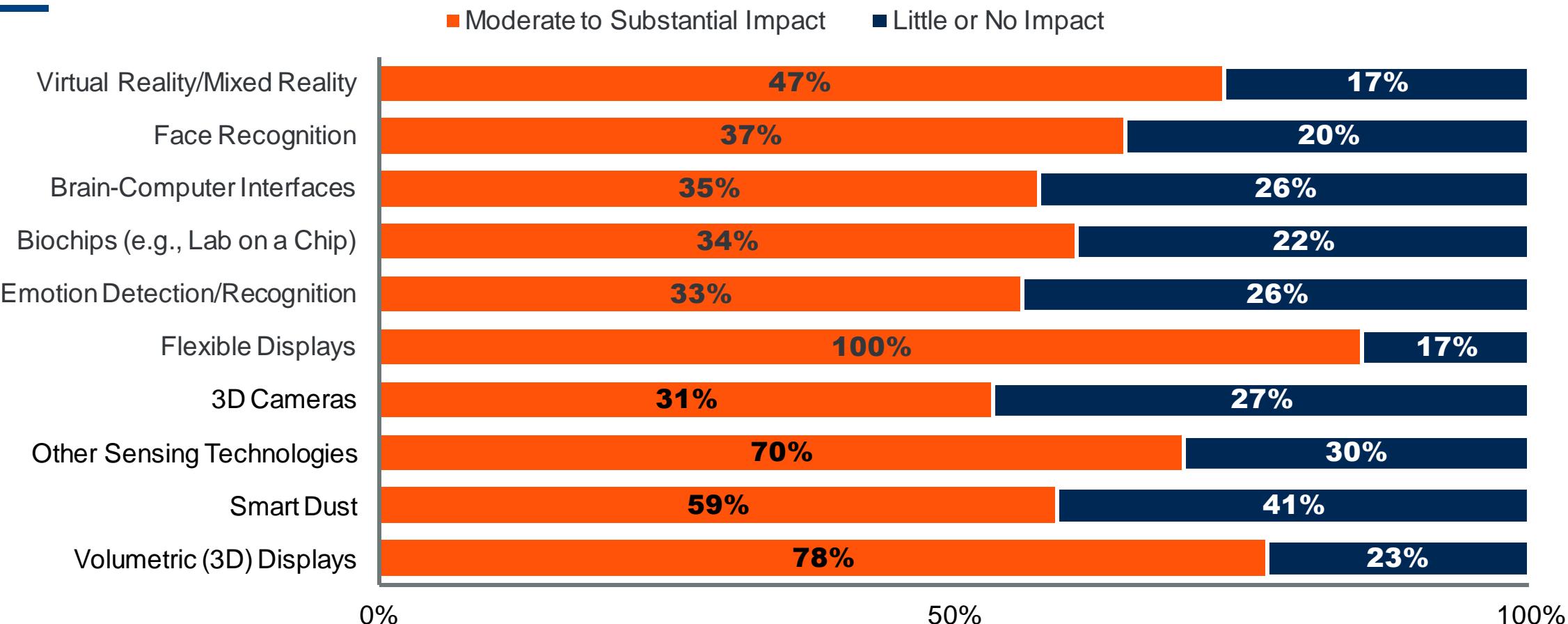
- REST and API-driven
- MASA
- Cloud



- Edge computing
- Serverless and event-driven
- AI-augmented

**Systems**

# EXPECTED IMPACT OF SENSING AND DISPLAY TECHNOLOGIES IN CREATING EXPERIENCE PERCENTAGE OF RESPONDENTS



n = 233 to 272, excluding "Unsure"

Q. In the next three to five years, what impact do you expect this technology will have on your business?

Source: ["Survey Analysis: Technology Innovations That Deliver the Greatest Value."](#) (G00390605)

# THE “EVERYTHING CUSTOMER” WANTS TO BE SERVED FROM ANY DEVICE, AT ANY TIME – SEAMLESSLY

---



Customer  
**TechQuilibrium**

# CUSTOMER TECHQUILIBRIUM OCCURS WHEN THERE IS VALUE IN EVERY MOMENT WHERE PEOPLE AND TECHNOLOGY INTERSECT



When these moments happen across multiple devices and touchpoints, the customer's experiences are easy, immediate and rewarding



## Multiexperience

**The different modalities of user interaction across a variety of digital touchpoints through a user journey**



Touch



Gesture



Emotion



Location



Voice



Eye-tracking



Mobile



Wearable



Shopping



Travel



Work



Home

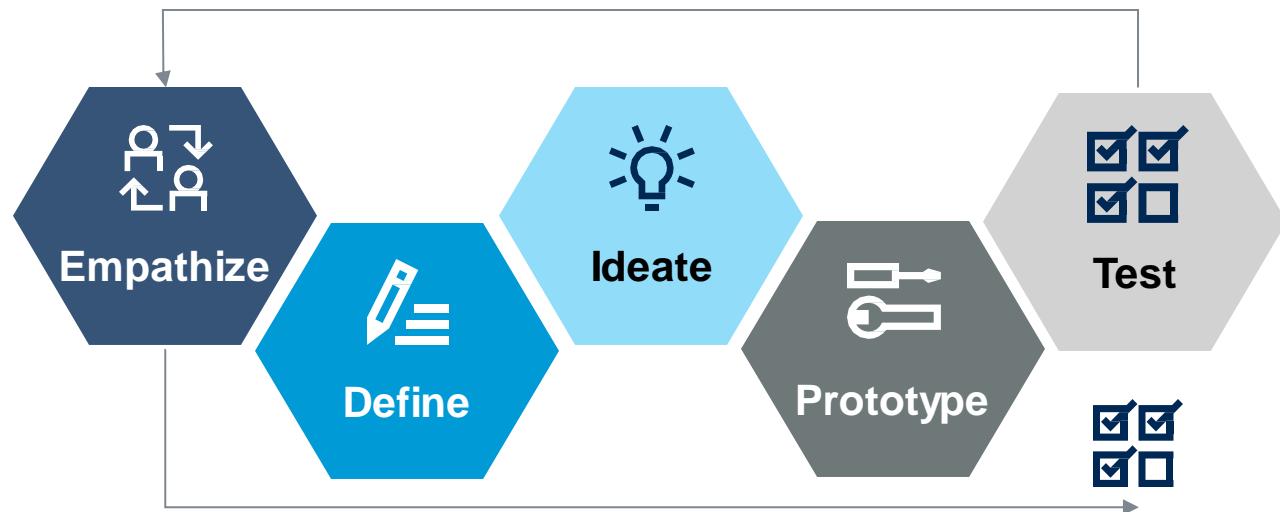
# TRANSFORMATION TAKES PLACE IN TWO PHASES

Industries	Midterm Customer Centricity Ambition (2 to 3 Years)	Long-Term Customer Centricity Ambition (3 to 5 Years)
 Retail	<p>Enable multichannel retail. For example, a click-to-collect process requires digital commerce and offline store operations to collaborate.</p>	<p>Unified commerce experience across online and in-store, supporting proactive, location-based and personalized experience.</p>
 Banking and telco	<p>Moving from a product-centric to customer-centric model to achieve a single-customer view and deliver cross-product personalized experience in different phases of the customer life cycle.</p>	<p>Open APIs to enable additional service providers to be part of the ecosystem. Manage customers across different service providers.</p>
 Consumer electronics manufacturing	<p>After-sales support, repair and return processes require manufacturers, retailers and repair centers to collaborate.</p>	<p>Connected devices enable access and serve customers throughout their life cycle, one platform connecting all partners in the value chain.</p>
 Airlines, airports and other hospitality industries	<p>Capture customers' real-time data from multiple channels, devices and locations to deliver a contextual and continuous experience across the customer journey.</p>	<p>Design and deliver customer experience across multiple service providers in the value chain in travel scenarios.</p>

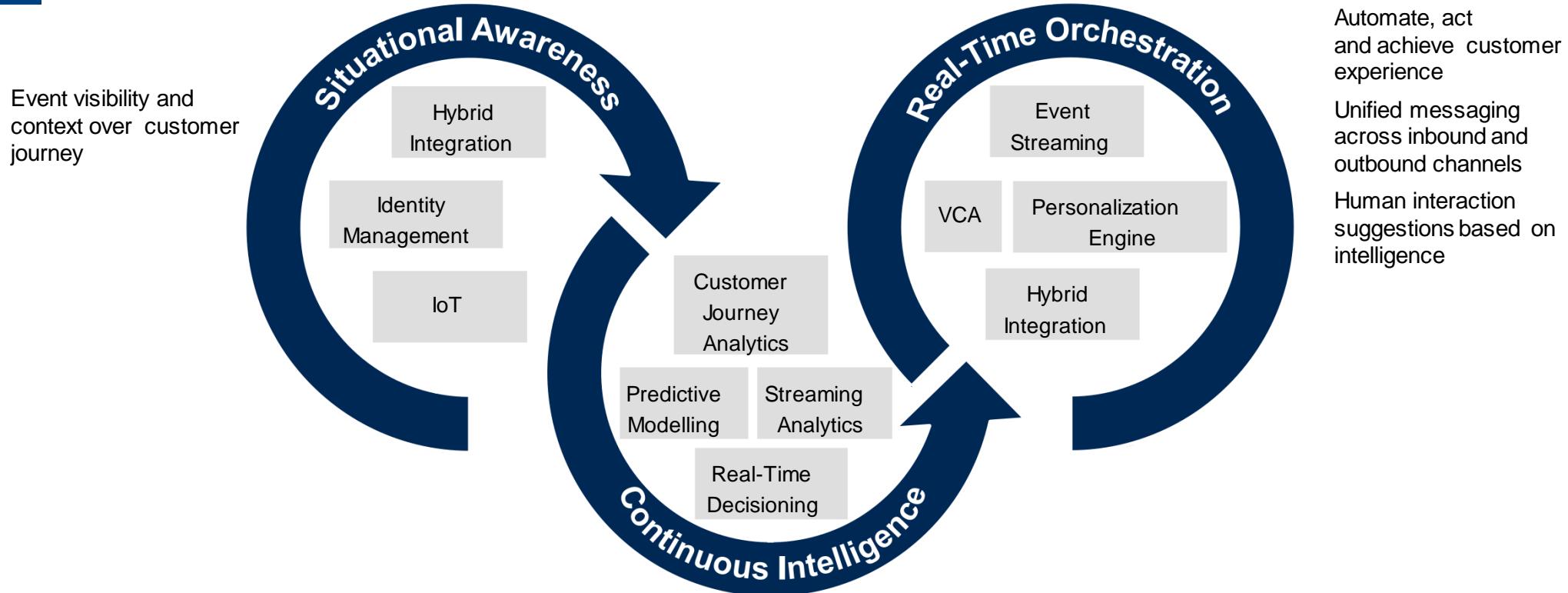
# CO-CREATION — DON'T BUILD FOR THEM, DESIGN WITH THEM

---

- Develop human-centered design capability
- Engage stakeholders in the service design and testing
- Observe constituent interactions with services
- Establish KPIs to track the involvement of constituents in design and testing



# REAL-TIME, ALWAYS-ON CONTINUOUS INTELLIGENCE SUPPORTS CONTINUOUS EXPERIENCE



Timely insight of cross-channel engagement efficiency and effectiveness

Prescriptive analytics that prescribe the best course of action (automated or human-driven)

Contextual event-driven recommendations

Increased ability of executing CRM and customer experience objectives

# RECOMMENDATIONS

---



Blend of AR&VR technologies will get people and machines working in unison.



Digital applications coupled with AI resources can extend and support the customer-facing journey.



Emerging technologies such as AI, VCA, Bots, Digital twins and Event driven architectures are expected to have biggest impact on customer experience journey.



UX design tools, platforms, customer analytics, redesign of business process and multi channel customer service will drive Customer experience.

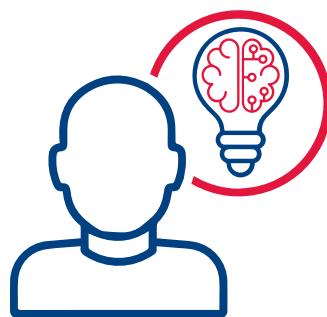


Promote cultural change by implementing low-effort, high-emotion culture hacks that drive customer centricity.

# AI ENABLED GLOBALIZATION

# OUTSMARTING THE CHALLENGES OF MODERN L10N

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**AI Assisted  
Resourcing**

**Global  
Support**



**More  
Efficient Production**

**Finger  
on the Pulse**



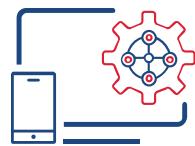
**AI Driven  
Quality Assurance**

**Unmatched  
Experience**

# PACTERA AI ENABLEMENT SERVICES

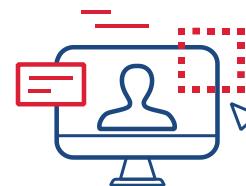
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Providing human intelligence to prepare, label and validate data for machine learning models at scale.



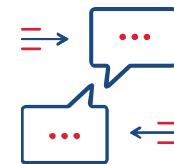
## Training Data Preparation

- Data Collection
- Query Creation
- Data Curation
- Content Writing



## Training Data Labeling

- Audio/Video Transcription
- Semantic Annotation
- Image/Video Labelling
- Data Categorization
- Search Relevance



## Human Validation

- AI Model Output Judging
- User Feedback
- SMEs



SEARCH



VISION



NLP



SPEECH



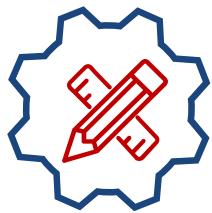
DATA ENRICHMENT

# GLOBAL DATA CURATION SERVICES

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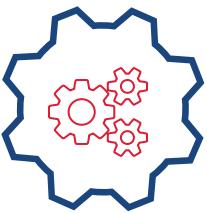
Data **CREATION, COLLECTION, CURATION** and **ANNOTATION** services to create a training **DATASET** for machine learning **models**. In addition, Pactera can judge/validate the accuracy of the **model and/or solution**.

## PROJECT TYPES:



### IMAGE LABELING

Recognizing different entities in an image



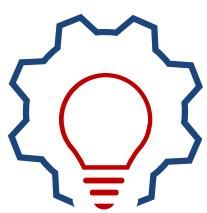
### QUERY CATEGORIZATION

Assign a Web search query to one or more predefined categories



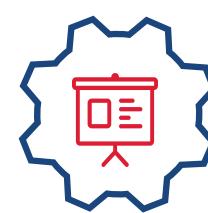
### AUDIO TRANSCRIPTION

Transformation of verbal and audio materials into text



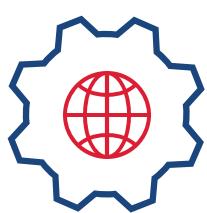
### INTENT ANNOTATION

Attach metadata to an action carrying some information



### VIDEO SUBTITLING

Ensure your viewers around the world can consume your content



### MAP JUDGING

Assign the location and other details to map. Judge the maps assigned

# END TO END AI ENABLEMENT DATA SERVICE SOLUTION

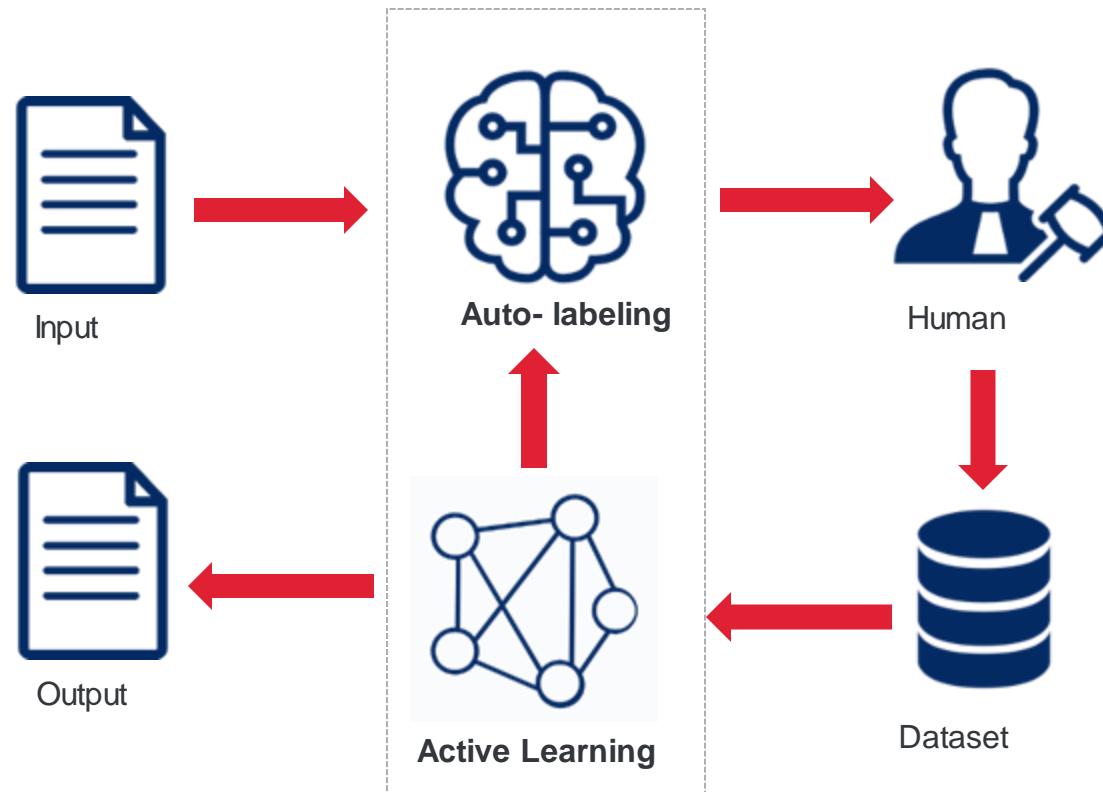
## - QUALITY DRIVEN ADAPTIVE PRODUCTION MANAGEMENT



# PACTERA'S ROLE IN TRAINING AI MODELS

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**Pactera AI Enablement** provides a much needed service for those who have existing AI engines and data models. We have a global network consisting of thousands of human judges that evaluate AI model output and create training data to increase AI output accuracy.



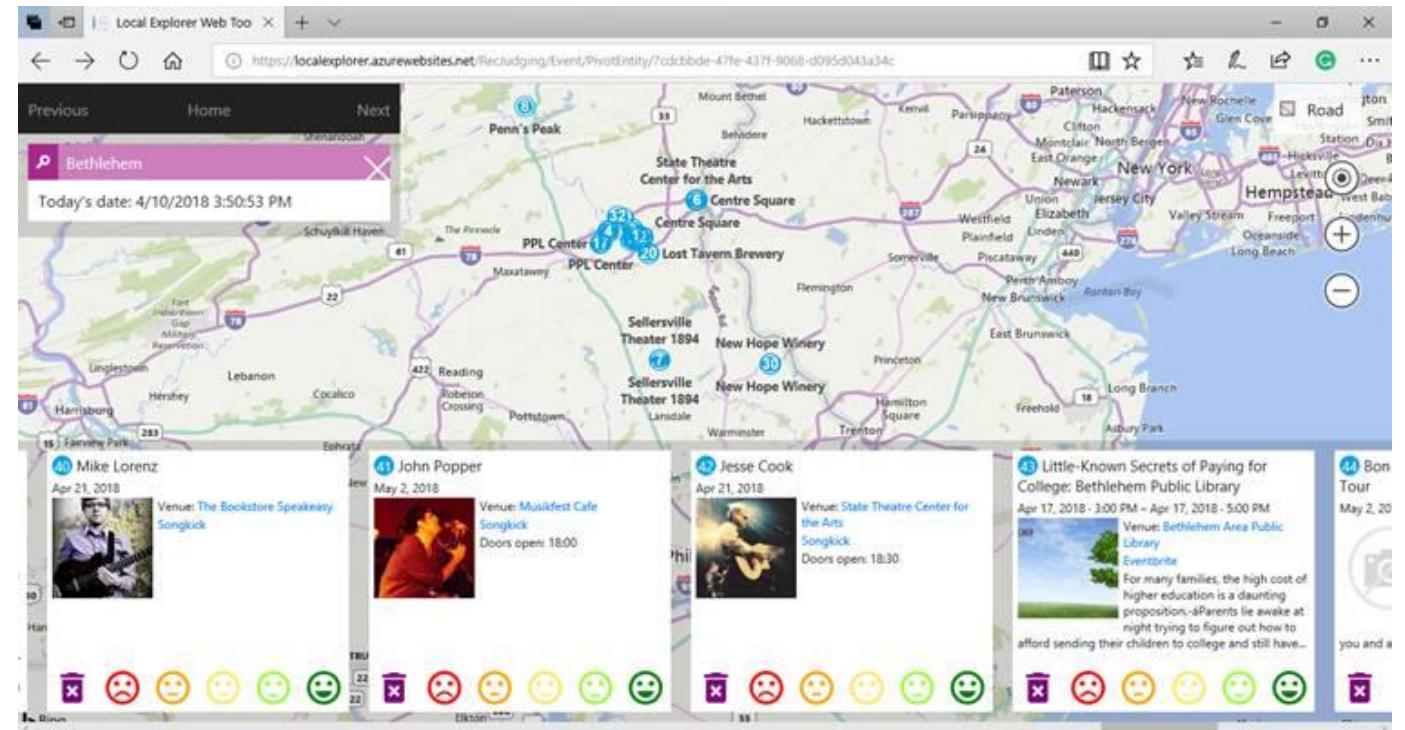
# HUMAN VALIDATION – MAP DATA CURATION

## Search Engine Event Relevance:

Searching for events in your city is easy because the search engine AI shows you events that are relevant to you. Human validation experts curate map data so the AI can make recommendations that fit your city.

## Pactera's Role:

Pactera judges examine different events across cities in the U.S., Canada, and Europe. like musical performances, comedy shows, and sporting events. About 50 events are judged for each city using the Local Explorer Tool. The tool displays the event's venue using Maps. Several criteria impact the relevance rating of an event, such as proximity and popularity.



# HUMAN VALIDATION – TRANSIT ROUTING

## Search Engine Transit Routing:

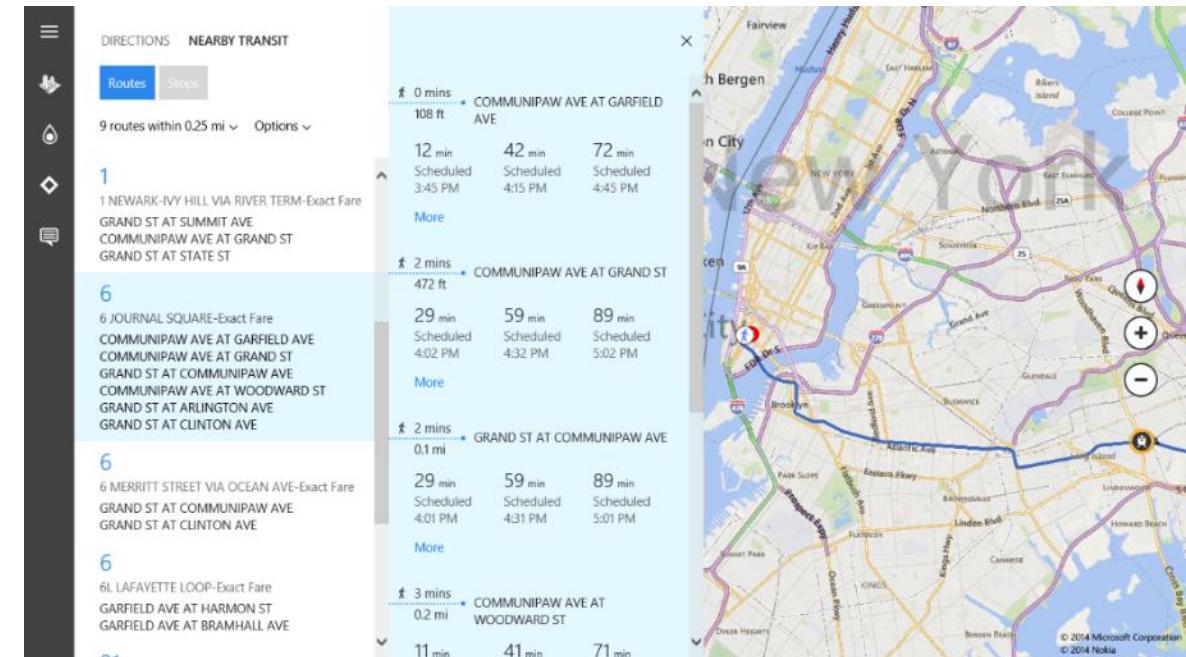
Pactera validation experts help train the AI to make better routing suggestions based on navigability, relevance and accuracy.

## Pactera's Role:

**Route Navigability:** Judges determine if a route is possible given a section of map with two points through internet research.

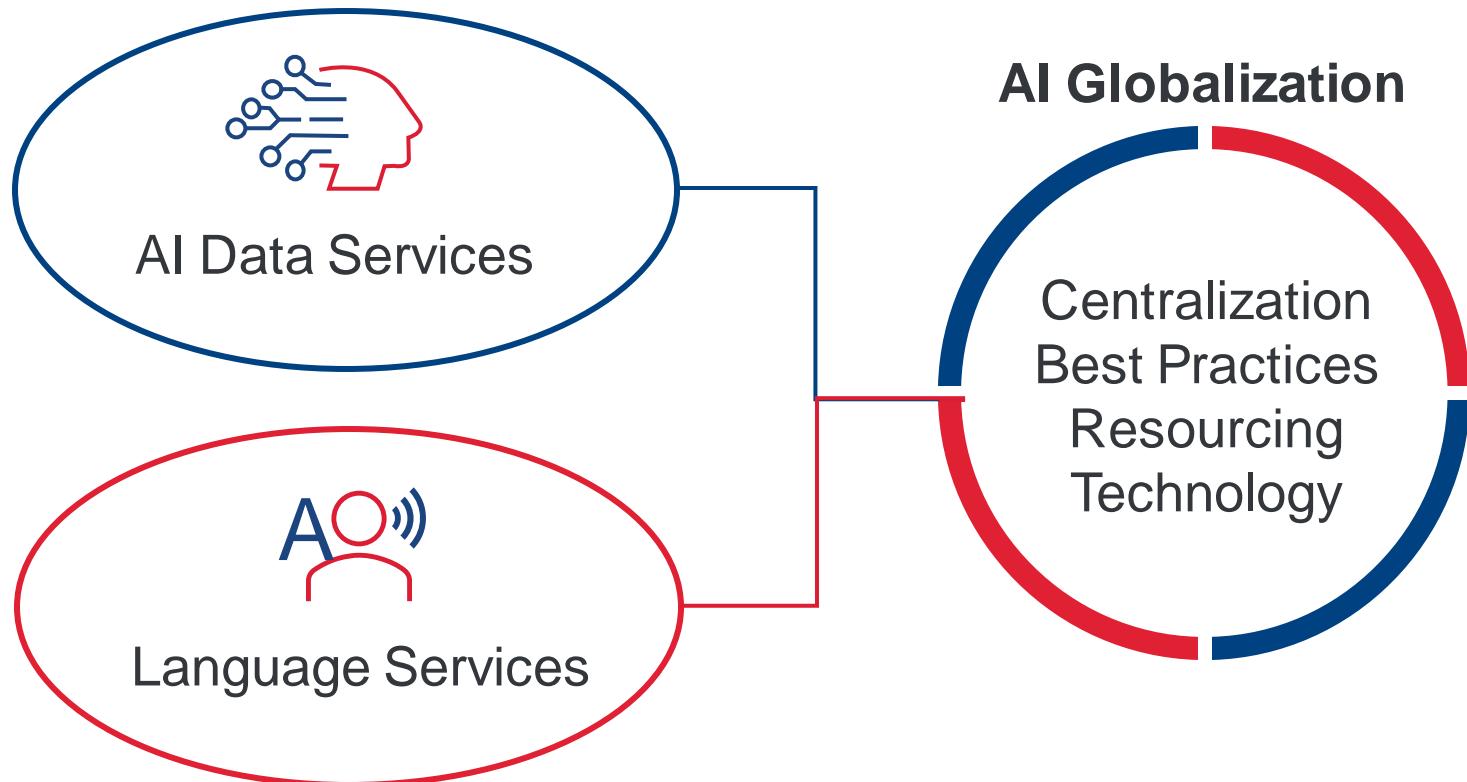
**Transit Route Relevance:** Given a series of possible routes using public transportation, judges rate transit routes as good, bad, or excellent.

**Transit Accuracy:** Judges determine if public transit routes are possible through internet research.



# TRANSFORMATION: CONVERGENCE, CENTRALIZATION AND AI

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- Engineering, Quality Management, Recruitment functions
- Crowd Methodologies
- Mature Program Management
- OneForma

# AN AI-INFUSED PLATFORM WITH END-TO-END AI/ML, DATA ENABLENENT, AND LANGUAGE SERVICES FUNCTIONALITY

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Recruitment & User Management



Workload Distribution & Management



Bespoke Production "Webapp" Tools



Quality Management & BI Analytics



# AI DATA COLLECTION & PROCESSING

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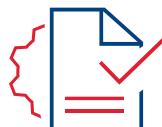
## VIDEO/VOICE

- Original Voice creation
- Voice data collection
- Voice data transcription
- Voice data labelling



## IMAGE

- Image data collection
- Image data labelling



## TEXT

- Text data collection
- Text data labelling



## MAP

- Map data collection
- Map data labelling
- Map data optimization



# OneForma IN ACTION: INTRODUCING AI-INFUSED PROCESSES

## AI-Assisted Video Subtitling



*Voice Recognition* used to provide automatic video subtitling workflow with human-in-the-loop proofreading

The screenshot shows a video frame of a woman speaking. Below it is a transcription of the spoken words in XML format. At the bottom are two green buttons: "TTS Preview" on the left and "Submit" on the right.

```
<prosody rate='<30.00%>'>此视频将要概述在基于 H T M L 5 的 vSphere <phoneme alphabet="ipa" ph="klient">Client</phoneme> 中，使用 vCenter <phoneme alphabet="ipa" ph="hat a vella bitti">High Availability</phoneme> 的增强功能。</prosody>
```

*Neural Text-To-Speech* used to provide human-like machine voices supported by human-in-the-loop for SSML application

## Voiceover Creation

## AI-Assisted Annotation

The screenshot shows a text input field with instructions: "Look at the text and label it according to the guidelines." Below it is a "Labelling Area" containing XML code. At the bottom is a green "Submit" button.

```
<intent id="send_email">send an email to <entity id="email"><entity id="personname">sergio</entity>.bruccoleri@pactera.com</entity></intent>
```

Original data: send an email to sergio.bruccoleri@pactera.com

*Natural Language Processing* used to automatically annotate intents and domains based on client's documentation

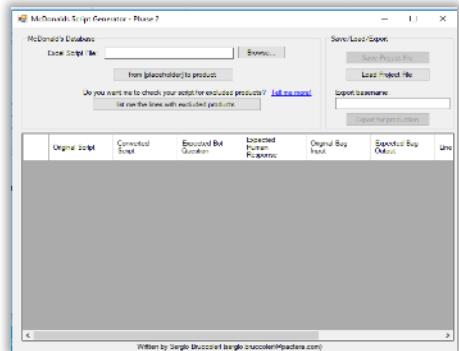
## Smart Curriculum Search

Utterance	Top scoring intent
solution development lead duties include	use case & enhancement
requirement gathering, specification and documentation	local prototype development
team liaison	remote development
production support & process enhancement	productization of services and tools
ua validation of development enhancements or tools	deployment/training strategy & delivery
design thinking and solution genesis	design thinking and solution genesis
Entities	SolutionSkills --> process
Entities	SolutionSkills --> solution

*Entity Recognition & Natural Language Processing* used to categorize and allocate resources

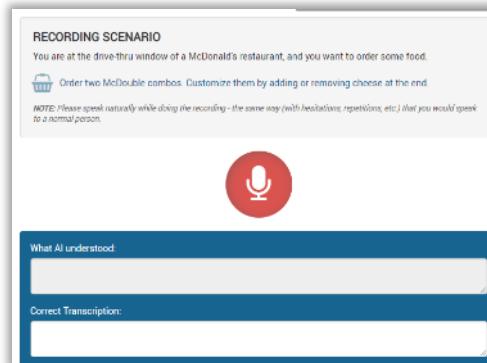
# OneForma IN ACTION: BOT EVALUATION

## Audio Script Generation



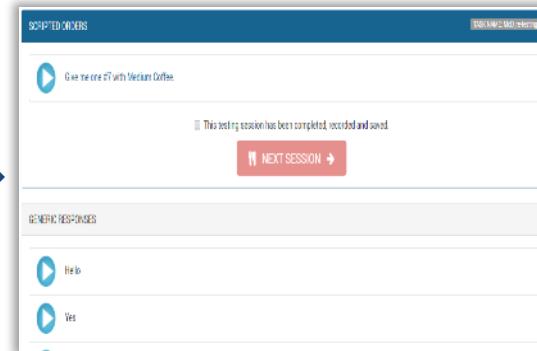
Dynamic generation of multiple audio scripts, to predetermined criteria, that will be recorded and sent to the bots for validation against Gold output

## AI-Assisted Voice Recording



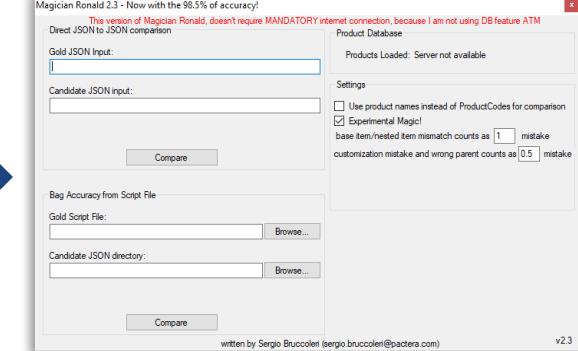
AI-Assisted Voice Recording WebApp to allow resources to record scripts and access automatic transcription

## Bot Testing Via Soundboard



Provide an objective testing environment for each script element. Ensure consistency of process and quality of audio presented to multiple Bots during evaluation.

## Evaluation



Comparing the candidate Bot output with the predefined gold output providing a dynamic output accuracy score

# SMARTER GLOBALIZATION

## Global Strategy

- Globalization Software Implementation & Infrastructure Strategy
- Global Value Chain, Account and Partnership
- Global Marketization

## Translation & Linguistic

- Software/Content Translation
- Multimedia Translation
- Marketing Localization
- Post-editing
- Crowd Translation
- Linguistic Quality Assurances

## Solution Engineering

- Tool Development & Maintenance
- Workflow Automation
- Machine Translation Engine Customization
- Translation Platform Setup and Customization
- Localization Engineering

## International QA

- Globalization, Localizability
- Centralized Native Speaker Testing
- In-market Testing
- API Level Internationalization Testing
- Function Based Automation Development and Testing



Project	Client	Languages
Bing Global, Bing Marketing, Ads Marketing, Skype E2E, MBS	Microsoft	120+
Localization For Multiple Products and Marketing Campaigns	Autodesk	30+
Product, Content and Marketing	VMWare	15+
Consumer-facing Content, Products	Alibaba	5
Product Content and Marketing	Tesla	12
Software and Content	Baidu	100+
Software and Content	Huawei	80+

# HOW DATA MAKES A DIFFERENCE...

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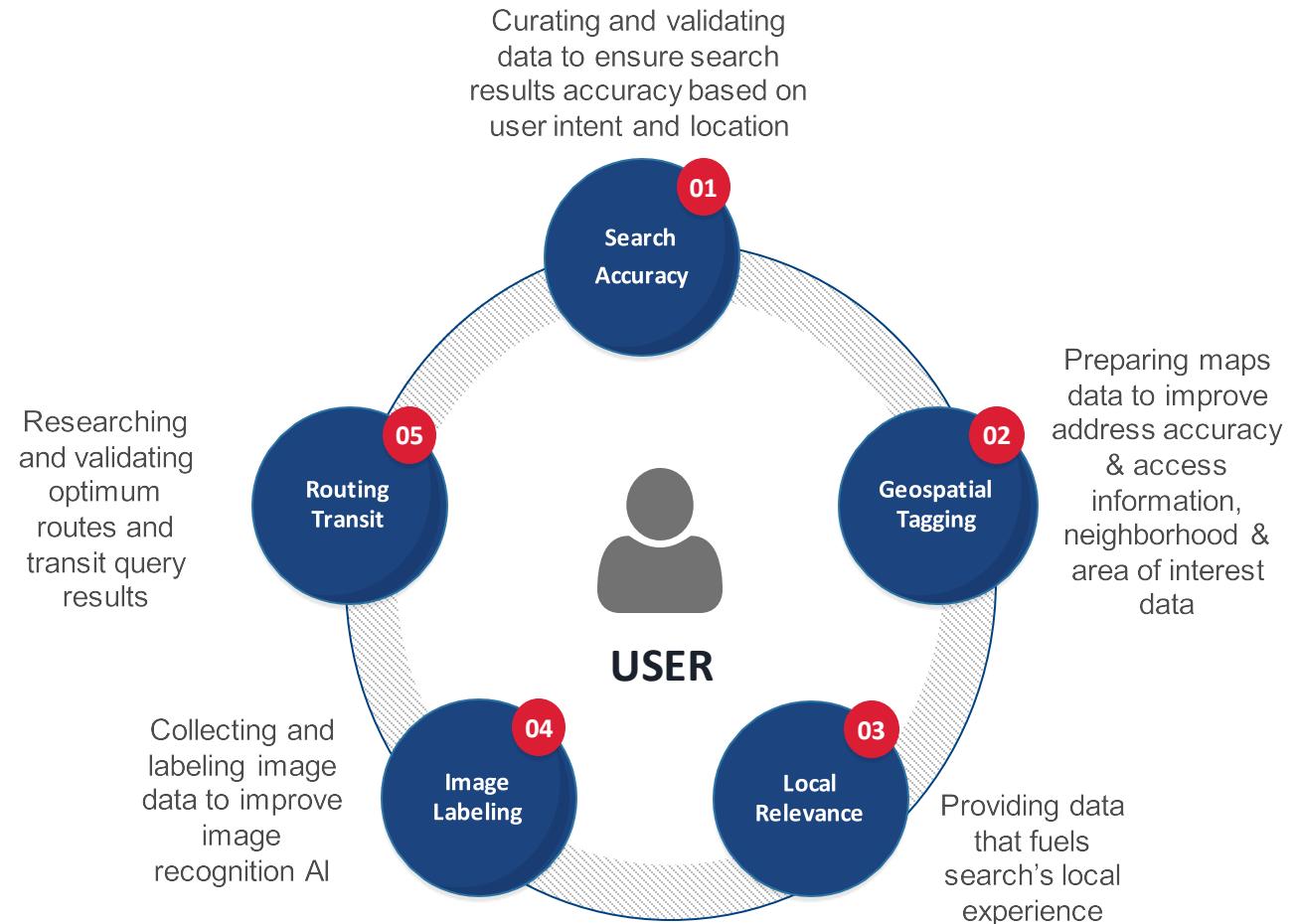
## Client Overview:

A major search engine uses artificial intelligence to **contextualize** search data that is relevant to each user. This relevance is based on a sophisticated AI model that takes each user's geographic location, preferences and history and correlates this with Big Data gathered from the entire client user base. The result is a rich user experience that is relevant to each user.

## Pactera's Role:

Since 2014, leveraging our global network of human judges, Pactera's **Global Data Curation Services** create, label, annotate and validate training datasets for the search engine AI model. Our teams take in data that are **< 80% accurate** and improves it to **> 98% accuracy**; directly impacting User Experience and confidence. In 2014 the search engine's US market share = **19.5%**. In 2018, US market share = **24%**.

Pactera judges have processed map data **for every state in US** and over **12 major global markets**.



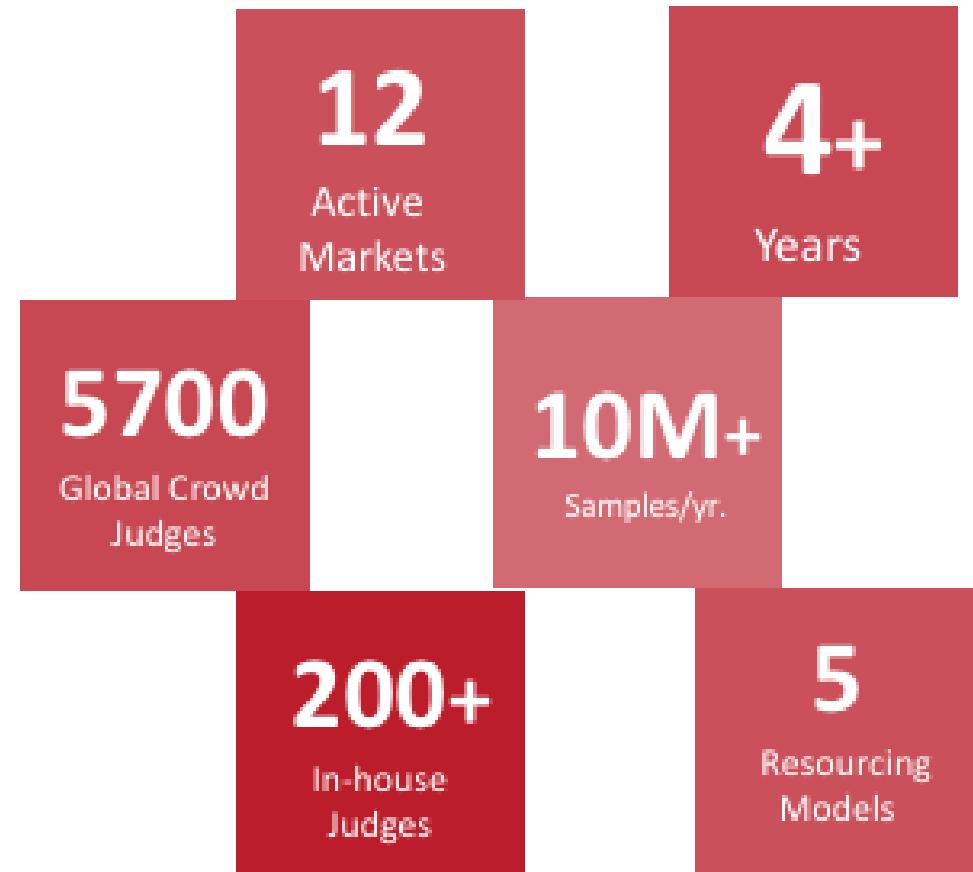
# SAMPLE CUSTOMER DATA: BREADTH OF PACTERA'S SCOPE

## Type of Judging Services

- Taxonomy definition
- Entity Classification
- Query Categorization
- Data labeling
- Image/video judgement
- Entity Extraction
- Semantic Annotation
- Dialog Mapping
- Local Relevance
- Geo Accuracy Labeling
- Transit and Routing
- Address Conflation
- Address Parsing
- Phishing & Malware judging
- Sentiment Analysis
- QoE judging
- Local Relevance
- Ads localization judging

## Human Judgement by Scenario

- Maps
- Search Relevance
- Local Experience
- Computer Vision
- NLP
- Bot Services
- Identity Protection
- Fraud Detection
- Transportation Services
- Ads Experience



# AI ENABLEMENT MOVING FORWARD

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## Global Sites Collaboration

- Strengthen the existing delivery centers in US, India and China
- Build up capabilities in Europe, India.....
- Collaboration with cross practice teams



## Gig and Community Operation

- 50000+ crowdsourcing resources with continuous expanding
- Robust crowd community for long-term engagements
- Deep understanding in the local market to active the Gig resources.



## Cloud and Technology

- Huge data need the magic of cloud
- Automation technology and platforms are key for AI Enablement
- Leveraging AI to processing AI data is the trend

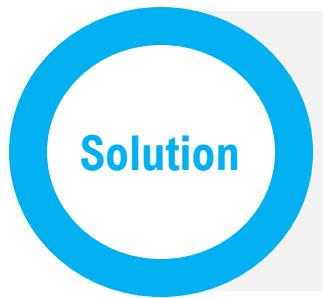
# OUR AI SOLUTION ACCELERATORS

# PREPTALK AI-DRIVEN MICROLEARNING TRAINING



In the \$130 billion Corporate Training market, many global organizations spend large amounts of money but still **struggle with the following challenges:**

- Engaging the digital generation;
- Onboarding the speed of growth;
- Learning effectiveness.

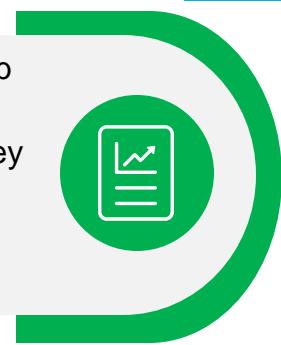
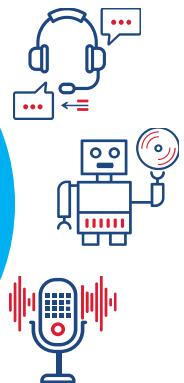
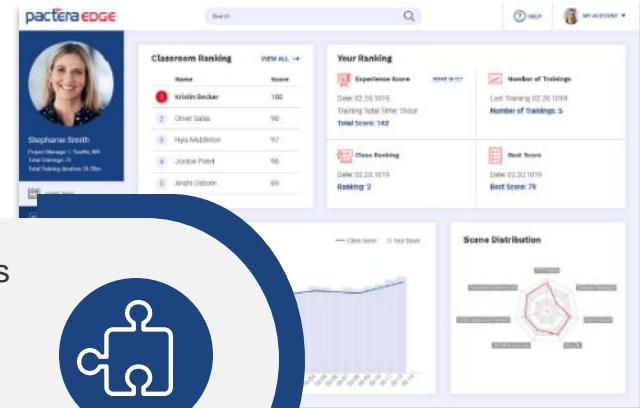


PREPTALK – the **Cloud-based, Anytime, Anywhere** Intelligent Training AI product for Enterprise customers :

- **Personalized** curriculum, with 1 to 1 direct **conversational training**
- **Conversational Assessment** of training effectiveness
- Intelligent **recommendations+ feedback** for knowledge improvement



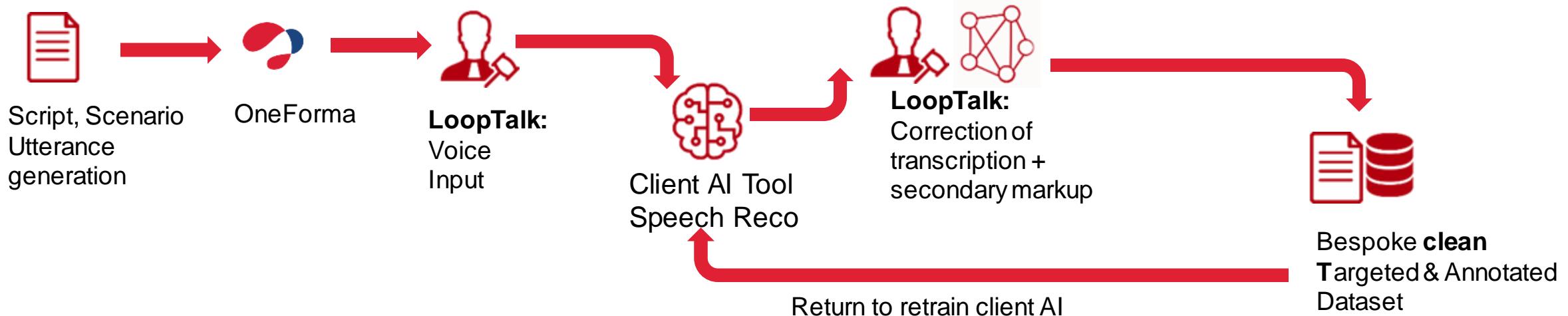
- Personalized training and assessment with great user experience on mobile devices and Web browser
- One to One Interactive conversation with AI teacher to make training a fun and exciting journey
- AI NLP and Cognitive service technology improves the learning and training effectiveness significantly
- Cloud based subscription model for easy adoption and scale out for growth



# LOOPTALK – FOR VOICE TRAINING

## Voice to AI, Text to AI. Cloud-based creation of voice data, associated transcription and evaluation of AI Engines

- The industry accepted workflow for transcription is no longer an acceptable methodology for our clients' end customers.
- Voice Data will still be required by our clients to improve their services and quality.
- We have seen an increase in requests for targeted voice data creation
- LoopTalk is designed to perform Voice Dataset generation and feedback for specific voice training requirements with connections into client-side AI engines
- Output: additional voice data recordings and correct associated transcription, as well as evaluation of AI Engine accuracy



# PACTSCAN: KNOWLEDGE EXTRACTION AUTOMATION

## Business problem

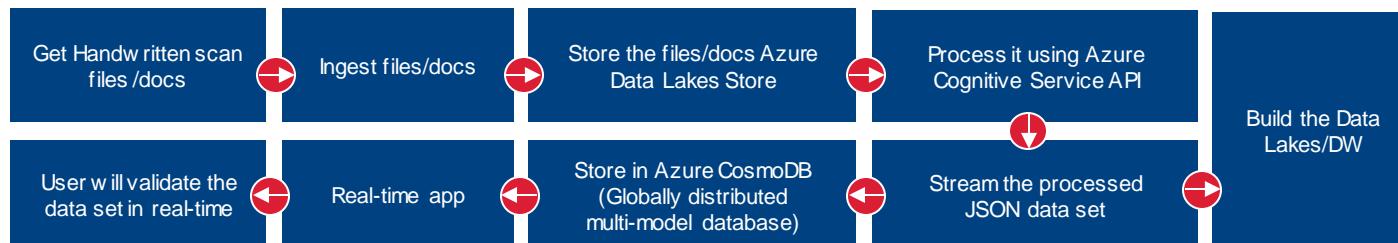
- Shift from physical to digital documents is the fast and effective search and knowledge extraction
- Gone are the days of manual reviewing documents line-by-line
- The researcher needs to extract general concepts, rather than specific phrases.
- It's even more complicated when applied to mixed-quality scanned documents containing handwritten annotations

## Technical problem

- **Entity and knowledge** extraction from documents with handwritten annotations
- Identify handwritten words on a printed page
- Recognize the characters to transcribe the text
- To reinsert these recognized characters back into the OCR result at the correct location.
- Seamlessly integrate into the document ingestion workflow

## Approach

- Capture data continuously from any Handwritten Scan files or Handwritten text using mobile apps
- Process it using **the Azure ML Package** for Computer Vision and **Azure Cognitive Services** in Real-time & near-real time with advanced analytics



# DAiT-A-MATE – AUTOMATED DATA GOVERNANCE & COMPLIANCE AUDIT MANAGER

The screenshot displays the DAiT-A-MATE Data Profiler Cockpit dashboard. At the top, there is a search bar and a navigation menu on the left. The main area features several data cards:

- Distinct Objects Discovered:** This is the card subtitle. Value: 31. View Details.
- Distinct Field Names Detected:** Unique field names across all table objects. Value: 248. View Details.
- PII Detections:** Potential PII Field detections. Value: 14. Socrates.
- Possible PII Correlations:** Potential Pseudo discriminatory PII correlations exceeding 40%. Value: 111. View Details.
- Objects pending Review:** Number of objects that are pending management and approval. Value: 31. View Details.

**DATA TYPE DISTRIBUTION:** List of Data Type Counts by Object.

S NO.	DATA TYPE
1	Binary object
2	Boolean value

**Corelations Data Review:** This section displays automatically determined corelations between different fields in the same table. Inspection of these corelations can help identify potential combination fields that are discriminatory.

Select Object: DimDate. Fetch Data.

S No.	OBJECT_NAME	COLUMN_HEADER	CORELATION_DETAIL
1	DimDate	CalendarQuarter	Correlates to "DayNumberOfYear" with a value of 0.968
2	DimDate	CalendarQuarter	Correlates to "WeekNumberOfYear" with a value of 0.967
3	DimDate	CalendarQuarter	Correlates to "MonthNumberOfYear" with a value of 0.971
4	DimDate	CalendarQuarter	Correlates to "CalendarSemester" with a value of 0.894
5	DimDate	CalendarSemester	Correlates to "CalendarQuarter" with a value of 0.894
6	DimDate	CalendarSemester	Correlates to "MonthNumberOfYear" with a value of 0.868
7	DimDate	CalendarSemester	Correlates to "WeekNumberOfYear" with a value of 0.865

Automated multi-vendor database auditing solution for PII, PCI, PHI and GDPR compliance review and management and obfuscated test data generation

# OPEN COMPONENT BOT FRAMEWORK

## Background

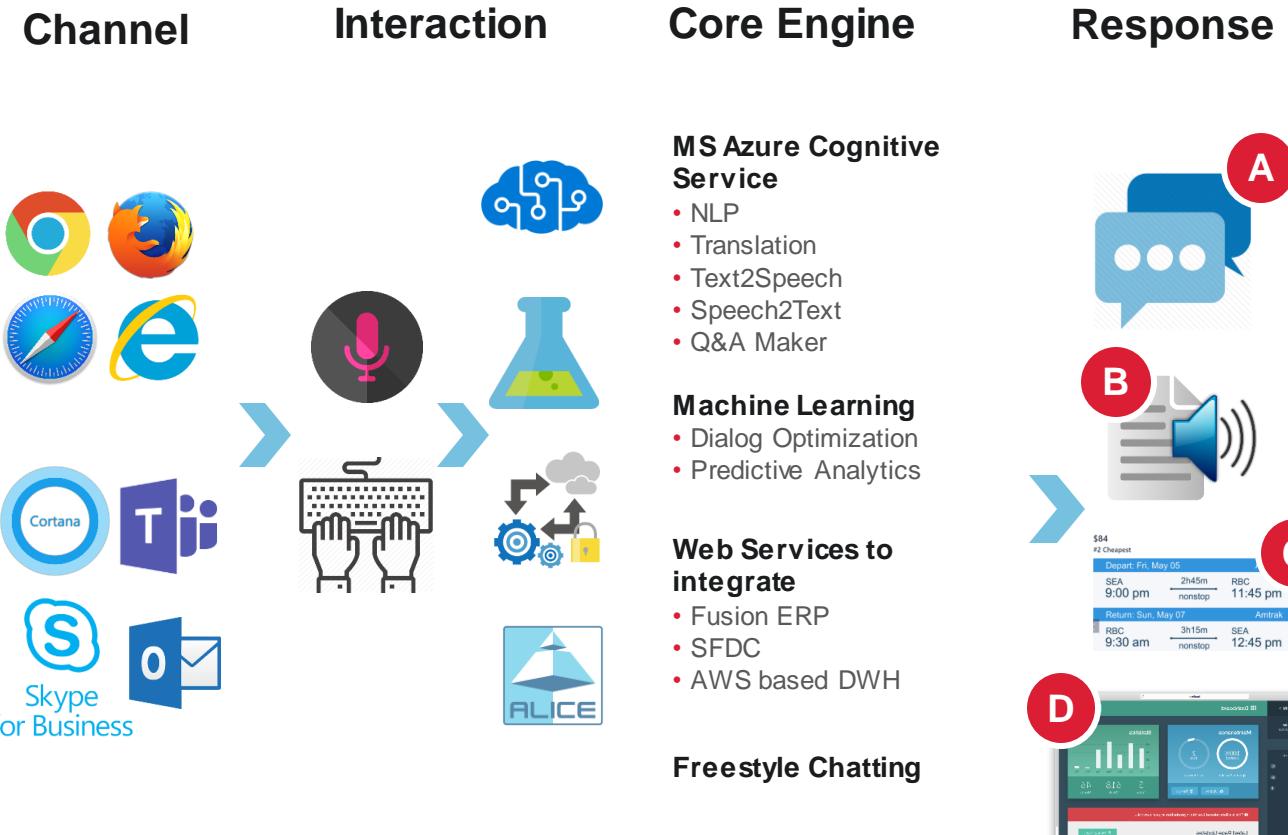
Cloud ERP with SaaS platforms house the client continue growing by leveraging standard blueprint with better user experience, faster deployment & sustainable yet smarter operational product is needed to support daily activities.

## Solution

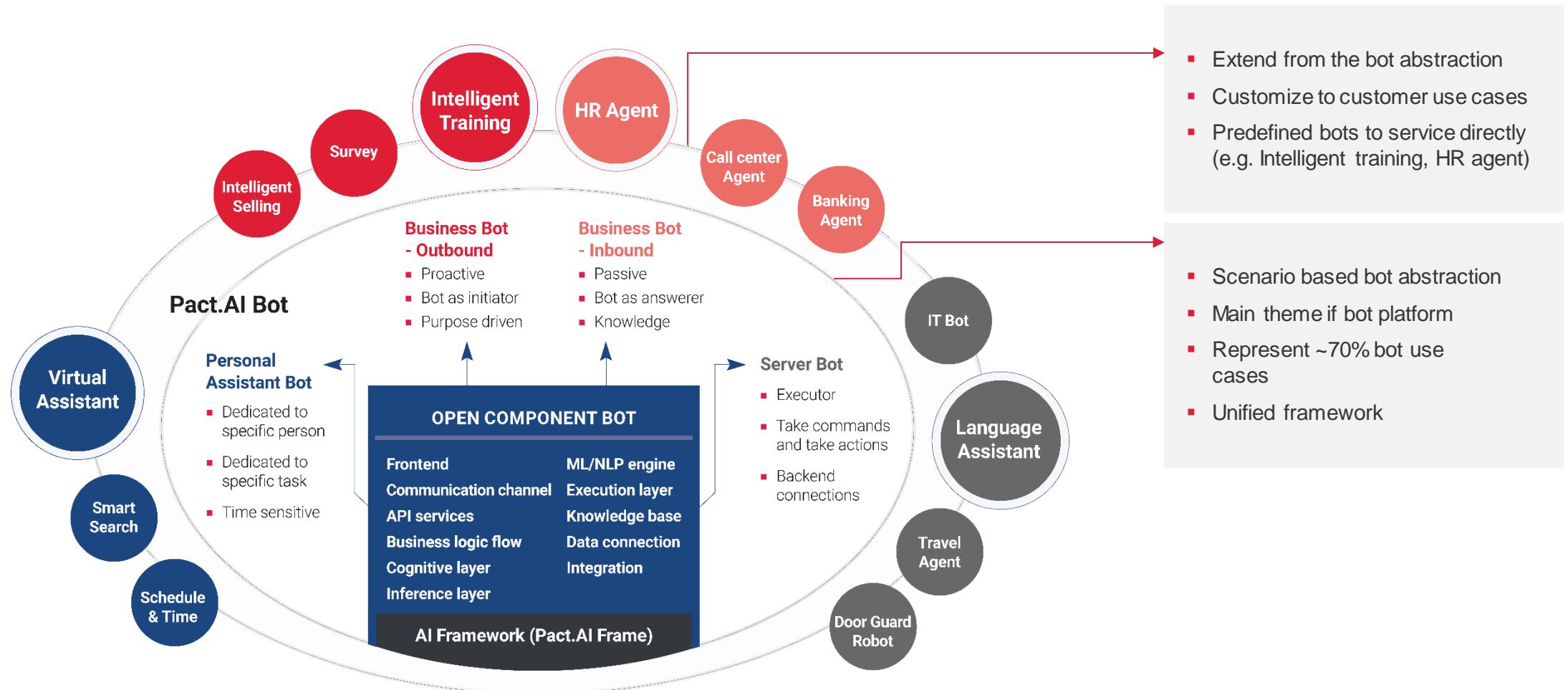
The AI assistant is a digital assistant which exhibit intelligent behaviors with actions, learn, demonstrate, explain & advice users with natural language processing and other cognitive capability.

## Objective

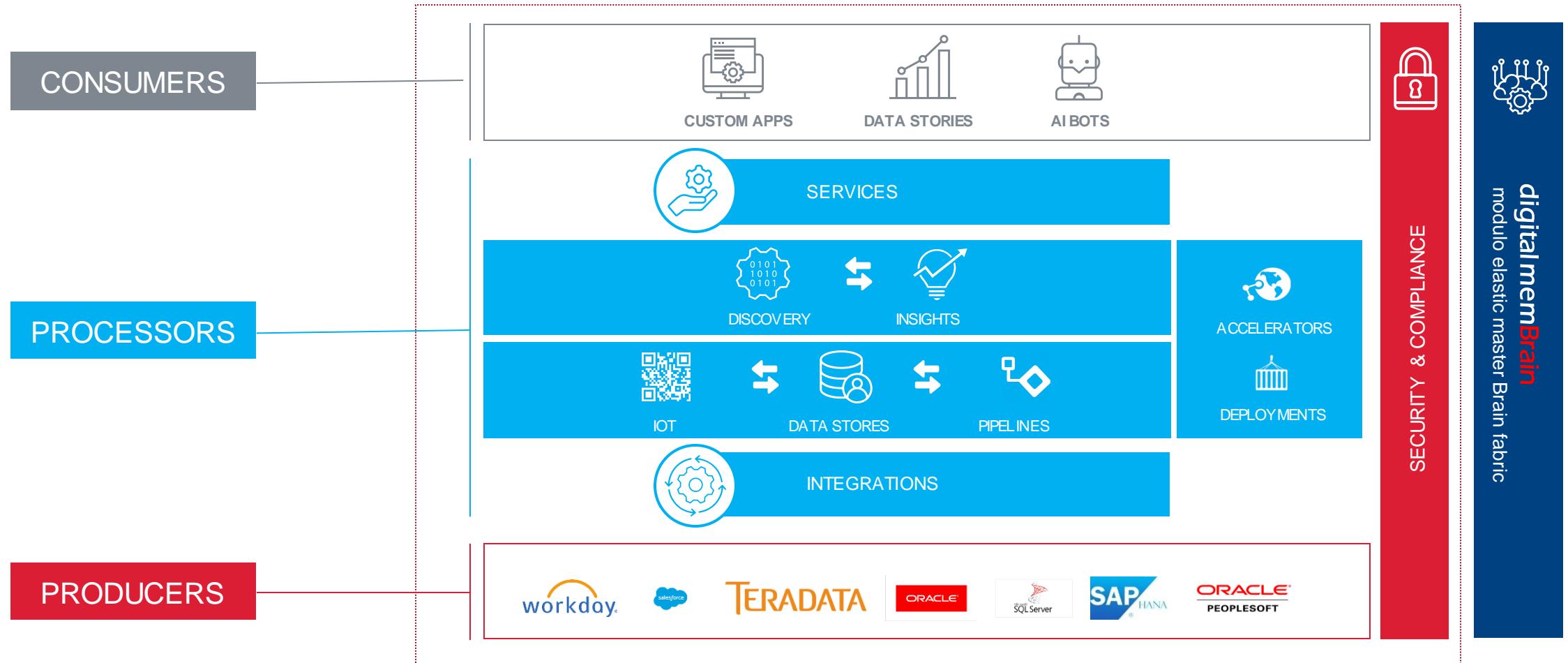
- To put in place the Digital/Diagnostics Assistant that can perform task & services for an individual with digital insights and combine the power of AI & ML with ERP and Data.
- Main functionalities
  - Getting Data and Analyze Data
  - Issue Preventing and Guidance on Fixing Them
  - Operational Q&A



# OPEN COMPONENT BOT FRAMEWORK



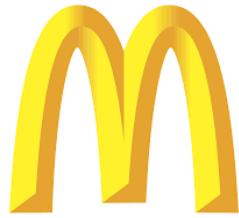
# DIGITAL MEMBRAIN: ENTERPRISE DATA FABRIC REFERENCE FRAMEWORK



# SUCCESS STORIES

# REPRESENTATIVE CLIENTS – AI SPACE

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**Requirement:**

Create mobile voice ordering experience for customers across the world.

**Solution:**

- Natural Language Processing for understanding meaning and monitoring customer service quality
- Developed speaker recognized API
- Pactera Edge's BOT services to reduce repeated human answers
- Voice Synthesis



**Microsoft**

**Requirement:**

Customer wanted to leverage machine learning to prevent identity fraud and unauthorized purchases on their website.

**Solution:**

Pactera set up the machine learning environment from data ingestion from the data pool to manual review. This further refined the predictive model to become more accurate.



**Walmart**

**Requirement:**

Vision-based image assurance services to detect anomaly in images imprinted over products.

**Solution:**

15-Layer DL based algorithm to detect – fake, un-authorized trademarks, celebrity recognition and alignment of spiritual and cultural constraints.

# INTELLIGENT PLANNING PLATFORM FOR B2B TRADE PROMOTIONS/DEMAND FORECASTING

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## Problem

- Core sales planning aspects were managed in Excel causing severe process, performance, collaboration and satisfaction issues.
- Lack of a well-defined process led to inefficiencies in the plan management.



## Solutions

- Pactera built a completely customized AI infused web-based planning platform leveraging SAP Hana database with a custom Angular JS front end.
- Pactera implemented an agile framework for rapid development and deployment of the solution to support the faster time to market requirement.
- Pactera team then partnered with Customer to re-engineer the promotion planning process and implemented the user experience, product design, application and data architecture.



## Impact

- Enhanced customer experience
- Automated generation of forecasts through the predictive model
- Increased collaboration
- Faster time to market
- Standard repeatable processes
- Flexible and scalable platform

# CONVERSATIONAL AI FOR PERSONALIZED CUSTOMER SERVICE

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## Problem

- Develop a Chatbot for personalized customer service



## Solutions

- Adapted and implemented AI technology to provide personalized customer service
- Developed a chatbot built on top of Microsoft's Bot Framework and Speech technologies, the automated assistant can send answers to customer questions in real time.
- Integrated with corporate social media account like WeChat, so the assistant can share product information when interacting with external customers.



## Impact

- A voice enabled intelligent service enables global customer service, and image recognition technologies enable online order submission and signoff.

# VOICE ORDERING THROUGH MOBILE APP

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## Problem

- In order to stay ahead of the competition, and to match customers' experiences with voice assistants, the leading fast food company in America wanted to introduce voice ordering to make it even easier to order on the go.



## Solutions

- Designed and created the mobile voice ordering experience for customers across the world.
- By using a single, yet flexible voice command, customers can bypass swipes, clicks, and drop-downs to order customized sandwiches and meals within the existing mobile application



## Impact

- Discovered how voice enabled within the bounds of their existing application (the mobile app is utilized by 20+ million customers and uses a single set of source code which powers their app across the globe in multiple languages and handles regional menus).

# CONVERSATIONAL AI IN EDUCATION

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## Problem

- Leverage a deep wealth of content to expand a brand that is historically associated with print books into new emerging digital channels



## Solutions

- Discovered, designed, and built an engaging way for children to learn through dynamic storytelling and conversation
- The first episode, "The Olympia Obstacles," provides a choice-driven experience where players travel back in time to the ancient city of Olympia, Greece. As players immerse themselves in the sights and sounds of Olympia, they learn about history in a fun way.



## Impact

- Launched 'Guardians of History', the first voice experience in the history of the 250 year old company, on all Alexa and Google Assistant devices

# NATURAL LANGUAGE SPEECH RECOGNITION FOR DIGITAL ASSISTANTS

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## Problem

- Train and test the Natural Language Processing (NLP) model of the digital assistant



## Solutions

- Pactera provided End to End data processing services for model training that included: Audio Data Collection, Audio Transcription, Text Transformation, Semantic Annotation and Language Consultation
- Pactera also supported the testing of digital assistant through the services: Text-to-Speech Testing and User QoE judging



## Impact

- Expertly processing approx. 36M data samples per year
- Continuing to partner with the client on new projects within Speech programs, like a prominent fast food chain drive thru transcription project or Enterprise AI PI

# AI ENABLEMENT FOR SEARCH SERVICES

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## Problem

- A major search engine uses artificial intelligence to contextualize search data that is relevant to each user. This relevance is based on a sophisticated AI model that takes each user's geographic location, preferences and history and correlates this with Big Data gathered from the entire user base.
- Client wanted to evaluate the output of search engines AI model, so that the results are accurate



## Solutions

- Pactera provided a valuable service to the client, who created the AI model that its search engine is founded on.
- Pactera leveraged a global network of human judges who evaluated the output of the search engine's AI model, and created training datasets so that AI model output is more accurate.



## Impact

- Search results provide accurate business listings.
- Maps provides detailed information on neighbourhood points of interest.
- Search provides detailed information on events in your local area.
- Search AI can find accurate images in image search.
- Maps finds the fastest route or method of transit between two points on a map.

# AI ENABLED SPAM FILTER FOR EMAIL APPLICATION

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## Problem

- A large technology company with an email application wanted to prevent Spam marketers from continually bypassing built in spam filters.



## Solutions

- AI-enabled spam filter can block spam coming to the inbox and send it directly to the junk folder. It needs continual training to ensure it is filtering the right email.
- Pactera designed and implemented the training environment to train the AI enabled spam filter.
- Pactera email labelling team judged sample email data and fed that training data to the environment.
- Pactera also validated the data and performed analytics on the process.



## Impact

- The AI enabled spam filter was a big success and is blocking the spam and sending it directly to junk folder.

# AI FOR FRAUD DETECTION & UNAUTHORIZED PURCHASES

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## Problem

- The online store of a large technology company wanted to leverage machine learning to prevent identity fraud and unauthorized purchases on their website. They needed a partner to help them build it.



## Solutions

- Pactera set up the machine learning environment from data ingestion from the data pool to manual review.
- Fraud Protection Predictive Model to catch typical fraud cases before they finish.



## Impact

- A robust system in place to catch fraud cases and unauthorized access.

# AI FOR DEFECT DETECTION

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## Problem

- A large semiconductor manufacturer approached Pactera to improve its defect detection workflow using machine learning.
- Foreign material and manufacturing defects come in irregular shapes and sizes



## Solutions

- Pactera set up the machine learning environment from image labelling, data preparation and model training.
- Built a Defect Detection Model for catching defects.
- Pactera further refined the defect detection model to fine tune its performance in detecting smaller or irregular defects and foreign material.



## Impact

- No more defect leakage

# INTELLIGENT TRAINING - AI SYSTEM

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## Problem

- Customer has the high agent turnover rate, and it bring high pressure on training the new agent as qualified instructor resources are insufficient.



## Solutions

- Intelligent training program to develop Coaching-Bot for assistant, instructors can do training and improve the training quality, the 7-days zero break index and effective call time by 60%.
- Agent: can choose variety of difficult situations to simulate real scene for voice training, talk to the training-bot by voice, bot scores the agent immediately after the practice is completed, detailed score and mistakes will be outlined; One can replay recording of ones own practice, the correct standard conversation pattern can be displayed to correct mistakes, etc.
- Instructors & Course Designers: design variety of difficulty and scene simulation of real business conversation scenarios for student agent, build rule to reflect the conversation pattern in the training, it includes special model configuration such as emotion detection.



## Impact

- One-on-one coaching. Change the role play of practice, transform to personal training-BOT, improve the productivity by 60%.
- Teaching assistant for instructors. Enhance instructors' experience with high-quality conversation pattern on teaching, have high visibility of student agent's progress and performance;
- **Practice anywhere, anytime.** It can be easily integration into various mobile applications, student agent can practice at anytime and anywhere.

pactera  EDGE

# GLOSSARY

# GLOSSARY (1/3)

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**Algorithm:** A formula or set of rules for performing a task. In AI, the algorithm tells the machine how to go about finding answers to a question or solutions to a problem on its own; classification, clustering, recommendation, and regression are four of the most popular types.

**Analogical reasoning:** Solving problems by using analogies, by comparing to past experiences.

**Artificial Intelligence (AI):** A machine's ability to make decisions and perform tasks that simulate human intelligence and behaviour.

**Artificial Neural Networks (ANN):** A learning model created to act like a human brain that solves tasks that are too difficult for traditional computer systems to solve.

**Autonomous:** Autonomy is the ability to act independently of a ruling body. In AI, a machine or vehicle is referred to as autonomous if it doesn't require input from a human operator to function properly.

**Bayesian network:** A type of probabilistic graphical models built from data and/or expert opinion. They are graphs explaining the chances of one thing happening depend on the chances that another thing happened. They can be used for a wide range of tasks including prediction, anomaly detection, diagnostics, automated insight, reasoning, time series prediction and decision making under uncertainty

**Chatbots:** A chat robot (chatbot for short) that is designed to simulate a conversation with human users by communicating through text chats, voice commands, or both. They are a commonly used interface for computer programs that include AI capabilities.

**Classification:** Classification algorithms let machines assign a category to a data point based on training data.

**Cluster analysis:** A type of unsupervised learning used for exploratory data analysis to find hidden patterns or grouping in data; clusters are modelled with a measure of similarity defined by metrics such as Euclidean or probabilistic distance.

**Clustering:** Clustering algorithms let machines group data points or items into groups with similar characteristics.

**Cognitive computing:** A computerized model that mimics the way the human brain thinks. It involves self-learning through the use of data mining, natural language processing, and pattern recognition.

**Computer vision:** The field of A.I. and image processing that train machines how to interpret the visual world

**Convolutional Neural Network (CNN):** A type of neural networks that identifies and makes sense of images.

# GLOSSARY (2/3)

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**Data mining:** The process by which patterns are discovered within large sets of data with the goal of extracting useful information from it.

**Data science:** An interdisciplinary field that combines scientific methods, systems, and processes from statistics, information science, and computer science to provide insight into phenomenon via either structured or unstructured data.

**Decision tree:** A tree and branch-based model used to map decisions and their possible consequences, similar to a flow chart.

**Deep learning:** The ability for machines to autonomously mimic human thought patterns through artificial neural networks composed of cascading layers of information

**Facial recognition:** The recognition of faces and emotional states in images or video signals. This is commonly done through point annotations called landmarks

**Heuristics:** These are rules drawn from experience used to solve a problem more quickly than traditional problem-solving methods in AI. While faster, a heuristic approach typically is less optimal than the classic methods it replaces.

**Image recognition:** Recognizing the specific types of objects in given image or video datasets

**Machine Learning (ML):** A field of AI focused on getting machines to act without being programmed to do so. Machines “learn” from patterns they recognize and adjust their behavior accordingly.

**Natural Language Processing (NLP):** The ability of computers to understand, or process natural human languages and derive meaning from them. NLP typically involves machine interpretation of text or speech recognition.

**Optical Character Recognition (OCR):** A system that detects images of handwritten or printed text and converts them into machine-readable text

**Recurrent Neural Network (RNN):** A type of neural network that makes sense of sequential information and recognizes patterns, and creates outputs based on those calculations.

**Reinforcement learning:** A process where machines learn to do a new task like humans do — through a system of rewards and punishments — starting as a novice and improving with practice and feedback.

# GLOSSARY (3/3)

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**S**peech recognition: The recognition of words and/or emotional state in an audio signal

Supervised learning: A technique that teaches a machine-learning algorithm to solve a specific task using data that has been carefully labelled by a human. Everyday examples include most weather prediction and spam detection.

**T**raining data: In machine learning, the training data set is the data given to the machine during the initial “learning” or “training” phase. From this data set, the machine is meant to gain some insight into options for the efficient completion of its assigned task through identifying relationships between the data.

**Transfer learning:** This method tries to take training data used for one thing and reuse it for a new set of tasks, without having to retrain the system from scratch.

**Unsupervised learning:** A type of machine learning in which human input and supervision are extremely limited, or absent altogether, throughout the process. In unsupervised learning, the machine is left to identify patterns and draw its own conclusions from the data sets it is given. The most common unsupervised learning method is cluster analysis.