



# Demand Forecasting Accelerator on AWS

[www.sigmoid.com](http://www.sigmoid.com)





## About Sigmoid

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# Sigmoid is an emerging leader in data engineering and AI solutions.



**750+**

Employees



Work with **30+**  
Fortune 500 firms



**>97%**

CSAT score



**200+**

ML models operationalized



**5000+**

Data pipelines built

Backed by

**SEQUOIA** 

## Awards and Recognition

**500™**

Technology **Fast 500**  
2023 NORTH AMERICA  
**Deloitte.**

**\*ISG**

Provider Lens 2023 Quadrant

**Analytics Services**  
Rising Star, U.S. ★

Report releasing Jan 2024



America's  
Fastest-Growing  
Private Companies



Open Source data  
solution provider  
of the year



**FORRESTER**  
**Now Tech:**  
**AI Consultancies,**  
Q1, 2021 Report

Major Contender in

**EVEREST GROUP**

Analytics and AI Services Specialists  
PEAK Matrix (2022)

## Offices



New York



San Francisco



Dallas



Lima



Bangalore



Amsterdam

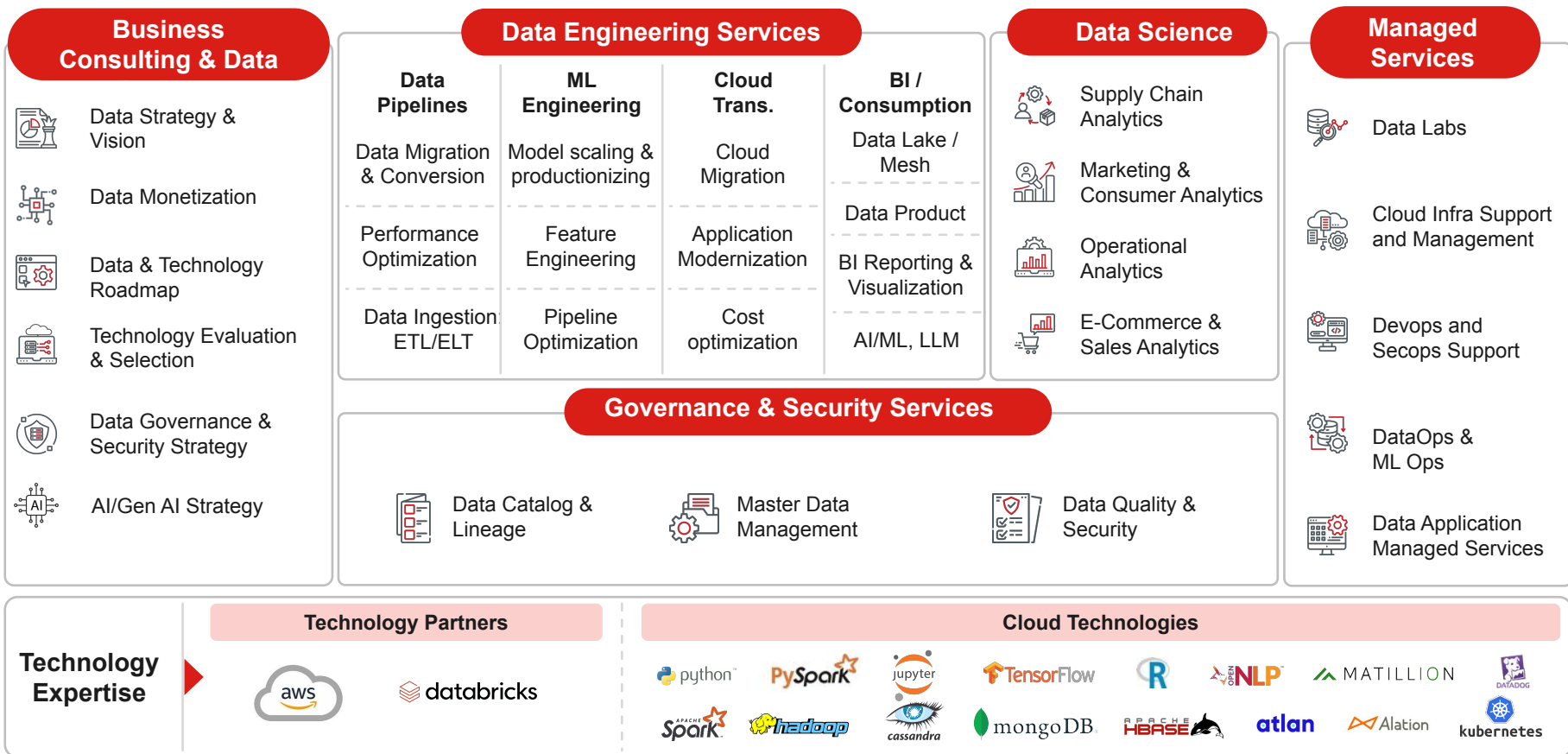


London



Sao Paulo

# Enabling Business Transformation with Full-Service Capability Suite



# Sigmoid Capabilities - Experience in implementing data solutions in AWS

Sigmoid has worked with more than Five large customers to design, build and deploy solutions in AWS

## Data Processing & Transformation:

- **Amazon EMR:** Collaborative Apache Spark-based analytics platform used for big data processing and machine learning.
- **AWS Glue:** Fully managed ETL (Extract, Transform, Load) service for preparing and transforming data.

## Data Storage & Management:

- **Amazon S3:** Scalable and secure data lake for storing large amounts of structured and unstructured data.
- **Amazon RDS:** Managed relational database service for structured data storage.

## Data Ingestion & Integration:

- **AWS Data Pipeline:** Creating data workflows that move and process data across AWS services.
- **Amazon Kinesis:** Real-time data ingestion from applications, devices, or any streaming data sources.

## Data Analytics & Visualization:

- **Amazon Redshift:** Data warehouse service used for analyzing large datasets with either serverless or provisioned resources.
- **Amazon QuickSight:** Business intelligence tool for creating interactive visualizations and reports.

## Machine Learning & AI:

- **Amazon SageMaker:** End-to-end platform for building, training, and deploying machine learning models.
- **AWS AI Services:** Pre-built AI services for vision, speech, language, and decision-making (e.g., Amazon Rekognition, Polly, Comprehend, Textract).

## Security & Compliance:

- **AWS IAM (Identity & Access Management):** Identity and access management service.
- **AWS Organizations & AWS Config:** Governance and compliance tools for managing AWS environments at scale.



Sigmoid's implementation of solutions in AWS involves leveraging a combination of services and tools tailored to specific business needs. Sigmoid would facilitate collaboration between data engineers, data scientists, business analysts, and other stakeholders to align the implementation with business goals and ensure success.





# Demand Forecasting Accelerator

# Demand Forecasting Accelerator- What and Why?



## Challenges



Varied forecasting horizons



Different costs associated with overstocking & understocking



Product types range from raw materials to finished goods



Problems exist at different levels ranging from supply side to demand side

## Why is it important to solve



First input in any enterprise level supply planning exercise.



A broken forecasting system could lead to severe overstocking & understocking issues which can lead to huge financial & brand equity loss



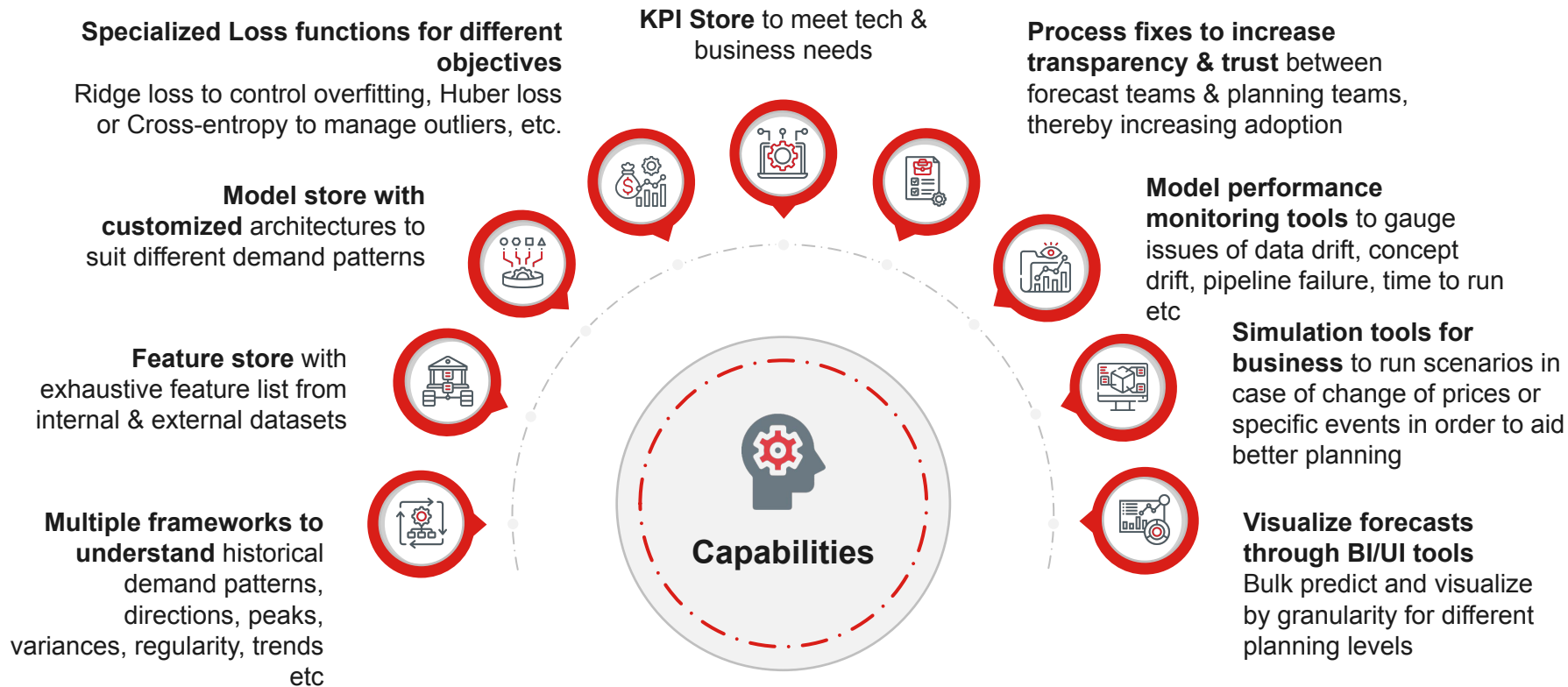
Almost all product businesses suffer from the lack of a robust demand forecasting system

## What is an Accelerator

Accelerator is a concept that lies between a custom solution & a full fledged product. It has following capabilities

- ▶ Host of multiple architectures, features & KPIs ready to be stitched based on need
- ▶ Highly customizable to meet the needs of different industries & stakeholders
- ▶ Quicker onboarding & speed to market
- ▶ Well tested frameworks on different data sets

# Demand Modeling Suite: Key Capabilities Accelerator





# Indicative Examples - Feature, Model & KPI Store

## Feature Store

- Holidays, seasonality, macro-economic data
- Technical indicators, e.g., lags, differences, MAs, differences-MAs, MA-spreads, direction, occurrence, etc.
- Retail demand, prices, stock/ inventory, assortment, discounts/ promotions, marketing
- BOM/ MWU, raw materials Purchase Orders - quantities and prices
- Raw material vendors lead-times, delays
- Planned production schedules and factory holidays
- Process loss at factories
- Customer POs (demand), delivery lead times and delays
- Supply-chain disruptions, launches of new products, changes in distribution - demand planner inputs not being captured

## Model Store

- Simple models like theta, ARIMA & Holtz Winterz to establish baseline
- Multi staged stacked models to estimate directions & occurrence incidents
- Log linear, recursive, bayesian based models & genetic models to cater to wide search spaces
- Constrained models with capability to consider business constraints
- Robust testing methodologies like backtesting, walk forward testing etc

## KPI Store

### Tech KPIs

- **MAPE** - Mean error
- **WAPE** - Weighted error
- **VWAPE** - Volume weighted error
- **ZWMAE** - Z value weighted error
- **Shape params** - CV, ADI, % peaks etc

### Business KPIs

- **BIAS** - Direction of prediction
- **COVERAGE** - % of SKUs for which forecast is available
- **BULLSEYE** - Good Value for Important products
- **Cost of Overprediction/ underprediction** - To be decided post discussion with Business teams

# Engagement Models

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# Engagement Model



## Scope Alignment & Data Acquisition

2 week

- Agree on high level scope (Brand / BU / Geography/ Channels)
- Understand existing datasets
- Identify key features
- Align on product hierarchy & Demand attributes
- Identify Business POC for data acquisition
- Identify benchmarks



## Modelling & Draft Output Generation

4 weeks

- Activity to initiate after data acquisition is complete
- Baseline model contextualisation to the new brand



## Output Calibration & Parameter Tuning

4 week

- Validate draft outputs with business team
- Create Feature store to identify understocking and overstocking events for each SKU / Brand / Category
- UI Contextualization



## Publish Outputs & Agree on next steps

2 week

- Publish final outputs to business team & align on product roadmap

*Pilot*

**150,000 USD**

*\*12 Weeks Engagement*

# Engagement Model

Scoping Checklist	
<b>Pre-Requisite to conduct a Pilot</b>	1. Share the requested datasets with the required granularity
	2. Benchmark Forecasting Reports
	3. Understand the KPIs that need to be calculated and showed to users on the UI
	4. Sigmoid to test out the data quality and confirm the start date
	5. Agreement on Success Metrics
	6. PO/LOI to start the Pilot
	7. Authorizing individuals with email address who will work on the solution
	8. Access to AWS Instance, Console - Infra Provisioning to be done
<b>Scope of Pilot</b>	1. PO Forecasting solution to be done at a SKU X Warehouse X Retailer level
<b>Deliverables</b>	1. Demand Trends and Levels to be given for the pre-decided SKUs for specific brands
	2. Validate the draft outputs with the business teams
	3. UI (dashboard) walkthrough will be given to business users and changes requested will be assessed to estimate development efforts



# Timelines

Project Management													
Description of tasks	W	W+1	W+2	W+3	W+4	W+5	W+6	W+7	W+8	W+9	W+10	W+11	W+12
Share the requested datasets with KPIs, Benchmark Forecasting reports and KPIs													
Data Quality Testing													
Agreement on Success Metrics													
Access and Infrastructure Provisioning													
Model Development													
Model Training and Testing													
Report Generation													
Fine Tuning													
Handover for User Testing													
Documentation & Success Criteria Sign Off													

# Success Story

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# Implementing the Demand Forecasting Accelerator for a F500 Major

## Case Background

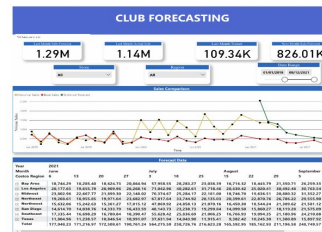
- The customer, a leading manufacturer of health, hygiene and nutrition products, needed to perform demand forecasting for a better supply chain planning
- They were looking for a robust demand forecasting solution that could consider the impact of covid and provide accurate forecasts so as to plan for inventory beforehand to prevent stockouts.

## Sigmoid Solution

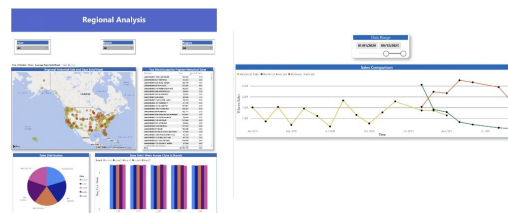
The accelerator consists of models making use of time series features(trends, seasonality etc) along with exogenous variable like statewide covid cases data, inventory data, orders data.



The fully automated forecasting modules were also integrated with other supply chain platforms



Incorporated robust testing approaches to ensure the consistency of the model performance in the future.



## Business Impact

**50%** improvement in stockout days

**45%** reduction in WAPE

**8%** quarterly sales uplift

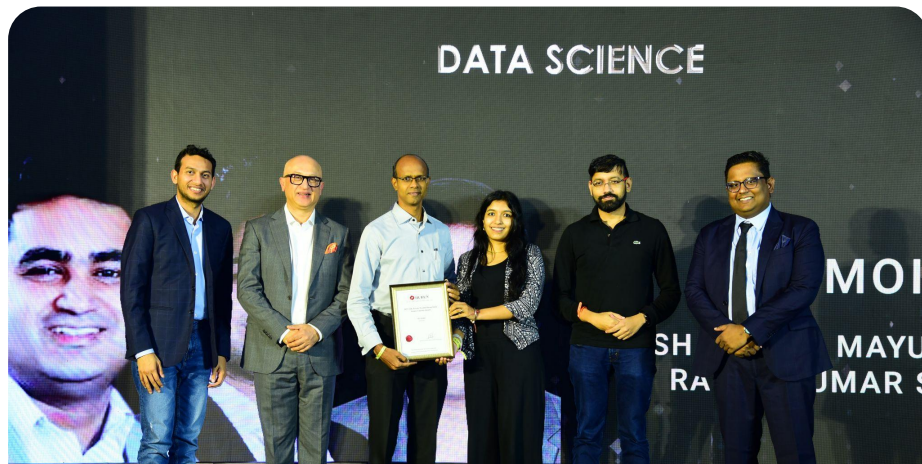
# Thank you



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Website: [www.sigmoid.com](http://www.sigmoid.com)



**'India Future Unicorn Award'**  
in Data Science category by Hurun India

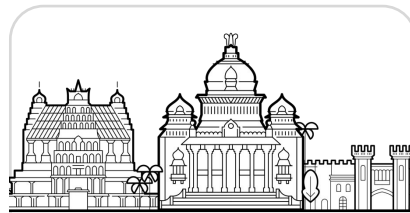
**Global presence:**



**USA** (NY, SF, Dallas,  
Chicago)



**EU** (Amsterdam,  
London)



**India**  
(Bengaluru)



**LATAM** (Lima)