



Demand Forecasting Accelerator on Azure

www.sigmoid.com





About Sigmoid

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

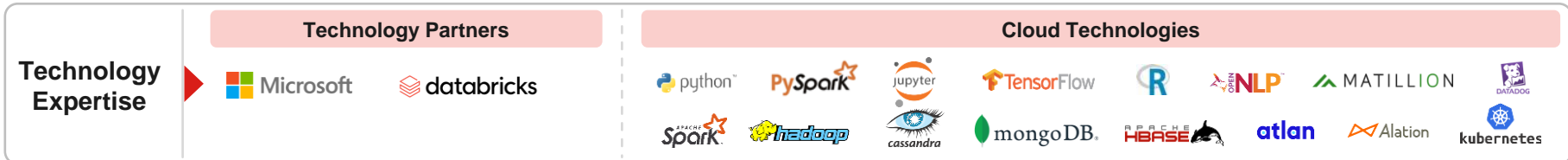
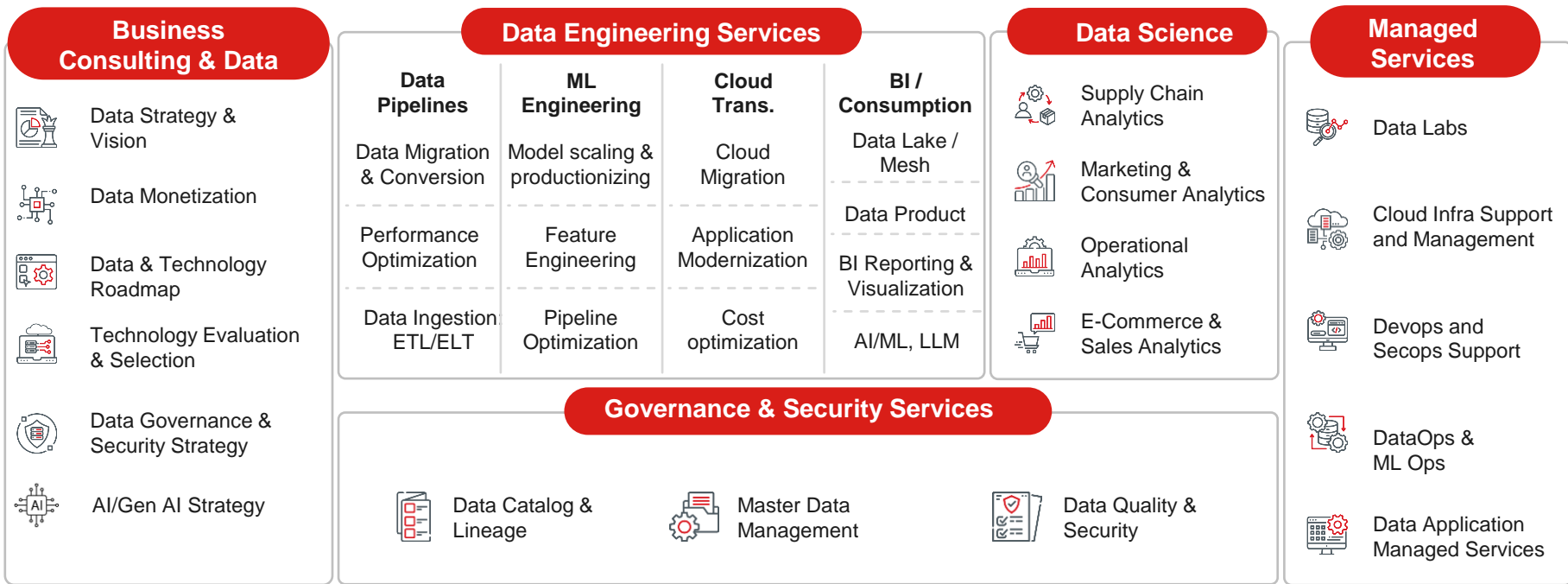


London



Sao Paulo

Enabling Business Transformation with Full-Service Capability Suite



Sigmoid Capabilities - Experience in implementing data solutions in Azure

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

Data Processing & Transformation:

- **Azure Databricks:** Collaborative Apache Spark-based analytics platform to be used for big data processing and machine learning.
- **Azure HDInsight:** Managed cloud service for processing big data using popular open-source frameworks like Hadoop and Spark.

Data Analytics & Visualization:

- **Azure Synapse Analytics:** Analytics service which will be used for analyzing large amounts of data using either serverless or provisioned resources.
- **Power BI:** Business intelligence tool to be used for creating interactive visualizations and reports.

Data Storage & Management:

- **Azure Data Lake Storage:** Scalable and secure data lake for storing large amounts of structured and unstructured data would be considered.
- **Azure SQL Database:** Managed relational database service for structured data storage.

Data Ingestion & Integration:

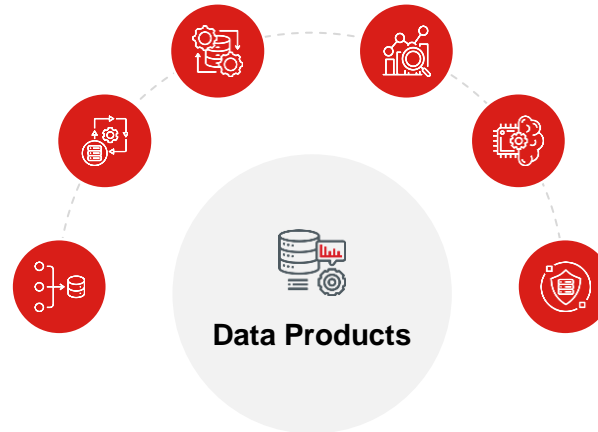
- **Azure Data Factory:** Creating data pipelines to move and transform data from various sources.
- **Azure Event Hubs:** Real-time data ingestion from applications, devices, or any data streams would be done.

Machine Learning & AI:

- **Azure Machine Learning:** End-to-end platform for building, training, and deploying machine learning models.
- **Cognitive Services:** Pre-built AI services for vision, speech, language, and decision-making.

Security & Compliance:

- **Azure Active Directory:** Identity and access management service.
- **Azure Policy & Blueprints:** Tools for implementing governance and compliance across Azure resources.



Sigmoid's implementation of solutions in Azure involves leveraging a combination of services and tools tailored to specific business needs. Sigmoid would collaborate between data engineers, data scientists, business analysts, and other stakeholders as it is essential 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



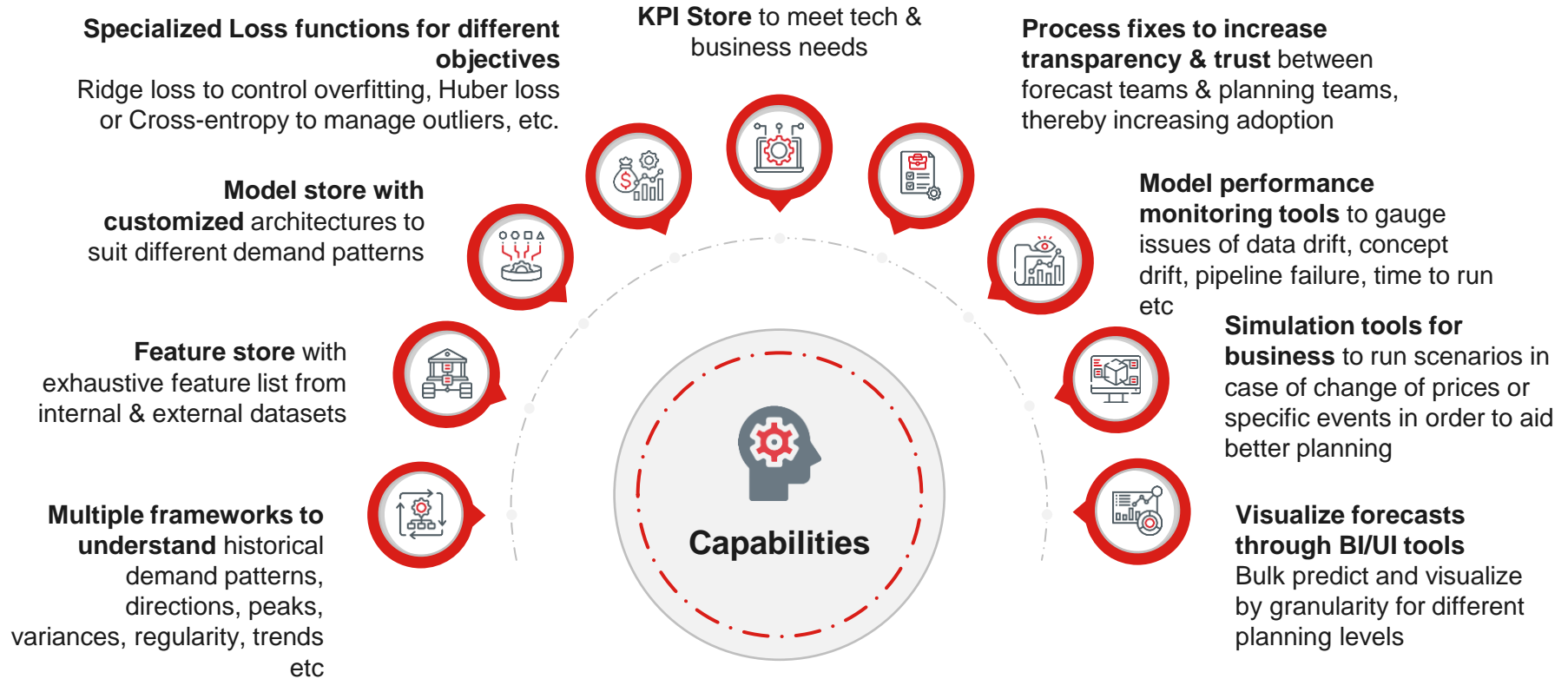
Almost all product businesses suffer from the lack of a robust demand forecasting system

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

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	
	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
Pre-Requisite to conduct a Pilot	8. Access to Azure Instance, Console - Infra Provisioning to be done
Scope of Pilot	1. PO Forecasting solution to be done at a SKU X Warehouse X Retailer level
Deliverables	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

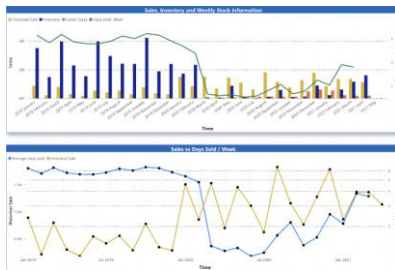
Implementing the Demand Forecasting Accelerator for a F500 Major

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 statewise 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



Email: surabhi.s@sigmoidanalytics.com



Website: www.sigmoid.com



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

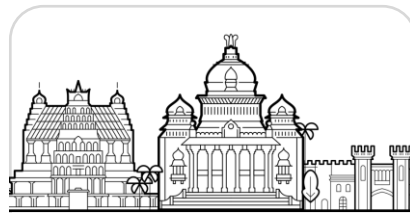
Global presence:



USA (NY, SF, Dallas, Chicago)



EU (Amsterdam, London)



India
(Bengaluru)



LATAM (Lima)