Supplemental Framework

Slide Show Presentation

Problem Solving Framework

Business Case Study

EACE – Framing of Problem

Customer	Inventory	Marketing	On-Offline	Technology
• Declining in-store customers • Focus on converting underperforming stores to fulfillment hubs for online growth	• Inventory carry-over is higher • Inventory discount is hurting margins	• Lack of customer centric promotions • Customer profile data mining is virtually non-existent	• Lack of Customer experience • Virtually zero personalization • Degrading instore shopping experience • Ordinary mobile app feature cadence	• Scattered use of Google Cloud • Slower delivery & deployment • Lack of benchmarking from digitally native competitor • Slower processing of customer data

EACE – Framing of Problem

- **Stakeholders**
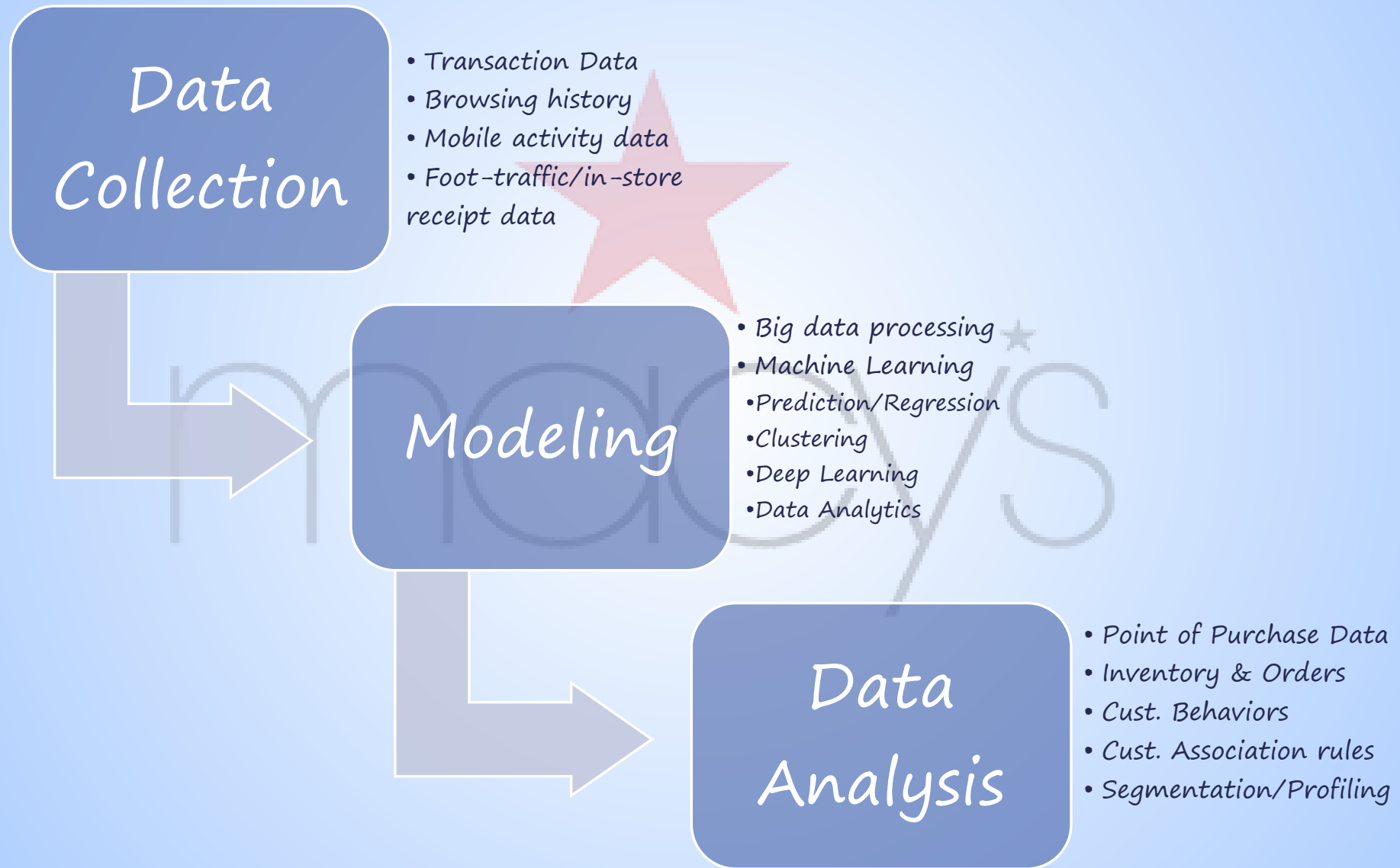 - CEO – Jeffery Gennette
  - CTO – Naveen Krishna

- Challenges
  - Changing consumer behavior
  - Changing business model i.e. fashion --> Consumer Preferences & Personalization
  - Effectively managing multiple touchpoints i.e. in-store, online, mobile, tablet
  - Everchanging technology and preferences of NextGen consumers
  - Habitual customers as a result of promotions/markdowns driven by inventory carry-overs

- Nature of Problems
  - Deterministic
    - Inventory management/assortment based on prediction
    - Value chain optimization
  - Stochastic
    - Customer spending forecast over time
    - Personalized recommendation based on past buying habit and future prediction

F<u>A</u>CE – Analysis to solve the problem

Data Collection
- Transaction Data
- Browsing history
- Mobile activity data
- Foot-traffic/in-store receipt data

Modeling
- Big data processing
- Machine Learning
- Prediction/Regression
- Clustering
- Deep Learning
- Data Analytics

Data Analysis
- Point of Purchase Data
- Inventory & Orders
- Cust. Behaviors
- Cust. Association rules
- Segmentation/Profiling

FACE – Analysis to solve the problem

- **Modeling Approach**
  - Mainly predictive and interpretation model to analyze each customer's
    - Spending
    - Browsing history trends/patterns
    - Usage of promotion, prediction on future usage
    - Segmentation of customer based on
      - Spending
      - Likelihood of buying certain styles
  - Leverage AutoML modeling techniques for speed, scale and insight

- Data
  - In-store customer point of sale data
  - Customer shared image data on Macy's social media channels – FB, Instagram, Twitter etc.
  - Any third-party data that can provide customer insight/profile
  - Geospatial data for demographic cluster insight
  - Customer activity data

FACE – Communication

Communication Medium
- Presentation
- Graphics & Visualization of KPI and findings

Customer Conversion
- % Online visitors
- % Anonymous vs. registered
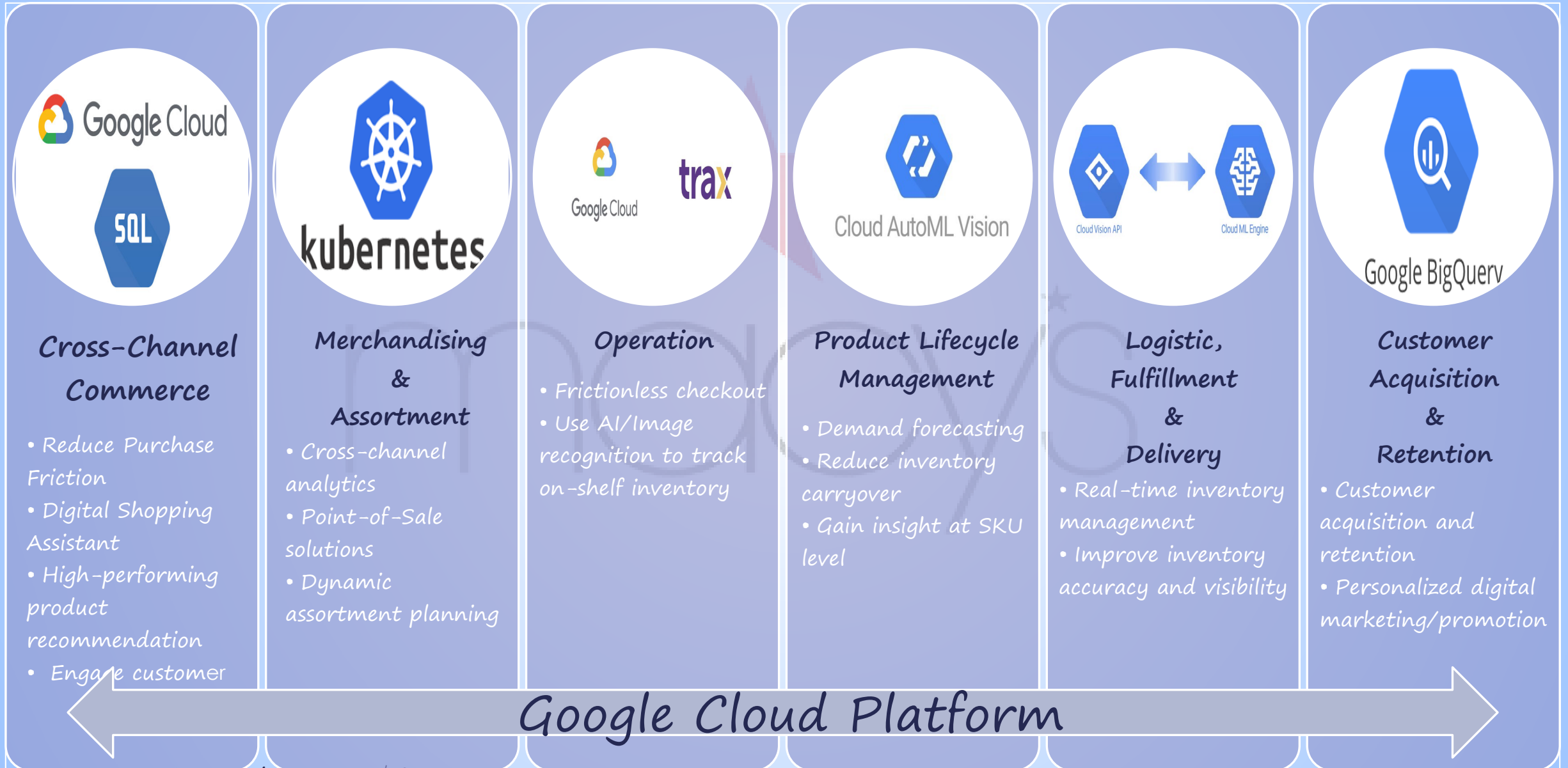- % Engagement vs. shopping

Customer Experience
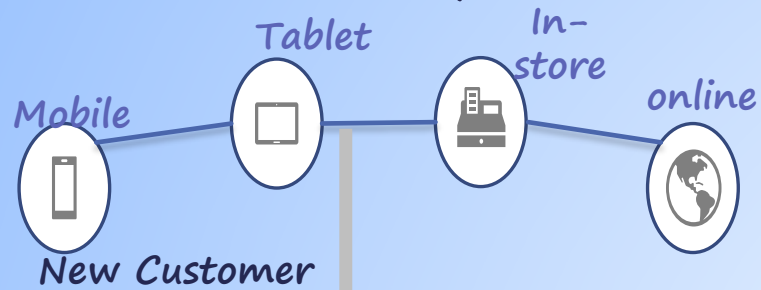- In-store shopping
- Online recommendation
Customer Segmentation
- RFM (Recency, Frequency, Monetary(analysis
- Group by transaction
- Identify in-store customer

FACE – Embed

Cross-Channel Commerce

- Reduce Purchase Friction
- Digital Shopping Assistant
- High-performing product recommendation
- Engage customer

Merchandising & Assortment

- Cross-channel analytics
- Point-of-Sale solutions
- Dynamic assortment planning

Operation

- Frictionless checkout
- Use AI/Image recognition to track on-shelf inventory

Product Lifecycle Management

- Demand forecasting
- Reduce inventory carryover
- Gain insight at SKU level

Logistic, Fulfillment & Delivery

- Real-time inventory management
- Improve inventory accuracy and visibility

Customer Acquisition & Retention

- Customer acquisition and retention
- Personalized digital marketing/promotion

Google Cloud Platform

Example Use Case

Mobile

Tablet

In-store

online

New Customer

Customer Application
- Messages
- Personalized Promotions
- Order Confirmations
- Order pick-up

★macy's

Welcome Back!
Here's what you've Missed..

/Users/{uid}/customers/{id}

Serverless Customer Messaging

macy's

Personalized Promotions

Win-Win

Technology Savings

Increased foot-traffic

Increased loyalty
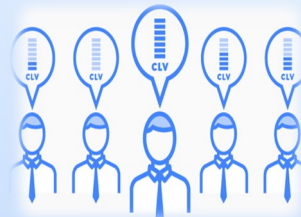
Higher Customer Savings

event-driven scaling

Pay only for what you use

Low CLV:CAC

Most Profitable Customer

Intimate Customer Relationship

No Servers to manage

Quick deployment

FACE – The Pachinko Machine

Analytical Solution Approach

- Retail Fashion Industry
- Macy's – A fashion retailer in departmental/ecommerce space
- Inventory and markdown has impacted revenue.
- Customer engagement and conversion is less than 2%
- In-store customer experience is declining and zero visibility in customer profile/preferences
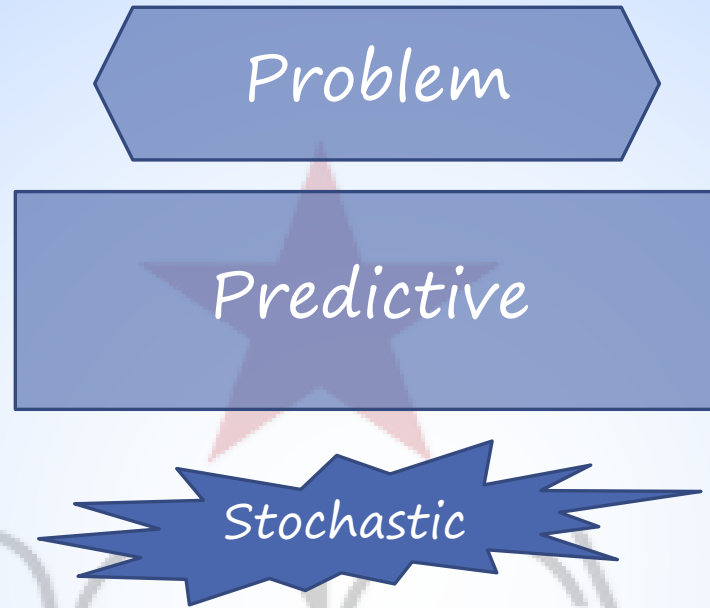
Problem

Descriptive WHAT?

Diagnostic WHY?

– How many unique visitors to Macys.com
– % of total number of customer engage/buy?

– What factors cause to remain anonymous?
– % of total number of customer sign-up?

Analytical Solution Approach

```
    ┌────────────────────┐
    │      Problem       │
    └────────────────────┘

    ┌────────────────────┐
    │                    │
    │     Predictive     │
    │                    │
    └────────────────────┘

        ✦ Stochastic ✦
```

- – Faster/real-time data acquisition, processing for prompt customer insights on
  - – Behavior
  - – Shopping habits & preferences
- – Identify customers with high buying probability
- – Offer personalized style recommendation before checking out online
- – How to encourage customer to signup and engage?

Analytical Solution Approach

Problem

Predictive

Stochastic
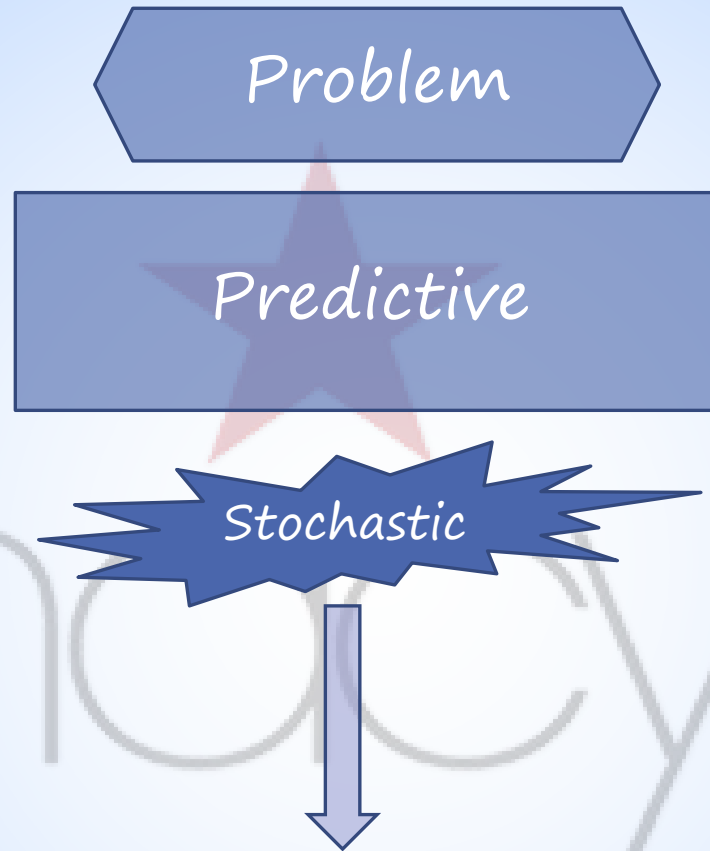
- Potential Modeling algorithms
  - Logistic Regression
  - Random Forest
  - Deep Learning
  - Clustering

Communication & Actions

Problem

Prescriptive

Deterministic
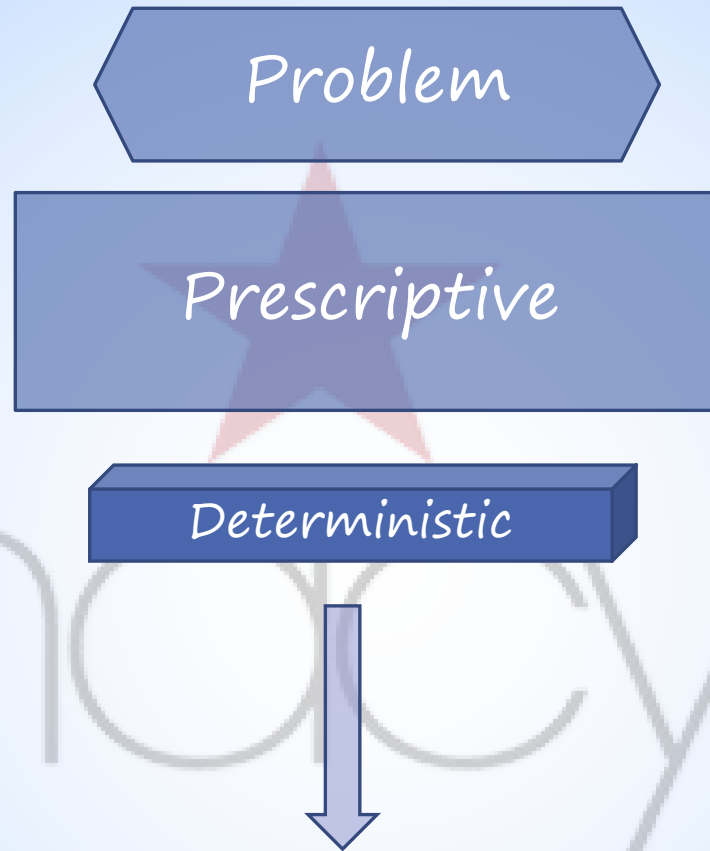
- Minimize inventory carryover
  - Decision variables to optimize inventory assortment and management
  - Machine learning with Google Cloud Platform

Embedding final models

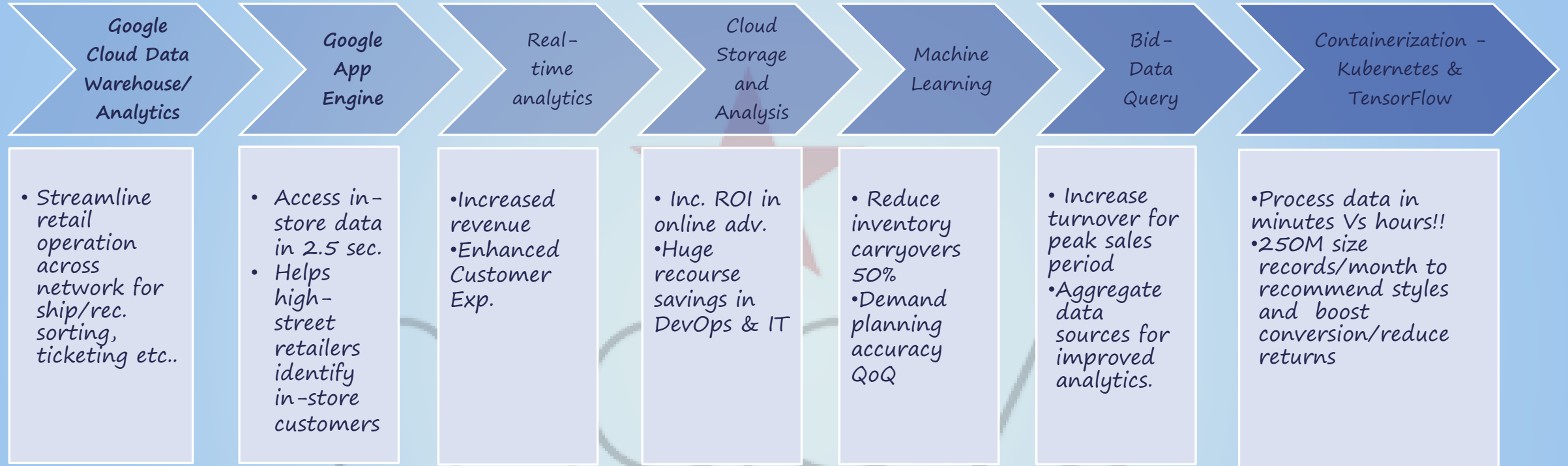| Google Cloud Data Warehouse/ Analytics	Google App Engine	Real-time analytics	Cloud Storage and Analysis	Machine Learning	Bid-Data Query	Containerization – Kubernetes & TensorFlow
• Streamline retail operation across network for ship/rec. sorting, ticketing etc..	• Access in-store data in 2.5 sec. • Helps high-street retailers identify in-store customers	•Increased revenue •Enhanced Customer Exp.	• Inc. ROI in online adv. •Huge recourse savings in DevOps & IT	• Reduce inventory carryovers 50% •Demand planning accuracy QoQ	• Increase turnover for peak sales period •Aggregate data sources for improved analytics.	•Process data in minutes Vs hours!! •250M size records/month to recommend styles and boost conversion/reduce returns

Existing Google Cloud Native Architecture Platform – 10x faster deployment

Proposed Architecture

Tablet
In-store
Mobile
online
Customer Touchpoints
Customer Recommendation
Custom App Push-notification

Customer Clicks Transaction
Signals
Engagements

Customer Experience Platform

Optimization
Customer
Content
Other
Personalization

Data Management

Continuous Optimization

Extract
Transform
Load
Train
Recommend

AI/Machine Learning/Analytics/Integration

Inventory
Sales
Supply Chain
Marketing
Payment
Merchant/Supplier

Continuous Learning

Legacy Systems/Application