Proposal: Minimizing Transportation costs & Maximizing Speed to Customer

Fractal Analytics

24th October 2018

Our understanding of your business requirements

Current scenario

- In current supply chain, SKUs flow from multiple vendors through **3 centralized fulfilment centers** and then to **700 (approx.) store locations**
- **Only 30% of products** are fulfilled by replenishment policies
- **Buy Online, Pickup in Store (BOPIS)** policy is based on current availability of inventory at store
- **Promotions** are often carried out **sporadically** to drive the sales throughout the year & move excess inventory
- In case of home delivery to customer – **promise date** is 5 days

What's the need?

- The business objective is to **minimize fulfillment & shipping costs**
- **Maximize the speed to customer**
- DCSG wants **inventory optimization** for all e-Commerce sales and all categories
- **Primary focus on 70% of products** which don't have any replenishment policies
- Integrate the consumption layer of solution with existing JDA Allocation system

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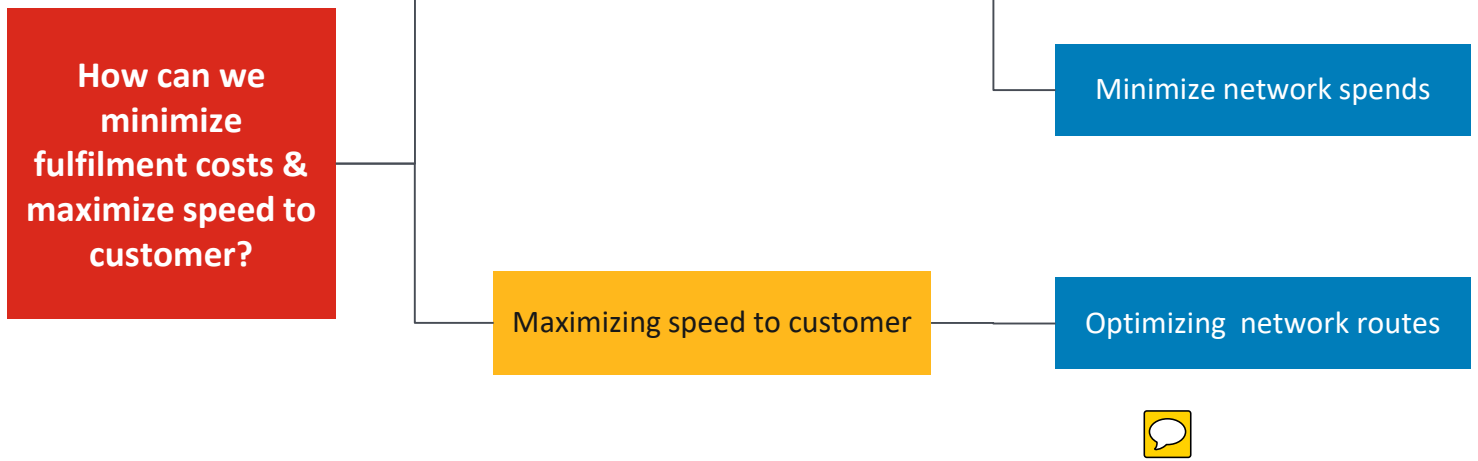
We will follow a structured problem solving approach to minimize fulfilment costs & maximize speed to customer



Use cases

1. Cost drivers for sub-optimal shipments
2. Store profiling

3. Grouping orders for FTL shipments
4. Line items to be shipped in same delivery window

5. Determine minimum stock at Store level
6. Recommend store replenishment frequency & quantity

7. Optimize VFR for FTL & LTL
8. Optimize carrier selection

9. SKU profiling at DC level & Like item shipments

10. Determining the right DC with the right OH for the SKUs

11. Determining no. of trucks needed for next week demand
12. Determining optimal transit days

Phase 1
Phase 2

* We have prioritized the specific use cases in Phase 1 basis the high level understanding of the requirements

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Phase 1

We will explore and deploy the right analytical techniques for each use case (Phase 1)

Use cases	1. Cost drivers for sub-optimal shipments	2. Store profiling	5. Minimum stock at store level 6. Recommend replenishment frequency/quantity at stores	9. SKU profiling at DC level & Like item shipments
Potential Drivers/ input variables *(not exhaustive)*	• Historical shipments by customer, stores, regions • Total demand • Shipping cost per item	• Annual demand • OH inventory • Historical shipments/orders • Promo volumes	• Annual demand • Transit lead time • Inventory unit cost of item • Buying cost of item • OH inventory	• Historical shipments by customer, stores, regions, DC • Total demand • Inventory unit cost of item • OH inventory
Analytical techniques & models	• Driver analysis using – Bayesian network • Demand profiling & segmentation	• Clustering based on channels, volume, capacity, demand, product attributes • SVM classification	• Multi criteria inventory classification • Inventory optimization by arriving at economic order quantity & re-order points	• Classification using Naive Bayes & SVM • Product association rules
Output *(indicative)*	• Products shipped sub optimally • Freight costs matrix by region, customers, stores	• Optimal set of store clusters to be catered together	• Optimal ordering & replenishing quantity • Re-ordering point • Min level or safety stock	• Set of strategic & profitable SKUs • Right SKU at right DC • SKUs which can be shipped together

Model building R python IBM CPLEX **Model building**

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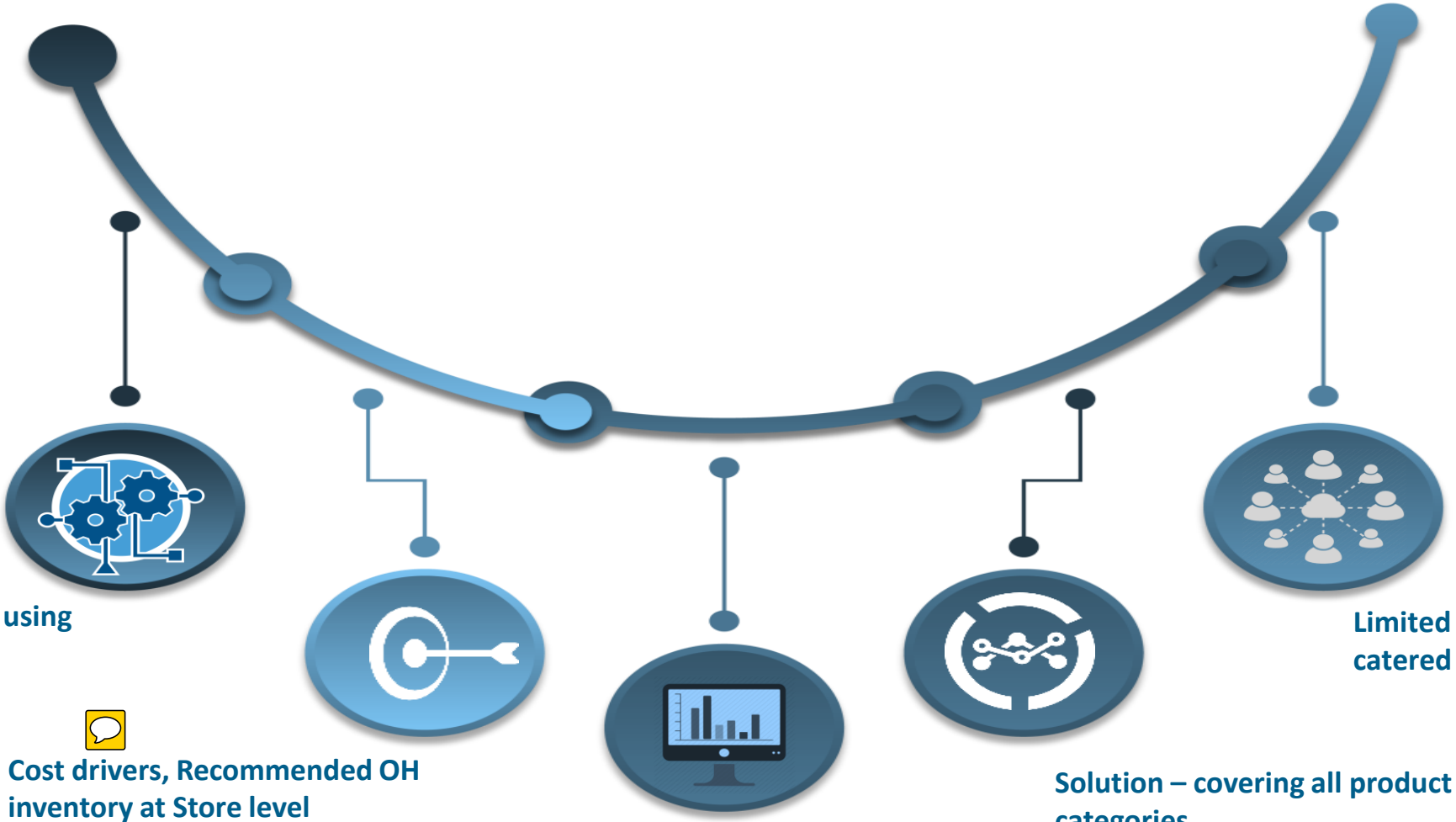
And deliver the following to DCSG



Harmonized data using KNIME/Python

- Cost drivers, Recommended OH inventory at Store level
- Recommended store clusters, SKU profiles
- Like item analysis

Power BI/Tableau based BI dashboard

Solution – covering all product categories

Limited to 1 DC and stores catered by that DC

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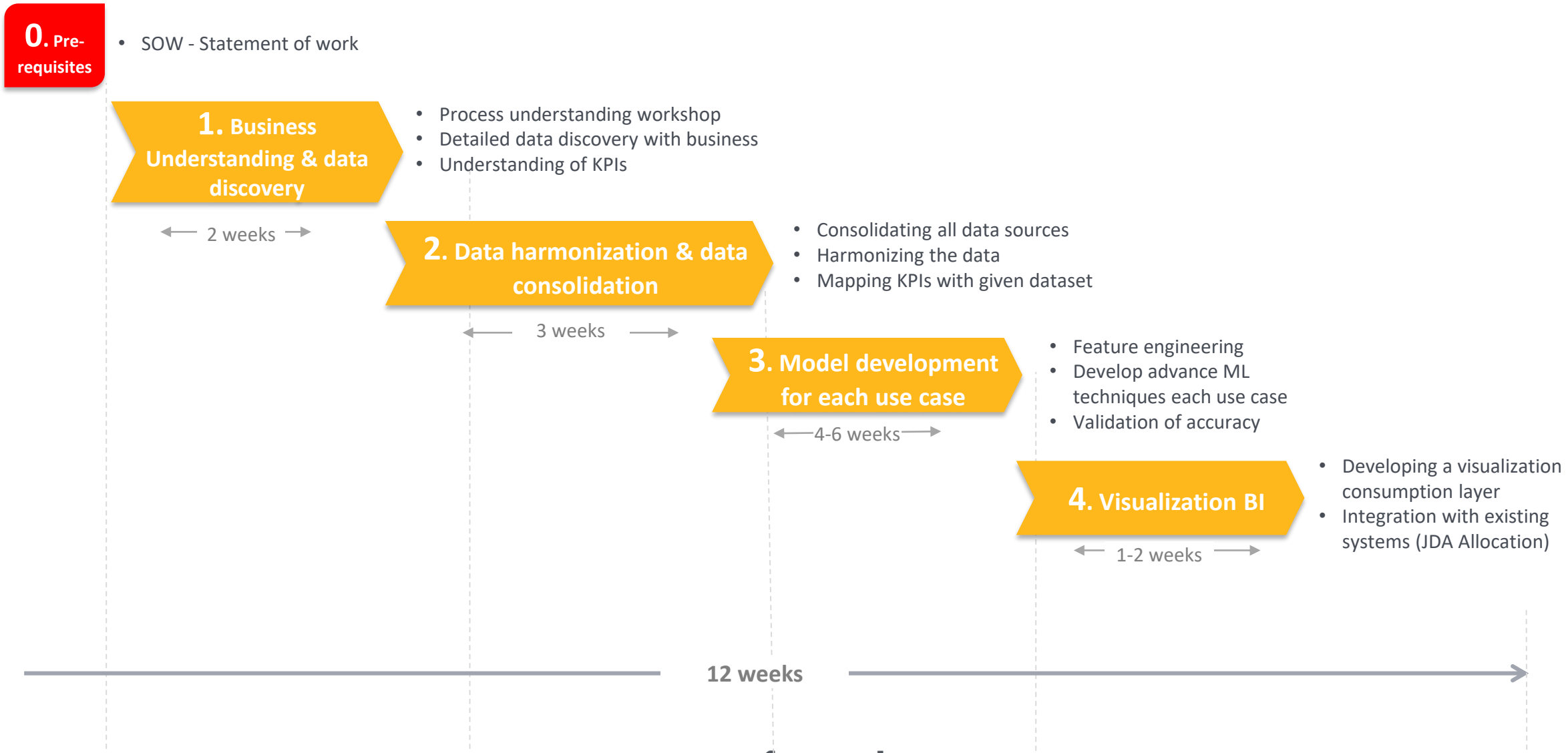
Phase 1 Project Plan



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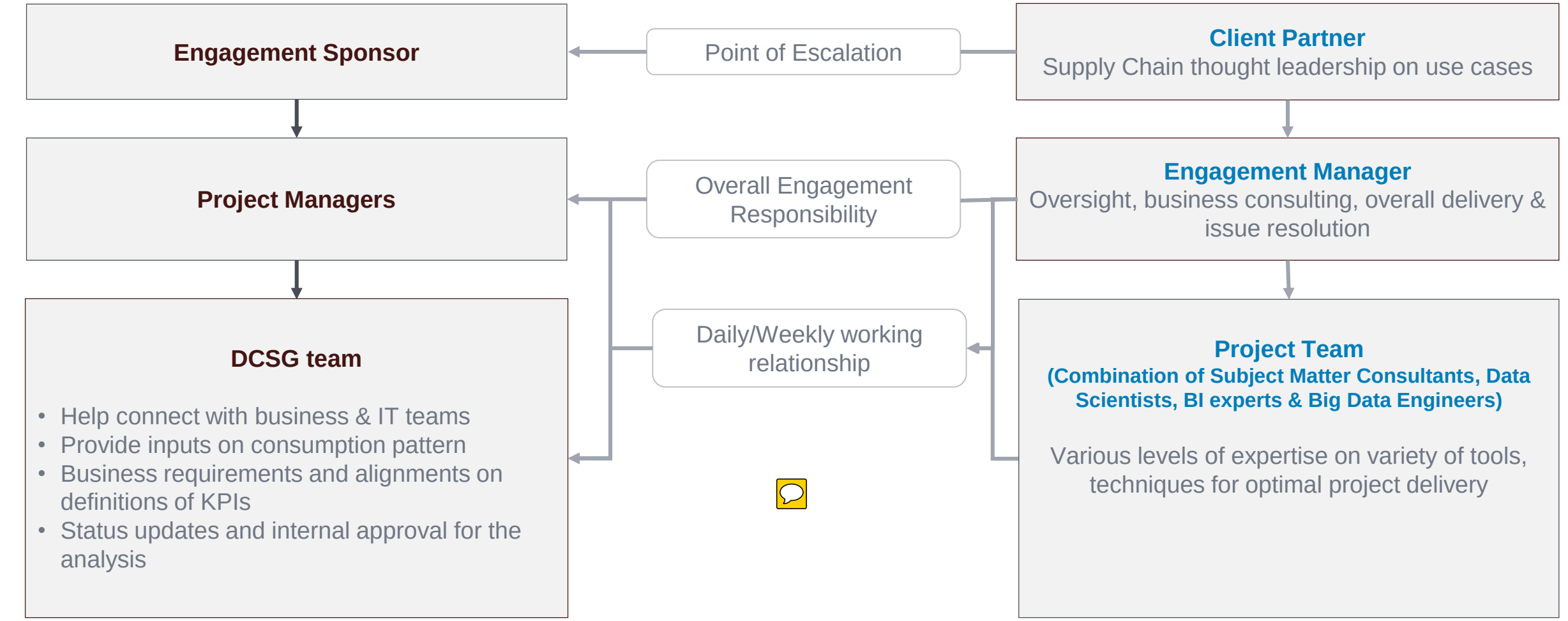
Our proposed engagement model during Phase 1



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Commercials

Project Cost: US $190,000

Terms & Conditions:

1. Does not include any taxes and duties, as maybe applicable
2. Does not include any cost of Travel & Expenses, which will not exceed 15% of the total project cost and need to be pre-approved by DCSG
3. Any change in deliverables or scope will have a direct impact on costs

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DCSG will lead the business and program management, while Fractal acts as the extended team to deliver on the desired outcomes

Stakeholders	Responsibility
DCSG	• Align on leading and lagging KPI metrics • Identify thresholds for each metric
Fractal	• Data assessment • Identify gaps in processes

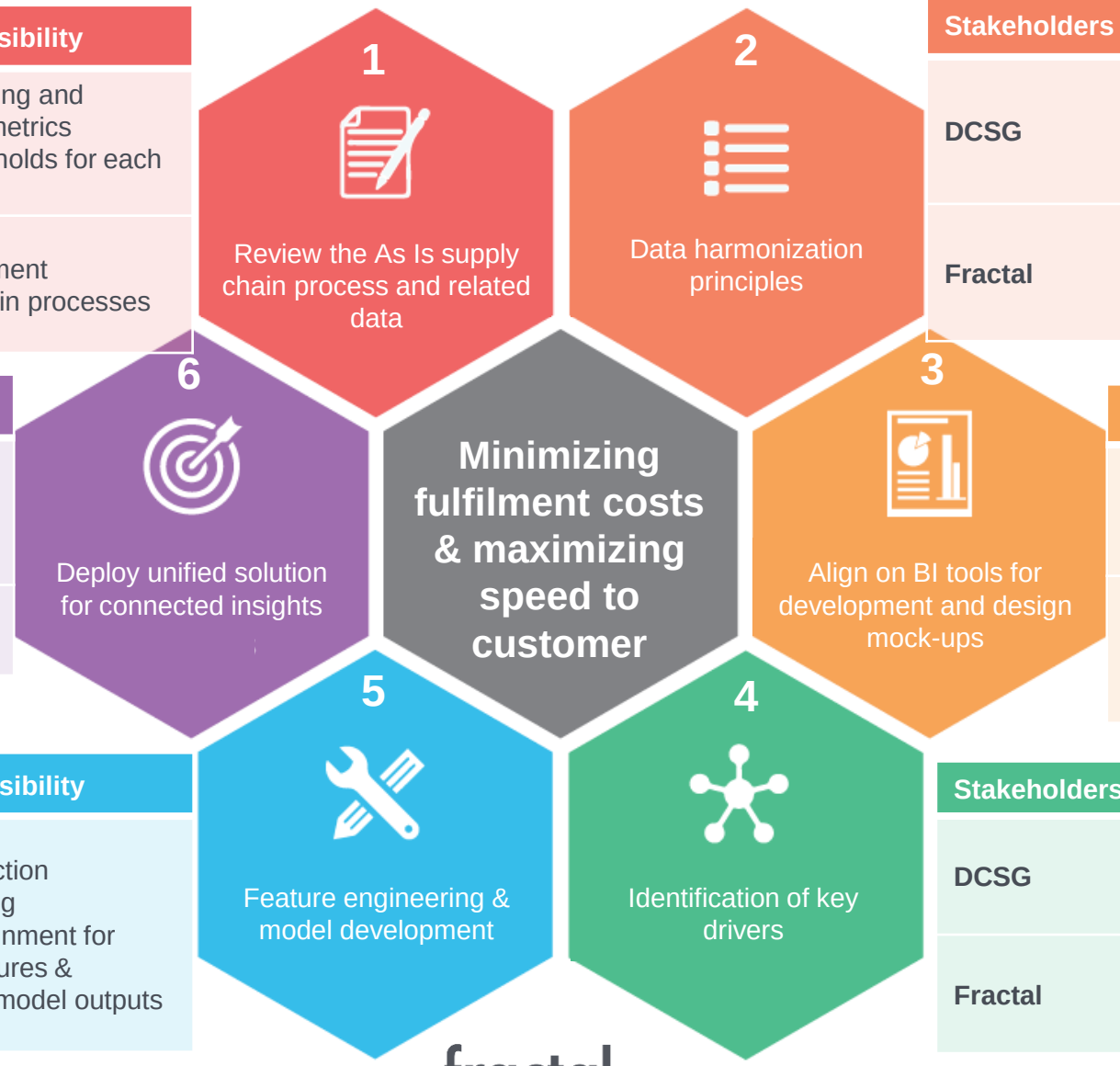
Stakeholders	Responsibility
DCSG	• Help connect with business & IT teams • Provide access to Data & infrastructure
Fractal	• Data harmonization from various databases

Stakeholders	Responsibility
DCSG	• Final output with accuracy calculations • UAT & business validations of insights
Fractal	• Connected insights across stores and products

Stakeholders	Responsibility
DCSG	• Alignment on Mock ups
Fractal	• Process understanding and deployment technology constraints to represent analysis effectively

Stakeholders	Responsibility
Fractal & DCSG	• Feature selection • Model building • Business alignment for selected features & validation of model outputs

Stakeholders	Responsibility
DCSG	• Provide inputs on business alignment with identified factors
Fractal	• Identification of key variables • Determination of statistically significant variables



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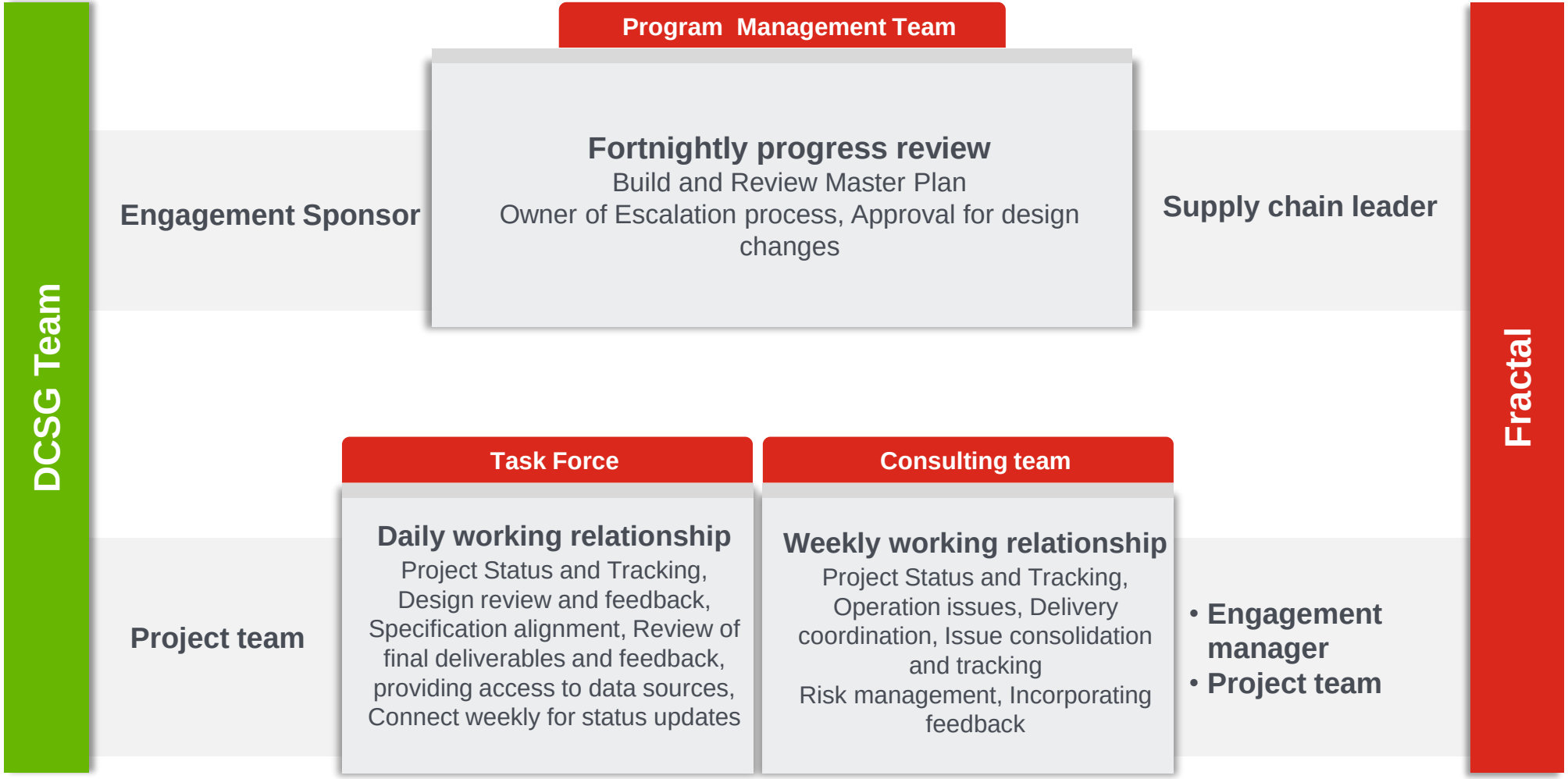
Governance during Phase 1



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Going beyond Phase 1

Beyond Phase 1, here are a few potential use cases that can be explored during Phase 2

Use cases	3. Grouping orders for FTL shipments 4. Line items to be shipped in same delivery window	7. Optimize VFR for FTL/ LTL. 8. Optimize carrier selection	10. Determining the right DC with the right OH for the SKUs	11. Determining no. of trucks needed for next week demand 12. Determine optimal transit days
Potential Drivers/ input variables *(not exhaustive)*	• Weekly OH inventory • Shipments history • Order line items • Historical orders	• Transportation costs & fill rates • Carriers/trucks capacity • Historical shipments • Available inventory • Total demand & orders	• Annual demand • Transit lead time • Inventory unit cost of item • Buying cost of item • OH inventory at DC	• OH inventory • Shipments history • Replenishment frequency • Future order volumes • Carriers/trucks capacity
Analytical techniques & models	• Product association rules • Correlation between shipment frequency & association groups	• Composite rankings for carriers • Bayesian techniques	• Inventory optimization by arriving at economic order quantity & re-order points	• Decision Trees like XGBoost, Random Forest • Multilayer Perceptron
Output *(indicative)*	• SKUs which can be shipped together to optimize truck load & maximize speed to customer • Clubbing like orders	• Daily optimized truck load plans • Best carriers based on optimized cost	• Min level or safety stock at DC • Optimal OH inventory at DC • Replenishment frequency at DC	• Weekly schedule of trucks & load capacity required based on demand and available inventory • Recommend transit days for each order

Model building R python IBM CPLEX **Model building**

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Fractal Credentials in Supply Chain Analytics

Fractal has demonstrated expertise in delivering insights, impact and innovation across Supply Chain use cases (1/2)

80%
forecast accuracy

- Agile, scalable forecasts & consumption trends for 150+ markets and 70+ segments
- Growth drivers based, quantitative methods & FVA approaches

$1Bn
savings through e2e inventory optimization

- Non performing inventory root causes & depletion recommendations
- Optimal safety stocks for maximized service levels
- SKU portfolio rationalization

$25Mn
annual savings across transportation

- Transportation cost drivers
- Carrier rationalization for least cost carriers & consolidation
- Maximized capacity utilization of volume & weight fill rates

4%
Increased service levels

- Established Service level drivers and interdependencies
- Enabled Scenario planning to assess the service levels for distribution uncertainties

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Fractal has demonstrated expertise in delivering insights, impact and innovation across Supply Chain use cases (2/2)

$500Mn

reduction in sourcing costs

- Commodity price modelling
- Alternative sourcing choices
- Recommended purchase frequency and volume while reducing scrap risk

15%

CAPEX reduction in outsourced manufacturing

- Determined Optimal Capacity to Demand ratio
- Recommendations on Optimal presses & molds
- Scenario planning for Service levels

$3Mn

savings with reduced off spec

- Predicted output product quality from sensory tags
- Reduced excess give away of nutrients
- Real time anomaly detection

~5%

Reduction of total freight costs

- Reduced sub optimal shipments
- Enabled CPFR through allocation principles and replenishment strategies
- Identified right mix of Inventory at DCs

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By solving complex challenges for our clients

S&OP Demand forecasting

- Augmenting demand planning with "AI"
- Impact of New Product launch on Excess Inventory
- Improving S&OP process productivity
- Integrated production scheduling & capacity planning

Network design & planning

- Network & Inventory optimization
- Optimizing DC Inventory flow through Planning & Replenishment

Sourcing

- Optimal balance of scrap risk, working capital & savings
- Evaluate competing commodity sourcing choices and enable decision making for buyers
- Optimizing working capital and CapEx in Vendor outsourced manufacturing
- Cash flow optimization to identify saving opportunities

Manufacturing

Shop floor

- Identifying Cost saving opportunities in Manufacturing
- Optimizing BCTs
- Smart machines for real time anomaly detection
- Predicting the firmness of baking agent based on real time monitoring of critical process parameters

Inventory

- Recommender engine for Slow Inventory
- Identify right safety & cycle stocks
- Reducing Inventory costs by identifying risk wrt Service Levels & Inventory
- E2e Inventory visibility

Warehousing

- Discover bottle necks across Supply Network impacting Service Levels
- Setting up DC control room with real time monitoring

Transportation

Distribution

- Optimizing Logistics & maximizing capacity utilization
- Driver analysis for OTIF & simulate controllable variables

Impact

Portfolio Optimization

- Composite ranking of SKUs for delisting the tail of the tail SKUs
- Segmentation of SKUs based on growth, profitability and volatility

Customer service levels

- On shelf availability
- SAMBC visibility
- Vendor managed inventory

Sustainability

- Sustainable Agricultural materials
- Greenhouse emissions
- Carbon footprint
- Energy utilization
- Water usage

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