

# *FOOD SENSE: TRACKING HOUSEHOLD GROCERY INVENTORY*

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# *Executive Summary*

- Online grocery shopping is one of the fastest growing markets in the United States. According to Statistica, the online grocery market amounted to about \$17.5 billion in 2018 and is expected to rise to nearly \$30 billion by 2021.
- Grocery retailers face challenges in understanding their customers once grocery products leave the store front. In particular, they would like to have a better insight into their customers habits, and have more responsive supply chains by producing more thorough forecasts of consumption.
- The suggested system connects customers to a database, by recording current stock in households. This information is relayed to the proposed grocery database, helping predict the customers future consumption.



# *Business Case: developing a new paradigm for customer convenience*

- Today “A smart fridge” looks like a normal fridge with a tablet glued to the front of it.”
- “A true smart fridge” in the future might monitor itself to provide a live-updated list of the contents, track expiration, and maybe order more groceries when you’re running out. It might more intelligently adjust cooling levels depending on what you have in the fridge.”

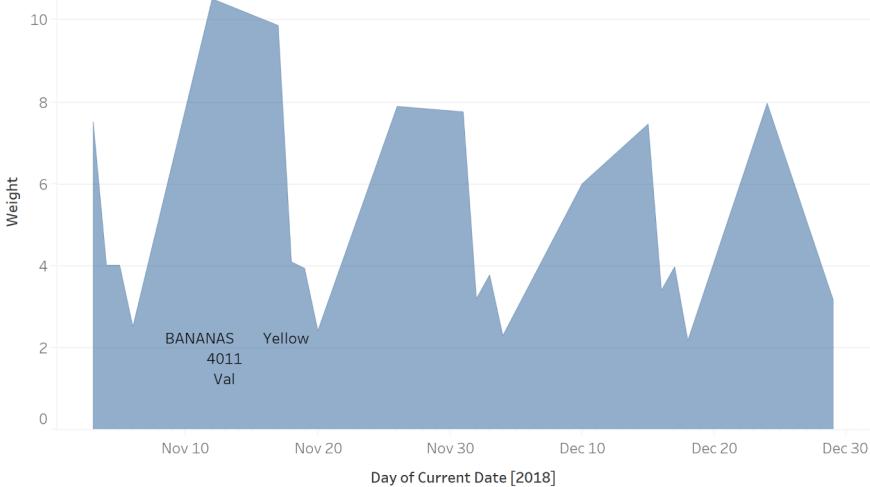
Hofman, C. (2016, July). *Why Buying a Smart Fridge is a Dumb Idea*. Retrieved from <https://www.howtogeek.com/260896/why-buying-a-smart-fridge-is-a-dumb-idea/>



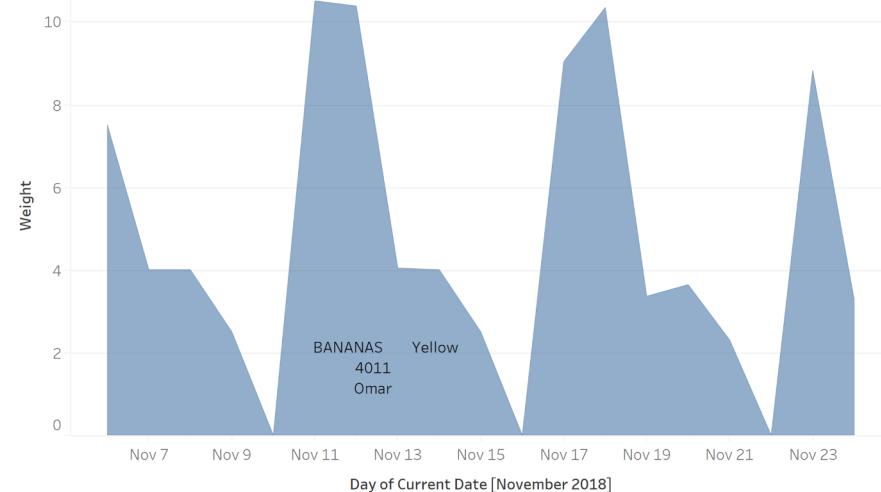
Samsung “SMART HUB”

# *Two Different Kinds of People*

Inventory/customer/product



Inventory/customer/product



# *Business Case: approach to securing competitive advantages for online retailers*

01

Optimize online grocery retailer's supply chain

- Reduce shipment and inventory costs by increasing coordination among distribution centers
- Reduce perishable waste cost through a more defined just-in-time approach

02

Increasing demand for online retailers

- Increasing convenience for customers by reducing shopping time
- Ensure customers have food supplies stocked by suggesting a shopping list that the retailer can fulfil

03

Better understanding of the customer profile

- More detailed market segmentation by data on specific customer preferences
- Insight into customer's usage rates through regular monitoring
- Identify new product opportunities based on specific customer preferences and dietary restrictions

# System Outline



# *Data Collection*



# Tools

## Hardware/Measurement System:

- Weighing Scale 10lb rated
- 2D Barcode Scanner

## Data Sources:

- Consumption information was collected by group members during a 2 week period by:
  - Weighing and tracking food products as soon as they were purchased and every time they were used
  - The rest of the data was simulated depending on provided consumption rates to attain bulk
- Whole Foods Store information in the Chicago area was scraped off the Whole Foods website
- UPC and PLU codes were scraped off using WebScrape and Beautiful Soup in Python from the USDA Food Composition Databases website

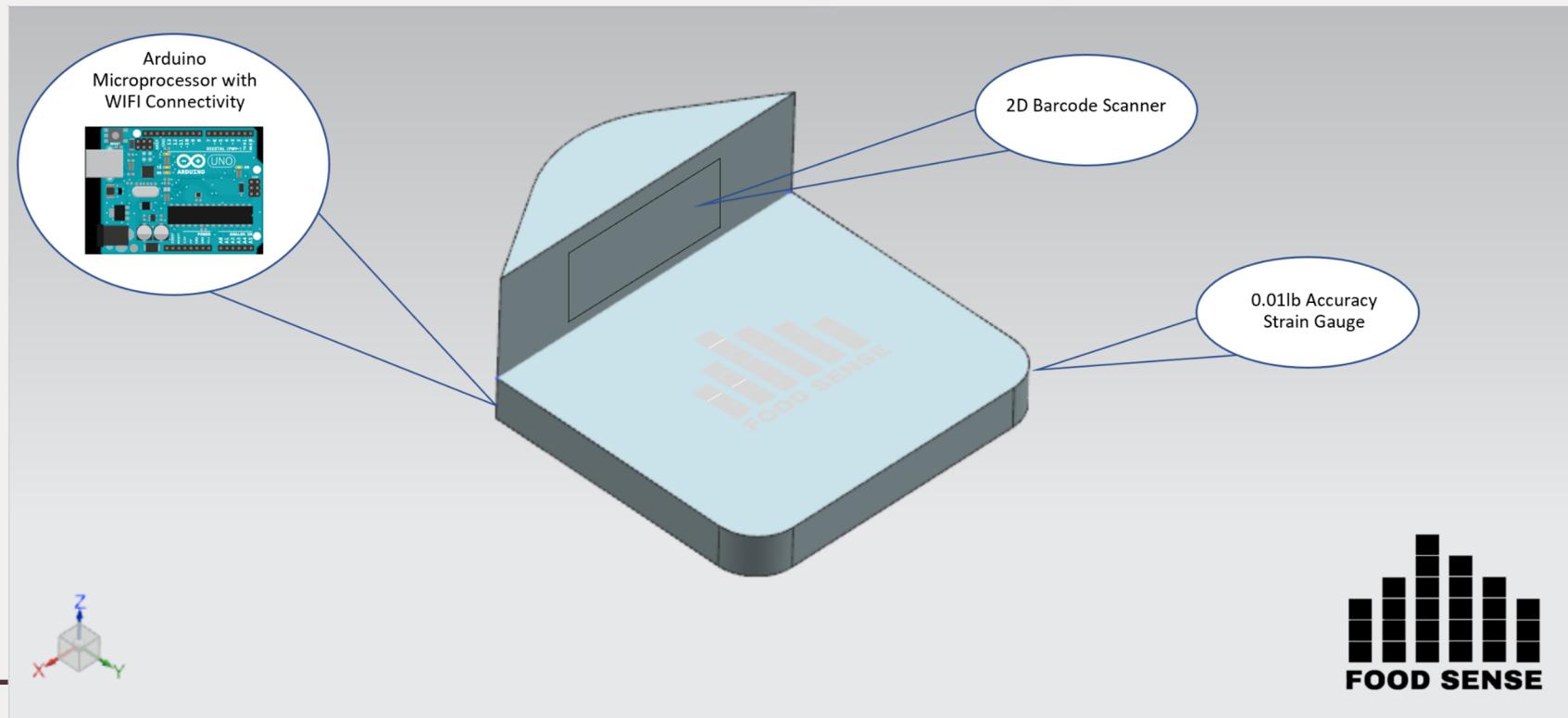


# *Data Simulation*

- Customer consumption data was collected through 2 week trials of 3 group members
- Average, Min, Max consumption rates were calculated for given product and given member
- Simulated 2 months of additional data for each member using triangular simulation based on (Average, Min, Max consumption rate)



# *Food Sense Fridge Collection Device*



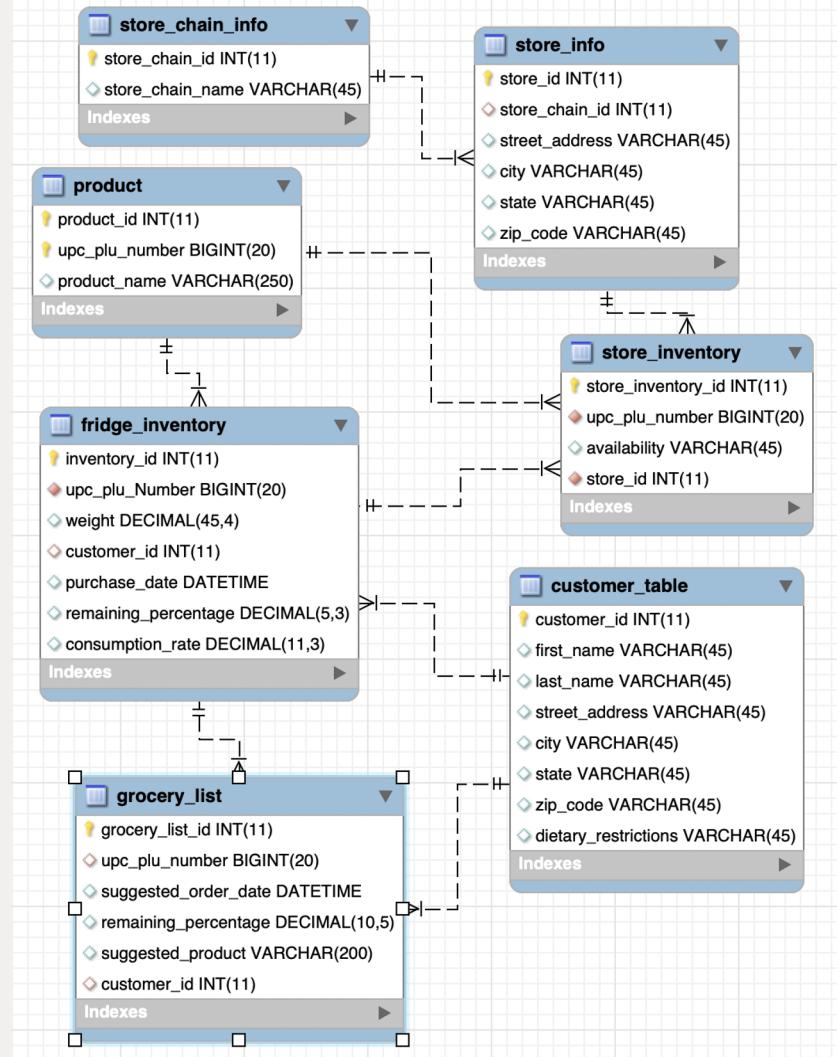
*Database*



# *Database Key Features*

01	Database Type	<ul style="list-style-type: none"><li>• Relational database connecting customers to online grocery retailers</li><li>• OLTP type database</li></ul>
02	Users	<ul style="list-style-type: none"><li>• Online grocery retailer supply chain operations, procurement, &amp; marketing can access whole database</li><li>• Household will receive a summary usage report</li></ul>
03	Data Integrity	<ul style="list-style-type: none"><li>• Database is normalized to reduce chance of deletion, insertion, and modification anomalies</li></ul>
04	Security	<ul style="list-style-type: none"><li>• Only developers will have administrative rights to the database</li><li>• Developer will assign read-only permissions to online grocery retailer</li></ul>

# EER Diagram



# *Data Modeling*

- Data was compiled into tables to form the basis of an entity relationship model
- Our primary key is the UPC-PLU number, this will be used to join multiple tables
- The three main tables have the following attributes:
  - Fridge\_Inventory: upc\_plu\_Number(PK), Weight, Expiration Date
  - Grocery\_List: Grocery\_List\_ID (PK), Remaining\_Percentage, Consumption\_Rate
  - Store\_Inventory: upc\_plu\_Number(FK), Store\_ID (PK), Availability



# *Design Considerations*

- Data types of main variables:
  - UPC-PLU number is defined as an Integer
  - Grocery\_List\_ID is defined as an Integer
  - Store\_ID is defined as an Integer
  - Date and Time is defined as DATETIME
  - Weight is defined as decimal
- Descriptive variable:
  - Dietary restriction is defined as VARCHAR



# *Notable Measures/Queries*

- Tableau:

- % Remaining:

```
{FIXED [Upc Plu Number], [Customer Id] :  
MAX (  
  
    IF [Current Date] = {FIXED [upc plu Number], [Customer Id] : MAX ( [Current Date] ) }  
        THEN ([Weight]*100/ [Max Weight]) END  
  
    )  
  
}
```

- Low Supply Items:

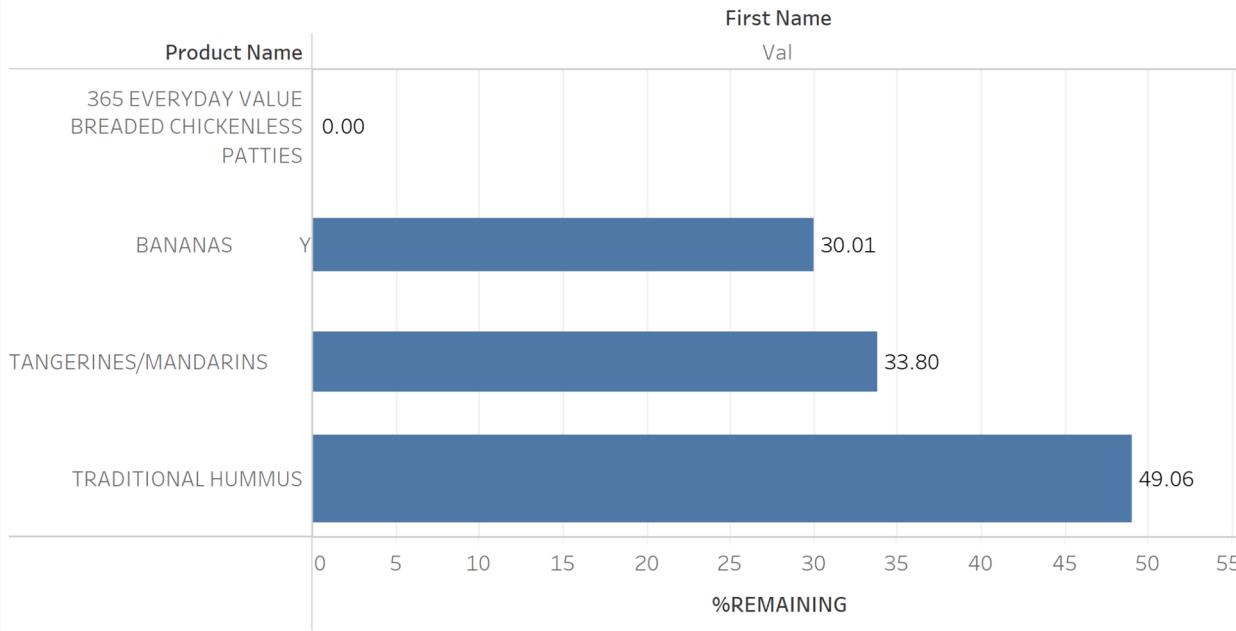
```
IF [ %REMAINING ] < 30 THEN "Low"  
END
```

# *Visualization*



# *Customer Dashboard: Current Stock*

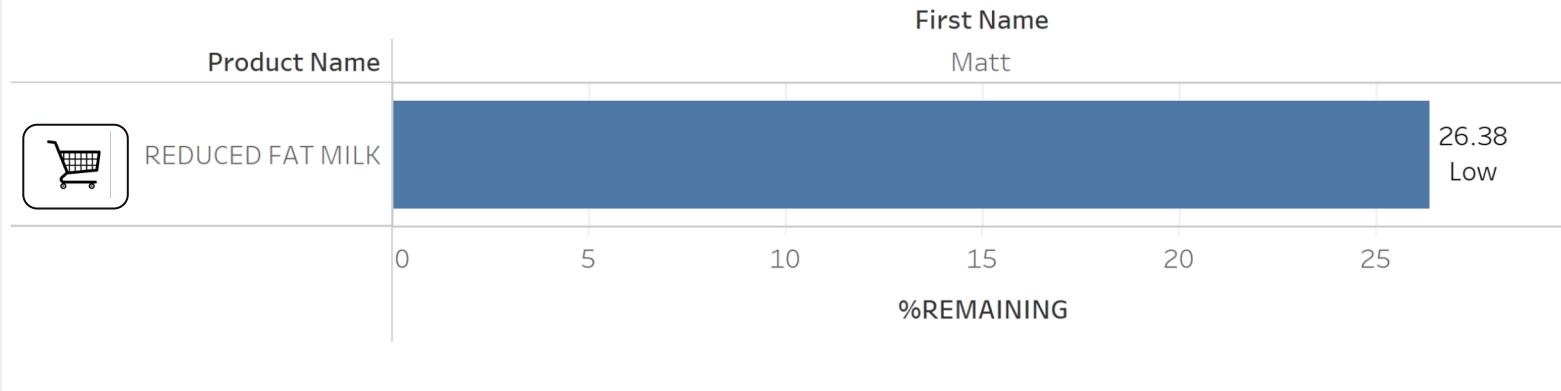
## Current Status



Customers can monitor what is currently available in their fridge

# *Customer Dashboard: Suggested Shopping Cart*

## Suggested Shopping Cart



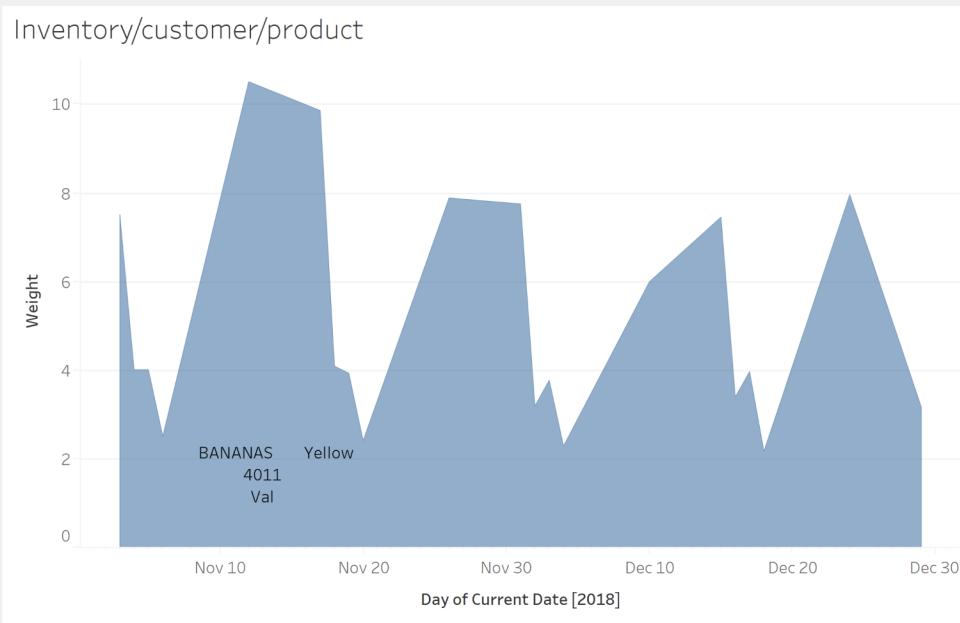
A suggested shopping cart is created based on items that are less than 30% remaining making it more convenient for the customer

# Mobile Connectivity



Our app is compatible on mobile devices allowing customers to conveniently monitor their fridge and order their shopping on the go

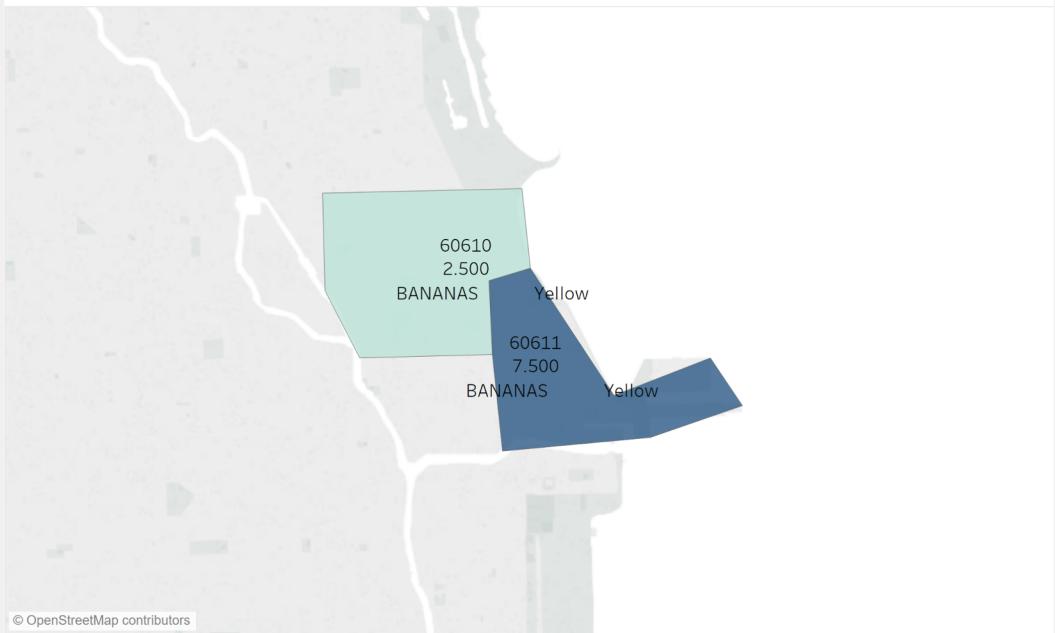
# *Online Retailer Dashboard: Consumption Trends of Customer*



Track consumption cycles of certain products which can be used to better target customers

# *Online Retailer Dashboard: Consumption By Area Code*

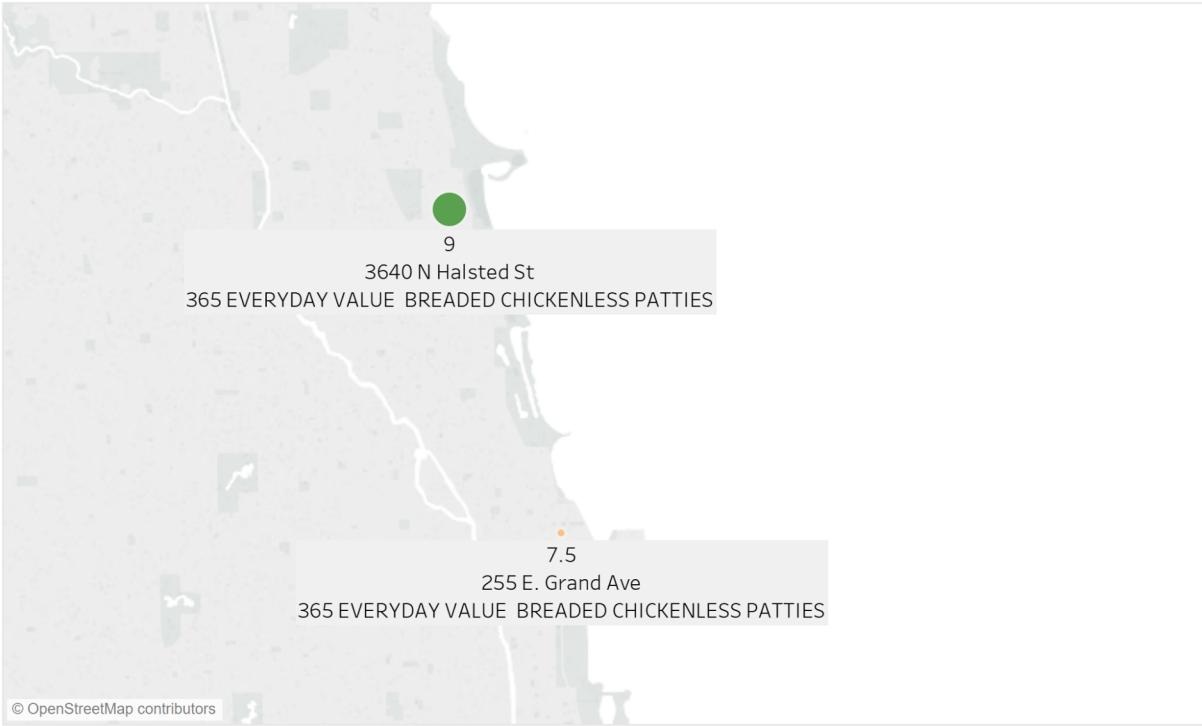
Current Customer Inventory By Region



Observe the consumption pattern of products through a geographic lense; find what types of communities consume certain products more

# *Online Retailer Dashboard: Store Stocking*

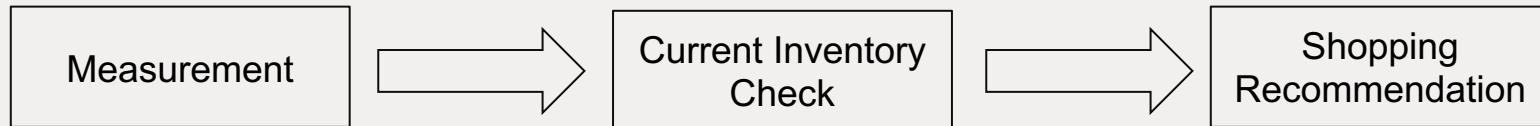
Store Inventory Map



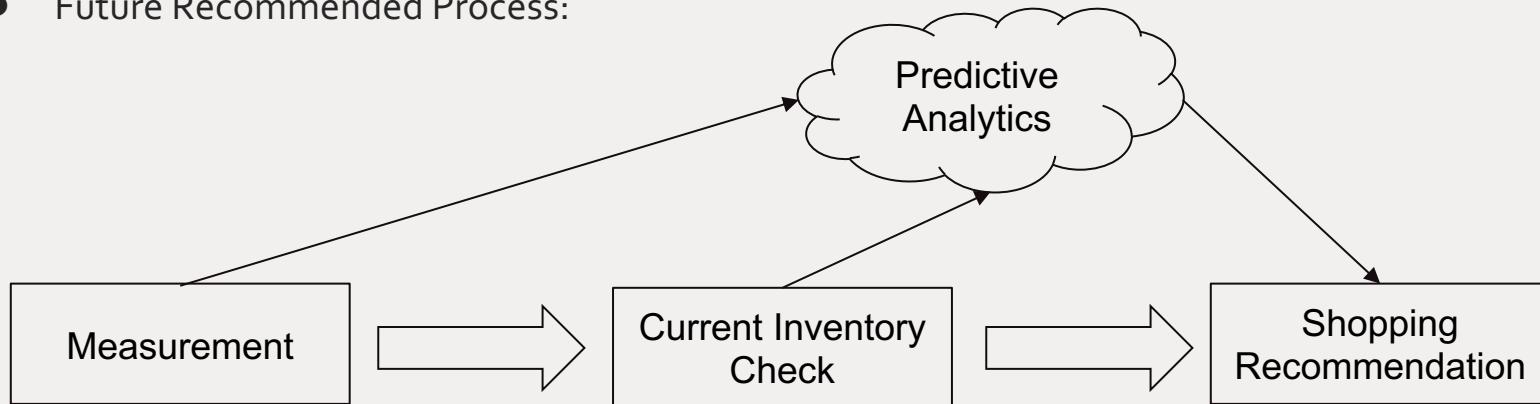
Track store inventory in ensure that each store can satisfy the demand for products in the areas they serve

# *Future Development: Integrating PA*

- Current Process:



- Future Recommended Process:



# *Recommendations*

- Create a way to track food that has been cooked, combined, or modified
  - Database only is able to track products that are in their original packaging
  - By capturing this data, consumption can be more accurately tracked
- Track where consumers bought each product
  - clients are able to determine what types of products consumers decide to purchase at their stores, and which products consumers purchase from competitors
- More application of predictive analytics to answer key client questions
  - What types of products are purchased together?
  - How often do consumers purchase certain products? When do they consume these products?
- Nutrition tracking can also be a strong benefit to the consumer

*Thank You*



# References

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