How Weather and Pricing Affects Sales
Using Matlab to Improve Tesco Supply Chain

Duncan Apthorp
Supply Chain Development
2,979 stores
30,000+ products in big stores
23 depots
58,000,000 cases delivered a week
Projects have very high returns

Improving promotions

- 30% fewer gaps in stores

Predicting weather effects on sales

- £6m less summer food waste

“Tesco Uses Weather to Predict Sales”
“...as well as boosting profits, its weather system will also help to cut food waste”

Reducing depot stockholding

- £50m less stock in depots

Optimising store operations

- £30m Less waste
But can take a long time – Tesco IT Infrastructure

IBM Mainframe
- Runs the business
- Hard Real Time
- 24/7/365 uptime
- 12 month lead time
- 2 updates per year

Teradata Data Warehouse
- 5 years of data
- 100 Tbytes, 100 cores
- Soft real time
- SQL Only
- Batch jobs / user queries

Matlab Desktop and Servers
- Agile Development
- 2 week sprints
- Analysis
- Model Development
- Simulations
Getting it right first time – Depot Simulation

Days Cover (Depot)

Depot to Store Availability

70% 75% 80% 85% 90% 95% 100%

1 Day LT
2 Day LT
3 Day LT
4 Day LT

Days Cover (Depot)

70% 75% 80% 85% 90% 95% 100%

Tesco | Every little helps
Store Simulator

Ordering System Harness

- Data Warehouse
  - Data Source
  - Sales
  - DataCollection

- Optimiser
  - Stores
  - Store
  - Forecasts
  - StockHolding
  - Order

- Depot

- Control
Why is weather important?

10° C rise in temperature means customers want:

• 300% more BBQ Meat
• 45% more Lettuce
• 50% more Coleslaw
• 25% fewer Brussels Sprouts

We ship 16,000,000 cases of fresh food a week
Weather isn’t the only factor to take into account

- Day-of-week
- Promotions
- School holidays
- Salad sales and temperature
- Easter
Weather isn’t the only factor to take into account

Salad sales and temperature

Promotions

School holidays

Easter

15%
We use 5 years of weather and sales data... and make the results freely available to our suppliers.
45% of sales are on promotions
We used 4 years data and insight to understand how promotions change what customers buy

Factors taken into account
- Offer mechanic
- Depth of discount
- Feature space in each store
- Product characteristics
- Individual store performance
- Competing promotions

Product Uplift

Cooking Sauce
- +19%
- +31%

Vegetables
- -9%
- -36%
Automated Promotion Forecasting

Offers from commercial

End plans from marketing

Sales history & ranging database

Promotions management system

Store by store forecast

Sales Uplift Model
500,000,000

Optimising Reductions
Matlab Model to predict optimal reductions

Price Elasticity

- **Meat**
- **Fruit & Veg**

Separate and scan expiring items
Print and apply reduction stickers
Deeper reductions if stock hasn’t sold
The Future – Closer Matlab Integration

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- Scrum Development
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TESCO — Every little helps
Summary

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And right first time!
Thank you – Question?