Understanding and Improving the Supermarket Price Reduction Process

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Supply Chain Development
Tesco: Multinational retailer

- **UK**: Republic of Ireland, Poland, Hungary, Czech Republic, Slovakia, Turkey
- **Europe**: Republic of Ireland, Poland, Hungary, Czech Republic, Slovakia, Turkey
- **Asia**: South Korea, Thailand, China, Malaysia, India

- **12 countries**
- **> 530,000 people**
- **£72.4bn sales**
Tesco UK

3,000+ stores
30,000+ products in big stores
23 depots
60,000,000 cases delivered a week
Supply Chain Development Projects

Improving promotions

Predicting weather effects on sales

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

Replacing our sales forecasting

Optimising store operations

Better on-shelf availability

Less summer food waste

Reduced Waste Stock

Less Waste

Tesco
Every little helps
Where does Matlab fit in Tesco?

**IBM Mainframe**
- Runs the business
- Hard Real Time
- 24/7/365 uptime
- Monthly updates
- 12 month lead time

**Teradata Data Warehouse**
- 5 years of data
- 100 Tbytes, 150 cores
- Soft real time
- SQL Only for now
- Batch jobs / user queries

**Matlab Desktop and Servers**
- Agile Development
- Analysis
- Model Development
- Simulations
Optimising Reductions
Why reduce products going out of date?

- It’s good for our customers
- It’s good for the environment
- It’s good for business
- It’s a legal requirement
What is the Process?

Up to 2010

- Products going out of date are scanned each evening
- Reduced up to 3 times
- Expiring product taken off sale before midnight
- Reduction percentages based on colleague’s experience
What is the Process?

2010 – Automated Reduction Percentages

- Reduction percentages automated

- Reductions calculated automatically:
  - Quantity going out of date
  - Sales forecast
  - Product type
The automated process brought major benefits

Price Elasticity

Sales Uplift vs. Reduction

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

- **Less Waste**
- **Increased Sales**

Sales Uplift

- 0%
- 25%
- 50%
- 75%
- 100%

Reduction
2014 – New Reduction Model

- Second Tesco Mathworks joint development
- Tesco
  - Business / systems knowledge
  - Big data expertise
- Mathworks
  - Increase in capacity
  - Data Analytics – new ways of analysing and visualising data
  - Statistical Modelling – new approaches
  - Production model development
- MATLAB as the common language
Programme was based on learnings from previous project:

1. Define programme aims and KPIs
2. Understand the data
3. Build a measurement framework
4. Build your first models, get a quick win
5. Then build the final models
KPIs - what do we want to achieve?

• Make it simple and clear for our customers

• Minimise our impact on the environment (waste tonnes)

• Minimise the cost (waste in £)

• Minimise the effort involved for our colleagues in store
Historic data shows a good spread of reductions.
Relationship between reduction and rate of sales

**Fast-selling Product**

- Number of observations
- Reduction %
- Rate Uplift

**Slow-selling Product**

- Number of observations
- Reduction %
- Rate Uplift
Evaluation Framework

START → Date → Scan

Overstock → Reduction → Sales → Stock, Waste

Graphs showing data trends and analysis.
Model

- Tesco retail and data knowledge
- Mathworks statistics and data analytics
- Models effect of reduction on sales rate
- Predicts KPIs
- Creates optimum reductions
Model Simplified Schematic

Scans → Merge → Train → Models for Products

Sales → Merge → Train → Models for Products

Stock → Merge → Train → Models for Products

Test

Train

Select Reduce % → Calculate Uplift → Calculate Quantity

Sales

Uplift vs Reduction %
Phased roll out to learn and measure benefits

<table>
<thead>
<tr>
<th>Store director group (30 to 40 stores)</th>
<th>Nationally representative trial (200 stores)</th>
<th>Future roll out</th>
<th>Coming to your local store 2015</th>
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Automated daily project tracking

<table>
<thead>
<tr>
<th></th>
<th>Availability</th>
<th>Stock Holding</th>
<th>Back Room Stock</th>
<th>Forecast Accuracy</th>
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<tr>
<td>Cumulative</td>
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<td>Pre Trial</td>
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<td>Trial</td>
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<td>Trial vs Pre</td>
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Customer Service Level Availability

Pre Trial
Cumulative
Trial
Cumulative
Trial vs Pre
Trial Stores: 16 Apr - 10 May
05 Jul
08 Jul
11 Jul
14 Jul
17 Jul
20 Jul
23 Jul
26 Jul
29 Jul
01 Aug
04 Aug
07 Aug
10 Aug
13 Aug
Working with Mathworks – some tips

• Agree the goals, and how to measure them
• Make it a joint development
• Have a single contact for day to day operations
• Hold regular high level reviews
• Don’t accept things that feel wrong
The Future – in database analytics

IBM Mainframe

Teradata Data Warehouse

Matlab Desktop and Servers

• in database analytics for heavy lifting

Matlab for:
• Control
• Simulation
• Small models

TESCO
Every little helps
New Technologies for Retail
Thank you – Question?
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