DEMAND FORECASTING AT M&S

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DEMAND FORECASTING AT M&S

First steps in the application of ML techniques to deliver demand forecasting and product fulfilment improvements at M&S

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Summary

- *New forecasting methods including machine learning offer the prospect of improved forecast accuracy and higher product availability.*
- *They need to be effectively incorporated into the demand forecasting processes of the organization.*
- *The session will explain the approach taken in M&S Clothing and Home to date including the tools and skills used.*
- *It will also reflect on learnings so far and a vision of a future incorporating advanced analytics into everyday operational processes.*

DEMAND FORECASTING AT M&S

- Demand and Fulfilment teams in each Business unit
- Centralised Supply Chain development supporting
- Planning c20m SKUs
- Planned in JDA Demand and Fulfilment
- 2 main algorithms used, JDA Lewandowski and AVS Graves at store level
- Lost sales calculated in JDA
- New product forecasting based on commercial estimate + shape

jda.

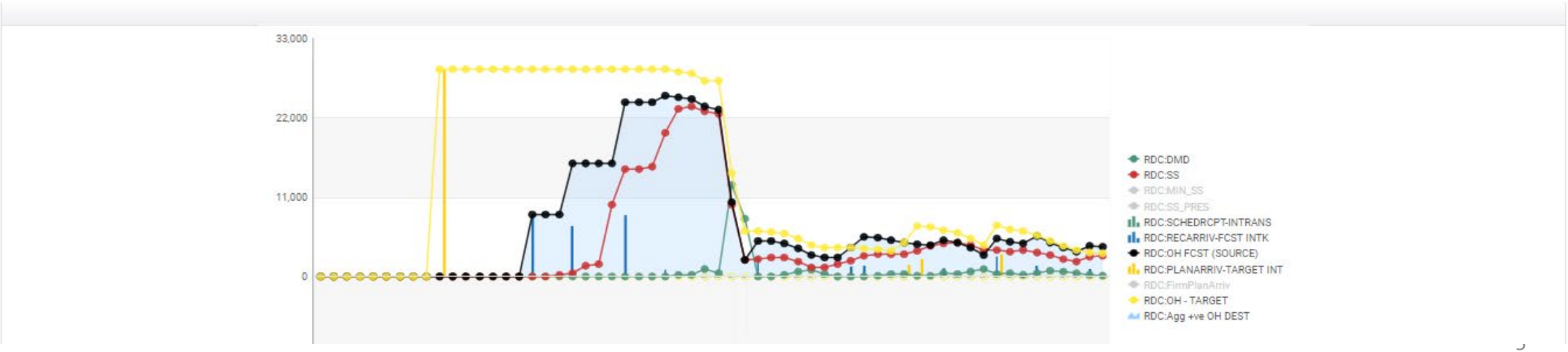
B7014784 | JDA2017-Prod | About | RECSHIP

Plan Analysis:Plan Analy... × | SKU LEVEL PARAMETERS × | SS TEMPLATE DATA DA... × | Parameter Workbench × | Plan Analysis:Plan Analy... × | SKU LEVEL PARAMETER... × | Plan Analysis:Plan Analy... × | Process:Parameter Wor... × | RECSHIP FE ×

Plan Analysis:Plan Analysis - LOCTYPE

Scenario Live | Search Select a search

	20/04/19 Sat	21/04/19 Sun	22/04/19 Mon	23/04/19 Tue	24/04/19 Wed	25/04/19 Thu	26/04/19 Fri	27/04/19 Sat	28/04/19 Sun	29/04/19 Mon	30/04/19 Tue	01/05/19 Wed	02/05/19 Thu	03/05/19 Fri	04/05/19 Sat	05/05/19
IGNORED DMD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
SS	0	0	288	528	1,536	1,680	9,912	14,832	14,856	15,216	19,872	23,160	23,568	22,800	22,488	9
MIN_SS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
SS_PRES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
SCHEDRCPT-INTRANS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
RECARRIV-FCST INTK	8,616	0	0	6,984	0	0	0	8,520	0	0	936	0	0	0	0	
RECSHIP-FCST SHIP	0	0	0	0	0	0	0	0	0	0	0	288	240	1,008	456	12
OH FCST (SOURCE)	8,616	8,616	8,616	15,600	15,600	15,600	15,600	24,120	24,120	24,120	25,056	24,768	24,528	23,520	23,064	10
UNCONSTRAINED PLAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
PLANARRIV-TARGET INT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	408	
FirmPlanArriv	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
PLANSHIP - TARGET	0	0	0	0	0	0	0	0	0	0	0	288	240	1,008	456	12
OH - TARGET	28,656	28,656	28,656	28,656	28,656	28,656	28,656	28,656	28,656	28,656	28,656	28,368	28,128	27,120	27,072	14
FWD COV - TARGET	33D	32D	31D	30D	29D	28D	27D	26D	25D	24D	23D	22D	21D	20D	20D	19D
OH (DEST) BREAKDOWN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
PROJ OH DEST	8,616	8,616	8,616	15,600	15,600	15,600	15,600	24,120	24,120	24,120	25,056	24,768	24,528	23,520	23,064	10
Agg +ve OH DEST	8,616	8,616	8,616	15,600	15,600	15,600	15,600	24,120	24,120	24,120	25,056	24,768	24,528	23,520	23,064	10
NEG OH (OoS) DEST	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	



The JDA Moonshot

Blue Yonder acquired to enhance traditional forecasting capability

ADVANCING TECHNIQUES COMBINED WITH TRADITIONAL METHODS

All M&S Clothing a& Home lines have a **seasonal profile**

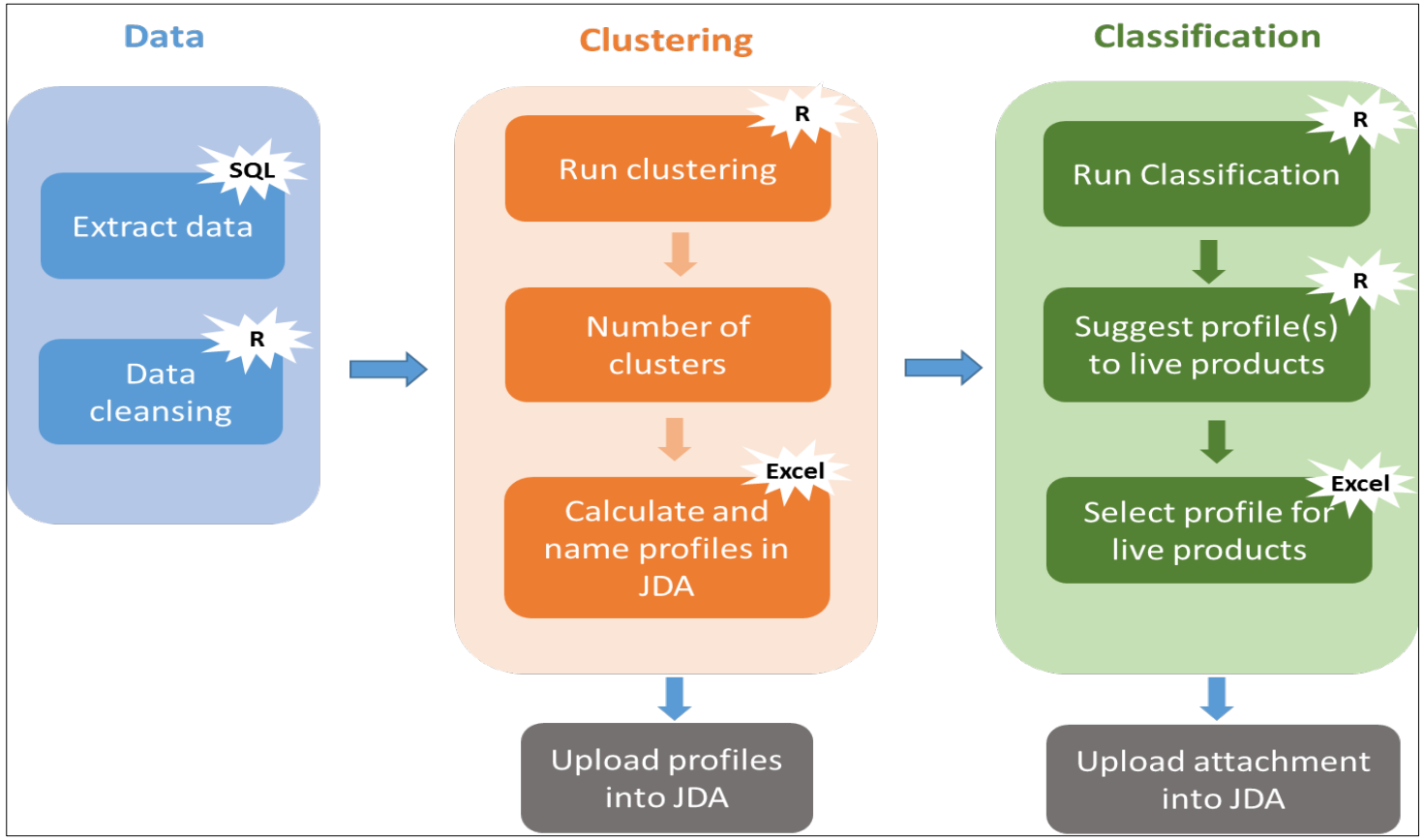
A seasonal profile is essentially the shape of sales across a selling period, showing peaks and troughs

They are essential for 2 reasons:

1. **Direct the shape of forecast**
2. Enable **effective cleansing of history** with which to make a forecast

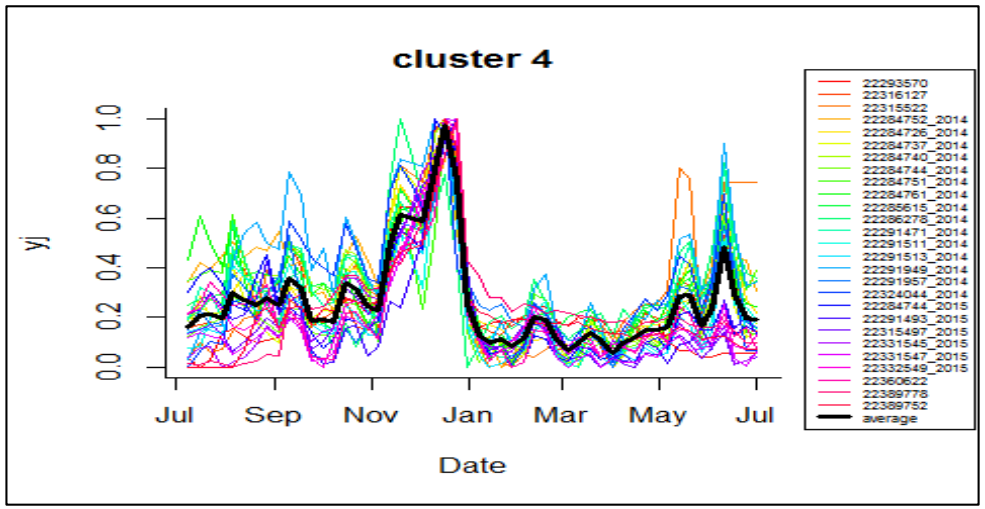
SEASONAL PROFILING

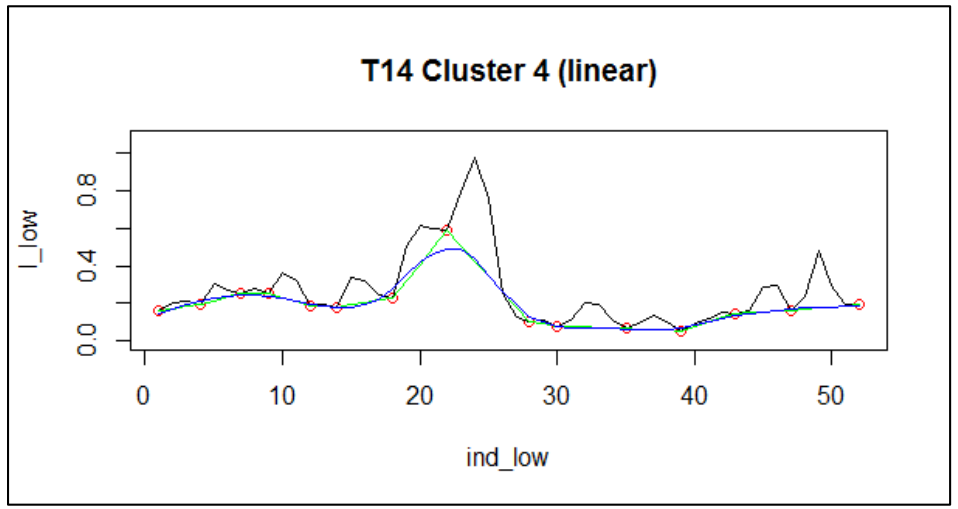
Seasonal Profiling Creation Process



SEASONAL PROFILING

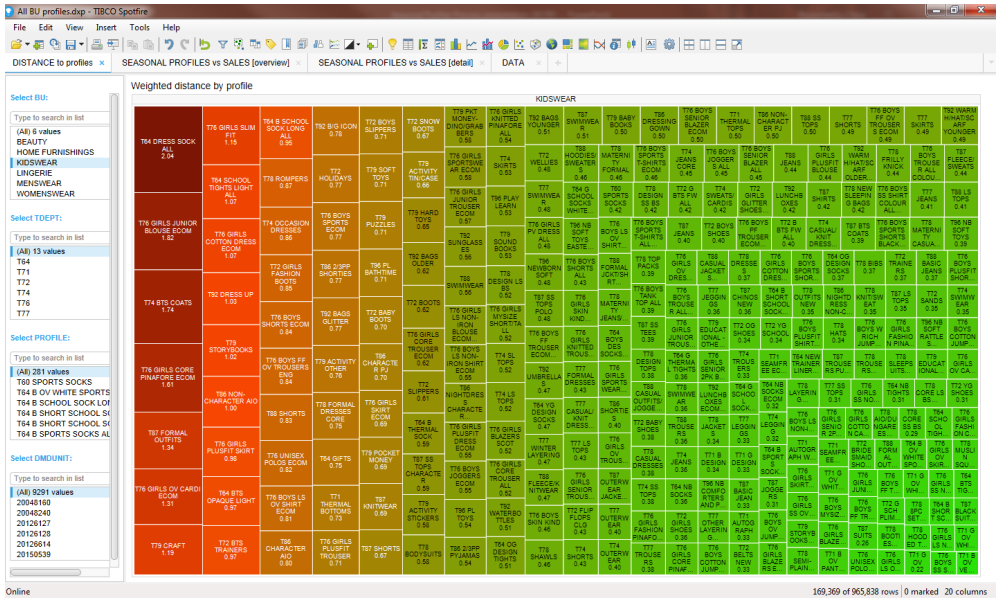
1. For each cluster, a shape is created (average of cluster components)
2. Smooth : we want to remove non-seasonal spikes (random, promotions) and keep the seasonal spikes (Easter, Father's day, Christmas etc..)

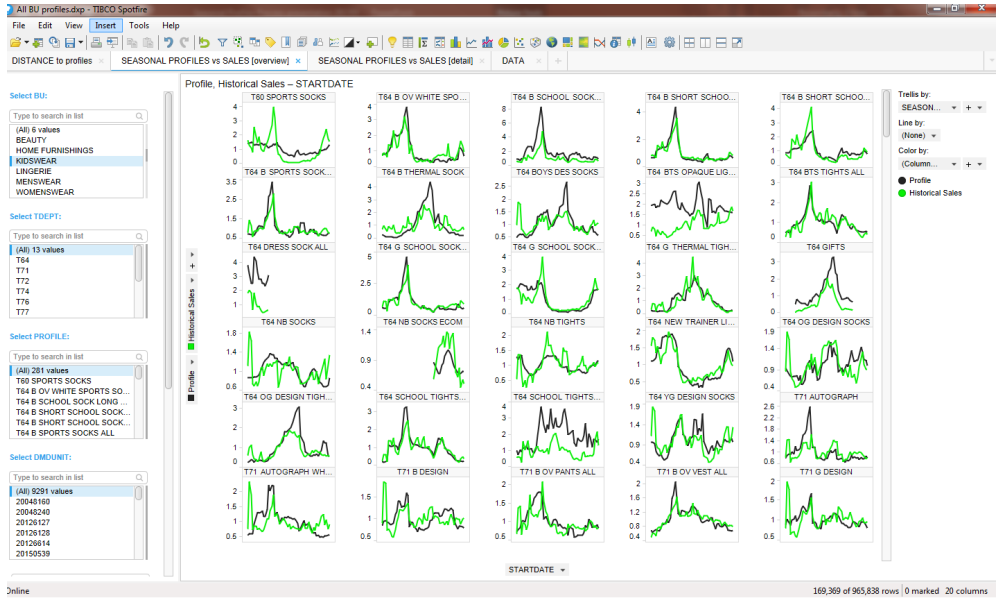




SEASONAL PROFILING

- A dashboard was created to assess the accuracy and suitability of the shapes
- Product sales are compared to their profiles





In case of bad accuracy:

1. Attach another existing profile
2. Or refresh the profiles: this will not update profiles individually but all the profiles (because of the clustering)

DEVELOPMENT WITH JDA

Leveraging shared analytics capability and technology

- In 2018, M&S & JDA started a project to understand product substitution
- Could we predict what customers would switch to if their first choice product was out of stock on line?

M&S/JDA PARTNERSHIP - COGNITIVE DEMAND

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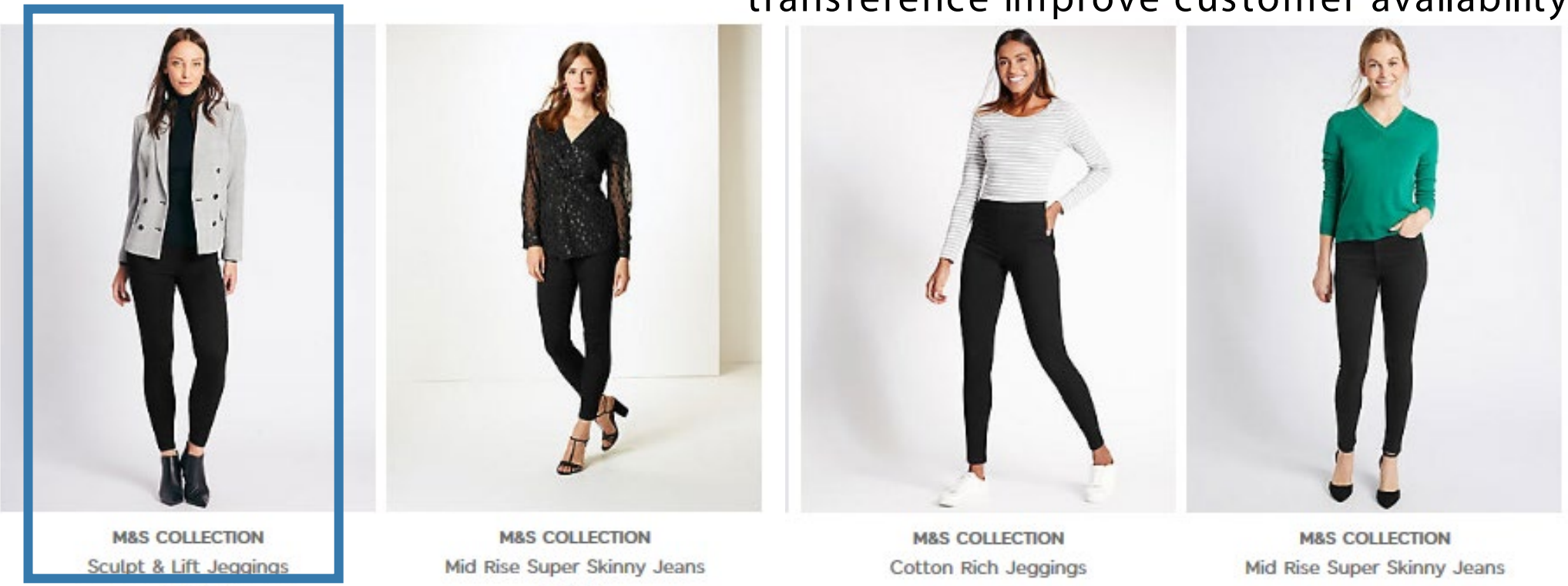
Can Machine Learning be used to identify alternative products that our customers want to buy?

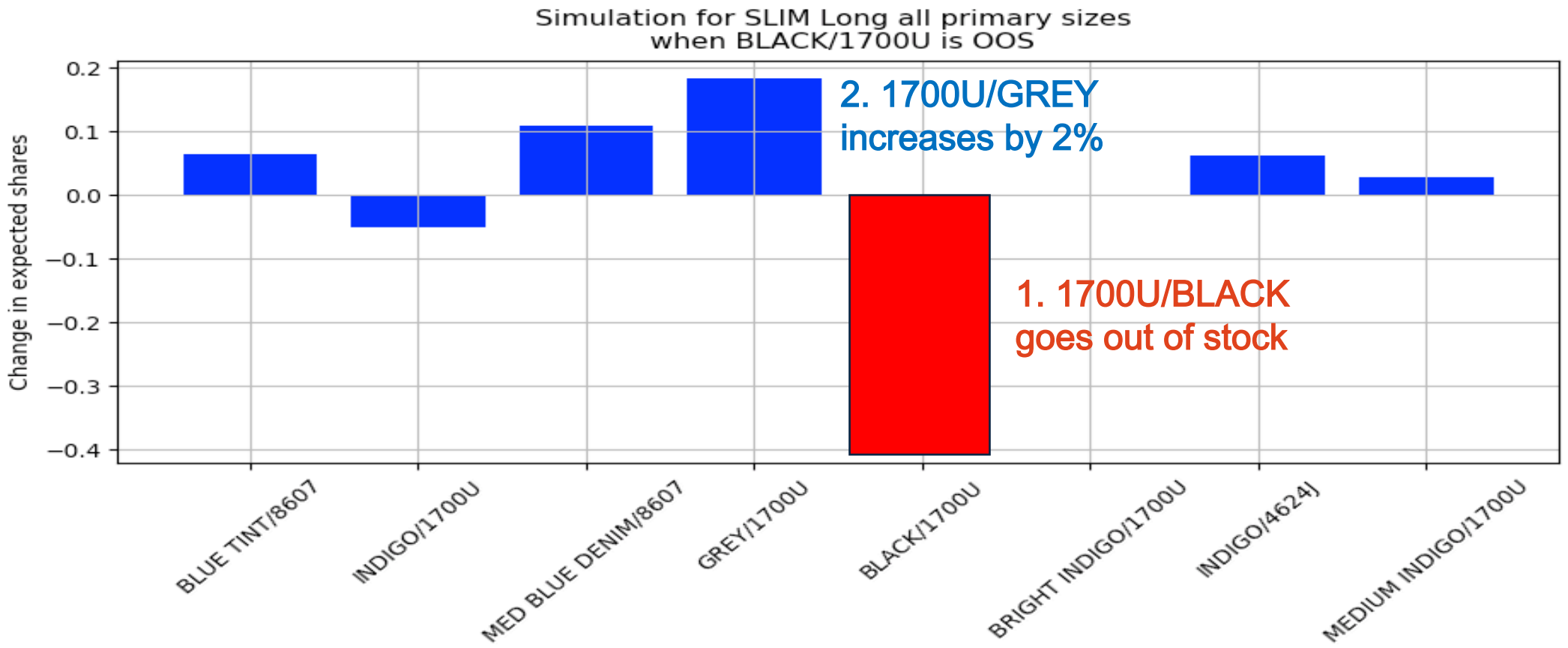
Could an understanding of demand transference improve customer availability?

Waist

Inside Leg											
	Short	6	~~8~~	10	~~12~~		~~16~~	18	20	22	24
	Regular	6	~~8~~	~~10~~	12	14	16	18	20	22	24
	Long	6	8	~~10~~	~~12~~		16	18	20	22	24



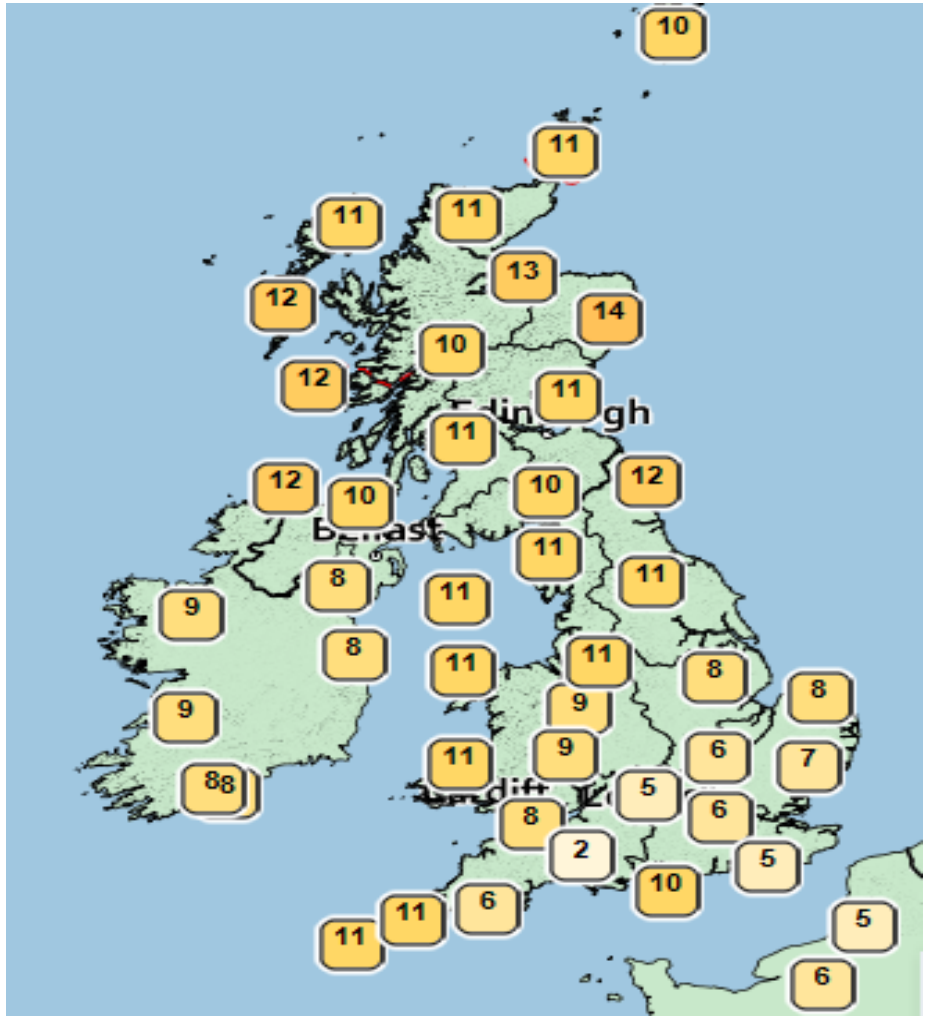
DEMAND TRANSFER



Demand transfer exists - The POC was able to forecast the percentage gain in sales of other items within the group when an item was out of stock.

NEXT STEPS FOR COGNITIVE DEMAND

- Widen the model – look at the potential for Demand Substitution in other departments
- Evaluate the application of Demand Substitution – demand dashboard alerts vs. auto transfer
- Weather variance – investigate regional variations in weather to respond to customer requirements



ANALYTICS & ORGANISATIONAL CONSIDERATIONS

- Hiring the right team – rights skills and ability to work in an agile environment
- Onboarding process
- Ability to communicate analysis and help guide the correct questions
- Where should analysts sit? – central group or with commercial teams?
- Need better ways to assess performance, and grade analysts
- Progression based on technical competence
- The right training – on what tools?
- Retaining analysts while the organisation moves to being data driven
- Starting to collect the right data that will be useful in the future
- Cultural challenges - pull for “Allocation” and control
- Should we use the forecast to measure availability?