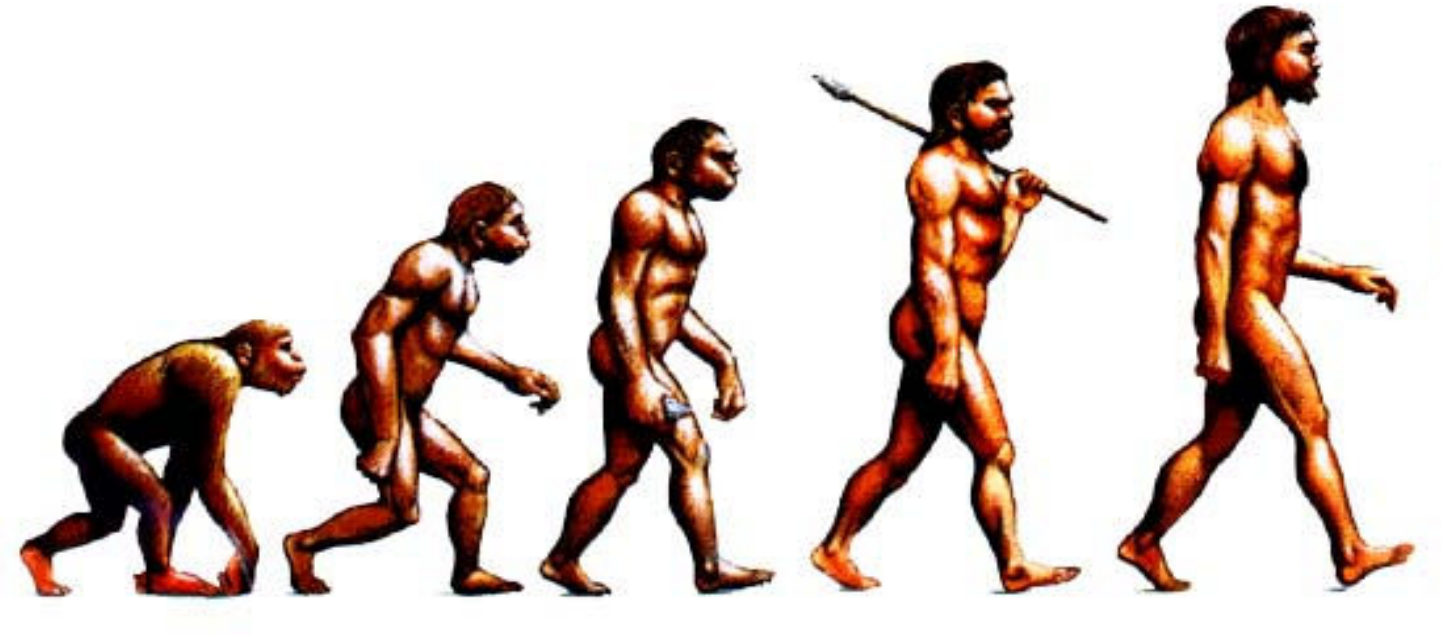
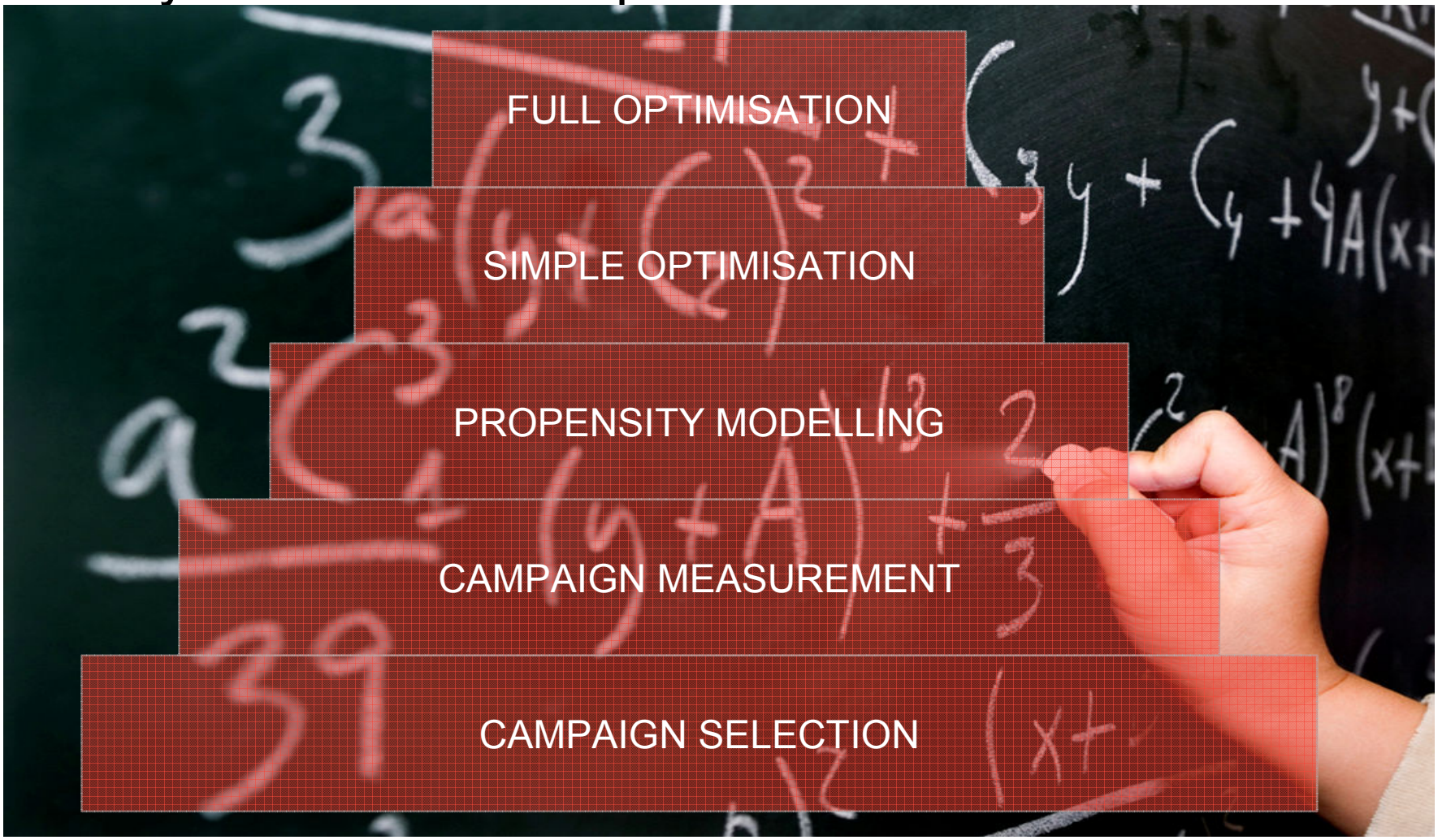
# Optimisation driving modelling diversification and segment uplift at E.ON

Lee Thomas
CRM Modelling Manager, E.ON UK
CRM Association, December 9th 2009

Where we started from 5 years ago.



# Analytic CRM Roadmap



# The problem of Optimisation is all about "constraints".

## Fantasy Football Team

- Selecting a Fantasy Football team is a very basic example of optimisation
  - You're trying to maximise the number of points you get whilst sticking to a budget limit
  - You place constraints on your selection by restricting the number of players in each position

- Worksheet in Holland.xlsx

- Our objective throughout this is to maximise the number of points our team has

# Fantasy Football
# vs
# E.ON’s Marketing Journey

# The first constraint

- First off we will introduce a rule that your team can only have 11 players
- This is similar to incorporating channel capacity (e.g. we can only make 50K calls a week)
- Players = 11
- Points = 1,859
- Cost = £65mn

- We'd win the league, but we can still get better value for money

- This is like the journey we went through around 4-5 years ago when we introduced models to our campaign selections – we had limited channel capacity, and we needed to choose the best prospects to maximise the benefit of that channel

# The next level – playing 4-4-2

- In football we need to play to a formation in order to win games
- We therefore introduce a constraint that we have to play 4-4-2, and have to have a goalkeeper (still no limit on budget)
- This is where it starts to get more complicated

- It makes the result less optimal by restricting who we can choose (i.e. our footy team can't get as many points) but it reflects reality more closely

- This is similar to introducing campaign eligibility criteria – e.g. saying we have to supply 50K Age Concern records or 100K in the North West.

# The best team with a 4-4-2 formation

- You should have got…

- Players = 11
- Points = 1,753
- Cost = £54.2mn

| PLAYER | CLUB | POINTS | COST | POSITN |
|---|---|---|---|---|
| P Cech | Chelsea | 136 | 4000000 | GOALKEEPER |
| N Vidic | Manchester U. | 169 | 4700000 | DEFENDER |
| J Lescott | Everton | 132 | 4100000 | DEFENDER |
| J Bosingwa | Chelsea | 129 | 3900000 | DEFENDER |
| L Baines | Everton | 120 | 3400000 | DEFENDER |
| F Lampard | Chelsea | 231 | 5800000 | MIDFIELD |
| C Ronaldo | Manchester U. | 185 | 7000000 | MIDFIELD |
| S Gerrard | Liverpool | 175 | 5600000 | MIDFIELD |
| M Taylor | Bolton Wanderers | 132 | 3500000 | MIDFIELD |
| N Anelka | Chelsea | 184 | 6300000 | FORWARD |
| D Kuyt | Liverpool | 160 | 5900000 | FORWARD |

# Introducing Budget Constraints

- In Fantasy Football, each team has a budget limit of £50mn
- Again, this restricts who we can choose and will reduce the total points we can get
- This is like introducing budget constraints to marketing
- This is where it starts to get more tricky for we humans, but this is actually a very, very simple situation for Optimisation to crack

# Introducing Budget Constraints

- I can guarantee nobody got this…
  - Players = 11
  - Points = 1,675
  - Cost = £49.2mn
  - The optimal 4-4-2 team within a £50m budget is:

| PLAYER | CLUB | POINTS | COST | POSITN |
|---|---|---|---|---|
| P Cech | Chelsea | 136 | 4000000 | GOALKEEPER |
| N Vidic | Manchester United | 169 | 4700000 | DEFENDER |
| J Lescott | Everton | 132 | 4100000 | DEFENDER |
| J Bosingwa | Chelsea | 129 | 3900000 | DEFENDER |
| L Baines | Everton | 120 | 3400000 | DEFENDER |
| F Lampard | Chelsea | 231 | 5800000 | MIDFIELD |
| S Gerrard | Liverpool | 175 | 5600000 | MIDFIELD |
| M Taylor | Bolton Wanderers | 132 | 3500000 | MIDFIELD |
| Denilson | Arsenal | 117 | 2700000 | MIDFIELD |
| N Anelka | Chelsea | 184 | 6300000 | FORWARD |
| K Davies | Bolton Wanderers | 150 | 5200000 | FORWARD |

# As difficult as Fantasy Football can get…

- The final situation is that we've now got to choose 3 separate teams
- We're only allowed to choose the same player once
- We've got to play 4-4-2 in each team with a goalkeeper
- Each team has a £50mn max budget
- The objective is for the combined total points across all 3 teams to be as high as possible (not each individual team to be as high as possible)
- This is comparable to having to run a campaign via 3 channels for just one week without selecting the same prospect for more than one campaign

# The Combined 3 Best Teams

| URN | PLAYER | CLUB | POINTS | COST | POSITN |
|---|---|---|---|---|---|
| 1002 | E van der Sar | Manchester United | 131 | 3900000 | GOALKEEPER |
| 3094 | B Hangeland | Fulham | 96 | 3000000 | DEFENDER |
| 3041 | E Eboue | Arsenal | 112 | 3400000 | DEFENDER |
| 3046 | L Baines | Everton | 120 | 3400000 | DEFENDER |
| 3016 | Alex | Chelsea | 114 | 3800000 | DEFENDER |
| 5142 | Denilson | Arsenal | 117 | 2700000 | MIDFIELD |
| 5049 | J Milner | Aston Villa | 116 | 3400000 | MIDFIELD |
| 5010 | M Arteta | Everton | 121 | 4100000 | MIDFIELD |
| 5003 | S Gerrard | Liverpool | 175 | 5600000 | MIDFIELD |
| 7019 | D Kuyt | Liverpool | 160 | 5900000 | FORWARD |
| 7111 | Robinho | Manchester City | 157 | 6300000 | FORWARD |

| URN | PLAYER | CLUB | POINTS | COST | POSITN |
|---|---|---|---|---|---|
| 1006 | T Howard | Everton | 128 | 3500000 | GOALKEEPER |
| 3025 | P Jagielka | Everton | 102 | 3600000 | DEFENDER |
| 3021 | J O'Shea | Manchester United | 112 | 3700000 | DEFENDER |
| 3010 | J Lescott | Everton | 132 | 4100000 | DEFENDER |
| 3005 | J Carragher | Liverpool | 111 | 4500000 | DEFENDER |
| 5140 | C Brunt | West Bromwich Albion | 106 | 2800000 | MIDFIELD |
| 5039 | M Taylor | Bolton Wanderers | 132 | 3500000 | MIDFIELD |
| 5013 | T Cahill | Everton | 114 | 4000000 | MIDFIELD |
| 5001 | C Ronaldo | Manchester United | 185 | 7000000 | MIDFIELD |
| 7020 | P Crouch | Portsmouth | 151 | 5900000 | FORWARD |
| 7008 | R Van Persie | Arsenal | 154 | 6600000 | FORWARD |

- Players = 33
- Points = 4,425
- Cost = £143.7mn

| URN | PLAYER | CLUB | POINTS | COST | POSITN |
|---|---|---|---|---|---|
| 1001 | P Cech | Chelsea | 136 | 4000000 | GOALKEEPER |
| 3017 | J Bosingwa | Chelsea | 129 | 3900000 | DEFENDER |
| 3008 | A Cole | Chelsea | 109 | 4300000 | DEFENDER |
| 3003 | N Vidic | Manchester United | 169 | 4700000 | DEFENDER |
| 3002 | J Terry | Chelsea | 114 | 4800000 | DEFENDER |
| 5069 | C Dempsey | Fulham | 116 | 3200000 | MIDFIELD |
| 5048 | S Ireland | Manchester City | 127 | 3400000 | MIDFIELD |
| 5045 | L Osman | Everton | 114 | 3400000 | MIDFIELD |
| 5002 | F Lampard | Chelsea | 231 | 5800000 | MIDFIELD |
| 7029 | K Davies | Bolton Wanderers | 150 | 5200000 | FORWARD |
| 7012 | N Anelka | Chelsea | 184 | 6300000 | FORWARD |

# How complex are our marketing scenarios?

Fantasy Football

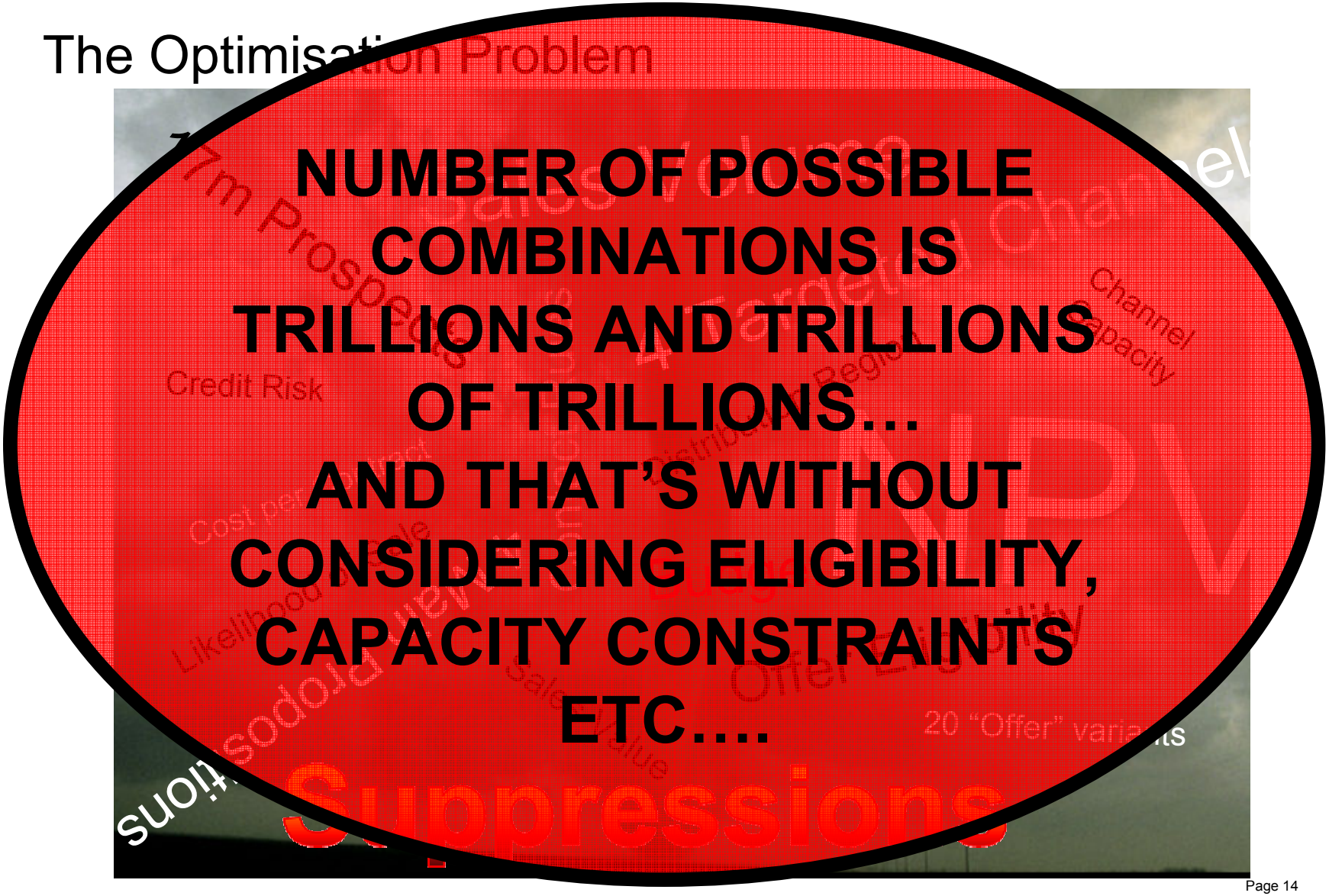
| |
|---|
| **550 players** |
| **3 teams** |
| **2 objectives (points and cost)** |
| **12 "Decisions" to optimise (3 team X 4 positions)** |

**For just 10 customers and 2 campaigns, there are over 1,000,000 potential contact strategies**

Prospect Marketing

| |
|---|
| **17 million prospects** |
| **4 channels, campaigns every week of the year = 200** |
| **3 objectives (NPV, Cost, Gains) but these vary by channel** |
| **Around 7,000 "decisions" on each prospect (week, channel, campaign, props, payment)** |
| **Contact rules (e.g. 4 week contact cycle)** |
| **Eligibility criteria** |

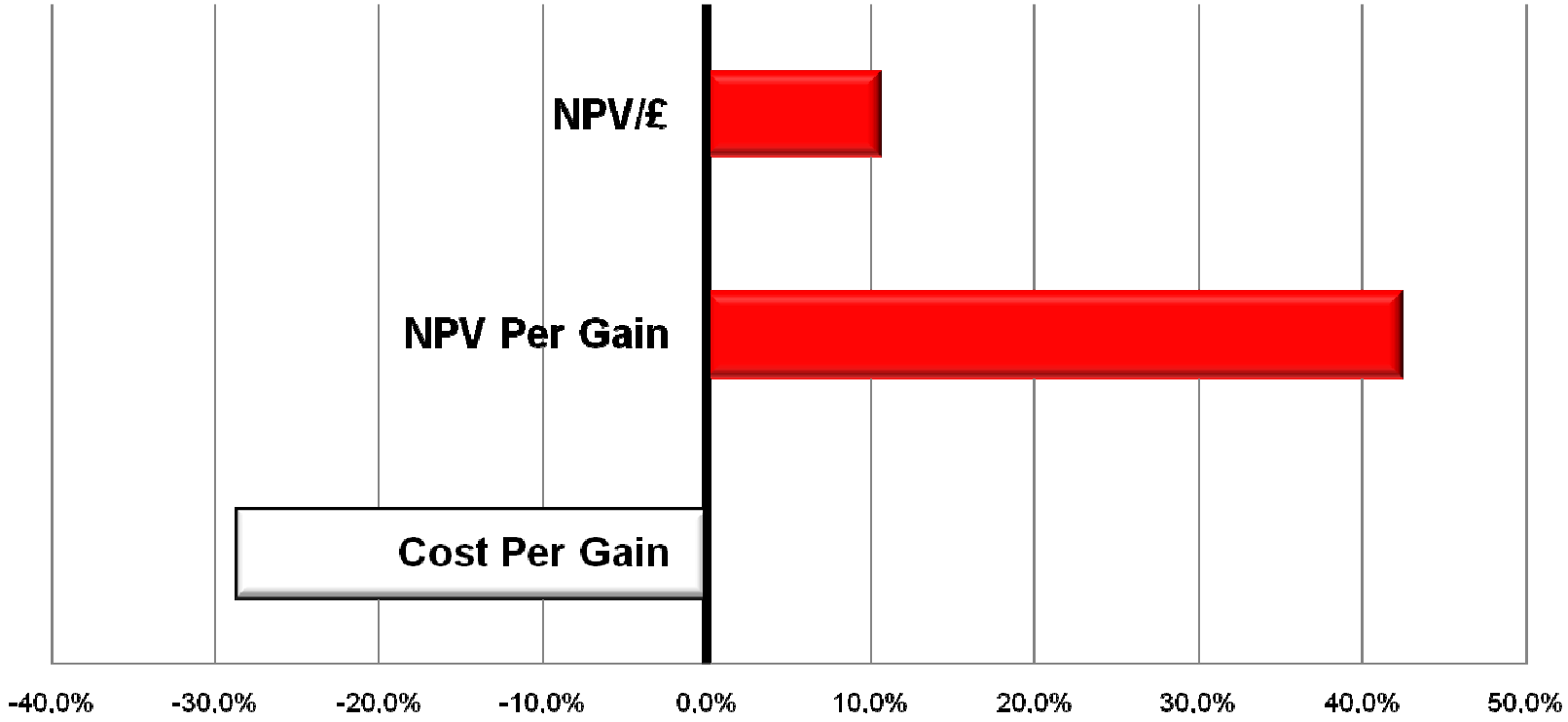
# The Optimisation Problem

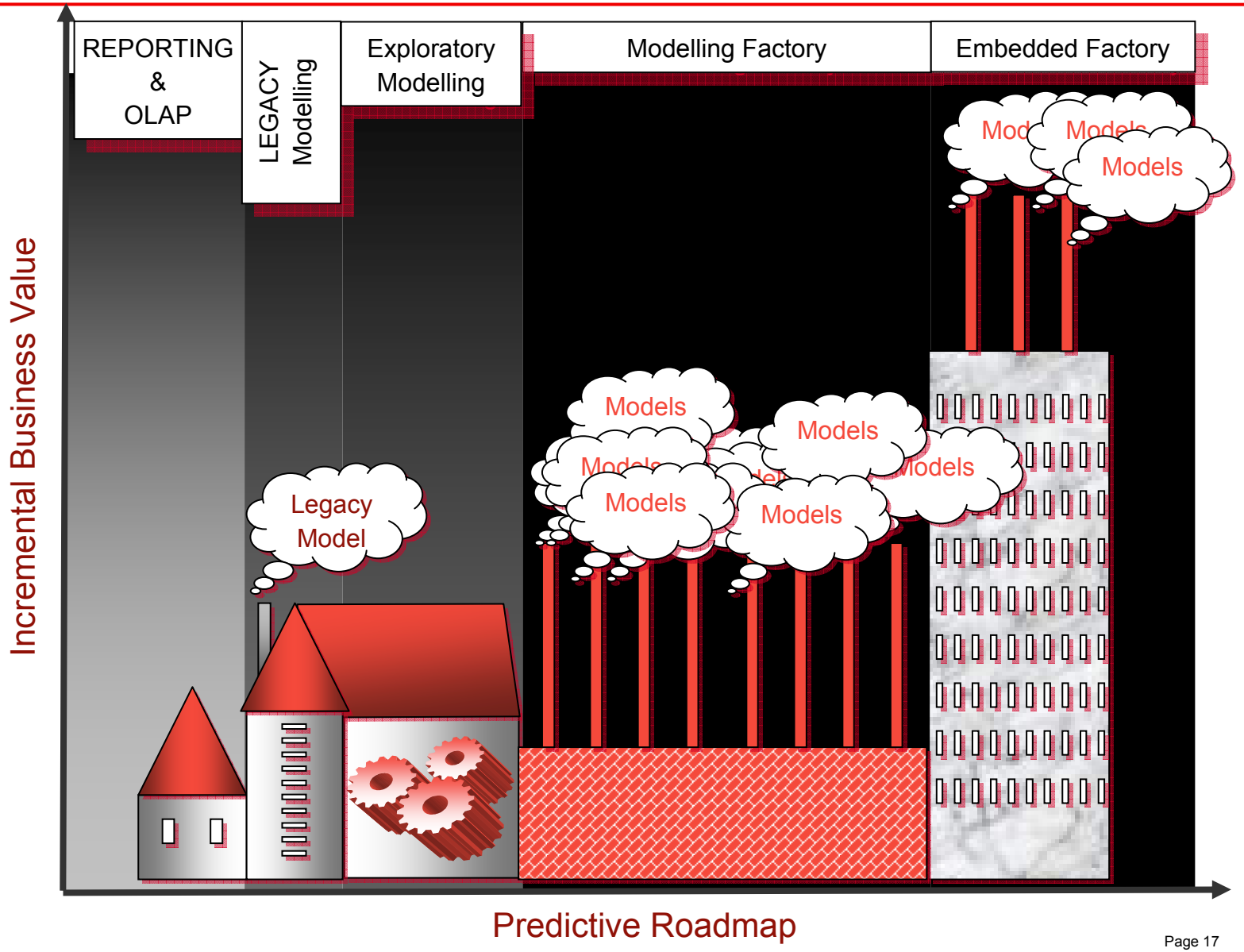


# The Optimisation Solution

- Bottom-up representation of the available prospect pool expressed in terms of the dimensions that are relevant.
- Inputs include ALL relevant models, values, costs, propensities etc AT CUSTOMER LEVEL.
- Top-down constraints (e.g. overall budget, channel budget, minimum sales volume, minimum sales value, maximum cost etc).
- Ability to optimise across goals (e.g. volume versus value)

# Trial Results




REPORTING & OLAP
LEGACY Modelling
Exploratory Modelling
Modelling Factory
Embedded Factory
Models
Models
Models
Models
Models
Models
Models
Legacy Model
Incremental Business Value
Predictive Roadmap

# The Modelling Solution

- A data mining product that could handle a 1,000 + input variables across millions of rows of data.
- A product that would give us a complete platform of classification/regression, time series analysis, clustering, segmentation and text coding.
- A product that would allow us not only to build highly accurate models but also reliable models with the large number of input variables.
- A data mining product that can do all this in minimal time.

# Optimisation, Modelling Factory and Time

Optimisation will only ever be as good as the models which feed it.

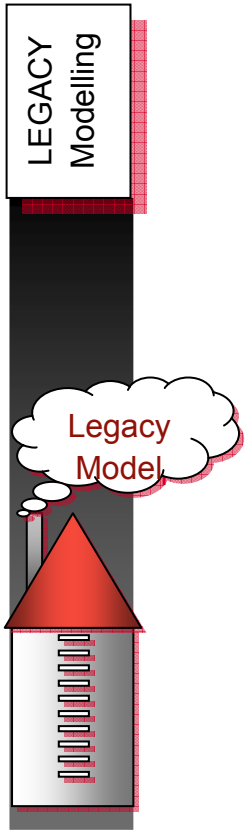
Time to Segment

# Electricity Consumption Model

- The electricity consumption model is the main driver we use to determine which offers are presented to prospects.

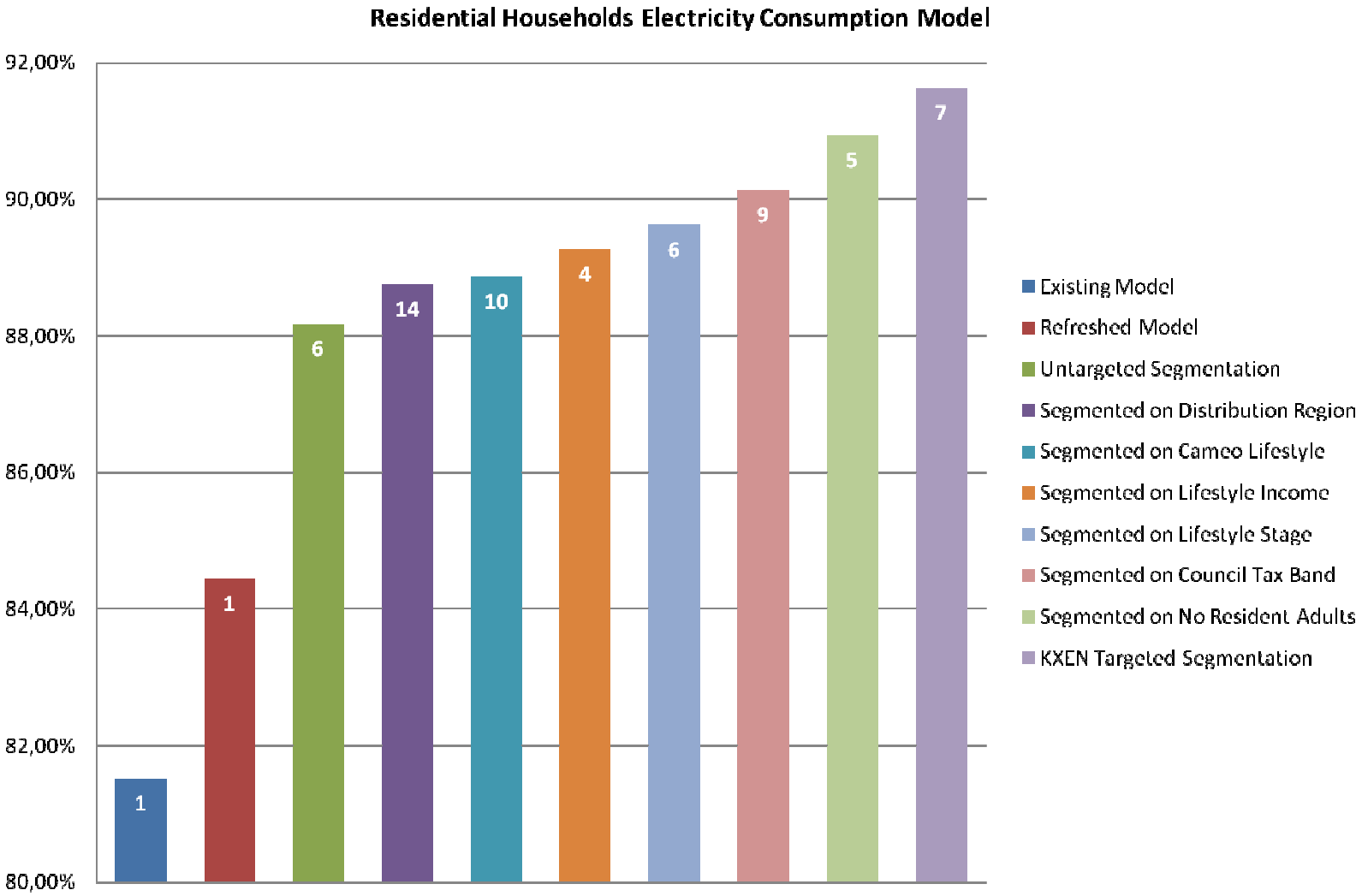
Data Sources used

- EuroDirect Domicile Information
- EuroDirect Cameo Information (Postcode Level)
- Census Data
- EuroDirect Person Information
- Experian Mosaic information (Postcode Level)
- Call Credit Geofraud Information (Postcode Level)
- NSPD data (Postcode Level)
- Other prospect models (Prepayment & Benefits)




In the past under our legacy model approach we built one consumption model and took a long time over it.

# Electricity Consumption Model – Segmentations



Time to Diversify

# SME Electricity Consumption Model – Profiling

## Highest Consuming SME

Paper Systems Bedfordshire
Eastern Region
Number of locations: 1
Number of Employees at Site: 50
Age of Company: 56 years
SIC Code: Manufacture of office machinery

## Lowest Consuming SME


Gentlemen's Hairdresser Derbyshire
Number of locations: 1
Number of Employees: 1
Age of Company: 21 years
SIC Code: Hairdressing & other beauty treatment
Product:  Alignment Sales NSC E7

# SME Gas Consumption Model –Profiling

## Highest Consuming SMEs

Kebabs Sheffield

Number of locations: 1

Number of Employees at Site: 5

SIC Code: Hotels Restaurants

Crematorium

Number of locations: 3

Number of Employees at Site: 20

Age of Company: 81 years

SIC Code: Funeral & related activities

## Lowest Consuming SMEs

Garden Centre Nottingham

Number of locations: 1

Number of Employees: 12

Age of Company: 12 years

SIC Code: Other retail sale in specialised stores

# SME Risk Model - Profiling

## Risk Decile 1 – Highest Bad Debt Risk

Construction Limited

SIC Code: 45210 – General construction of buildings & civil engineering works

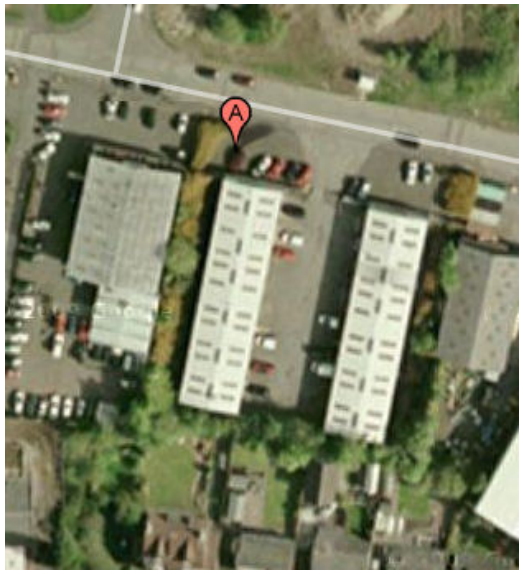
Age of Company: 7 years

Company Employees: 57

Number of CCJs in last 24 months: 6

Average Days Beyond Terms: 240

Predicted Annual Electricity Consumption: 53MWh



## Risk Decile 10 – Lowest Bad Debt Risk

JMHairdressing

SIC Code: 93020 - Hairdressing & other beauty

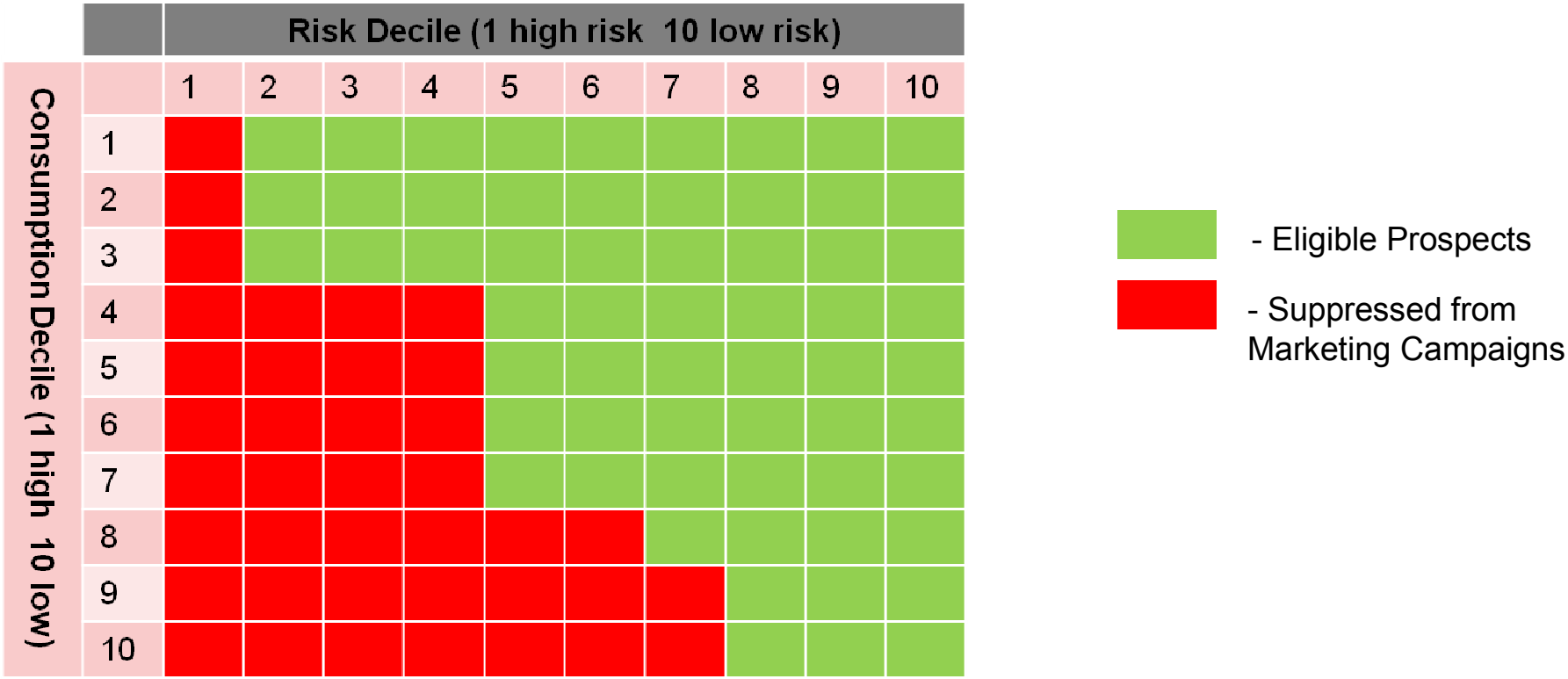
Age of Company: 24 years

Company Employees: 4

Predicted Annual Electricity Consumption: 13MWh

# SME Solicitation Model – Implementation

- Using both the consumption models and the risk model we've created a scorecard with the help of finance to ensure that value outweighs the risk for each of the segments
- This should reduce debt and increase the number of additional prospects for our marketing campaigns



# Longer Term Plans and fundamental changes to BAU.

- Optimised HEC walkbooks early 2010 – optimise density versus value/gains
- SME single site and ECM in 2010
- End 2010 and into 2011 – optimise across business units and objectives:
  - Optimise mix of SME versus Residential marketing
  - Optimise mix of retention and acquisition – is it better for us to spend our money on switching a customer to Capped or on acquiring a new customer on EOL?

Questions?