

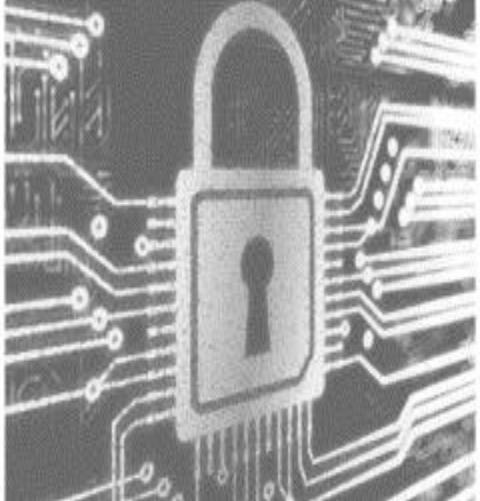


# SCAF Challenge Parametric Analysis 24<sup>th</sup> April 2012

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**THALES**

- ◆ Thales Bid Finance (Nav)
- ◆ The Challenge (Nav)
- ◆ Data Analysis (Mark)
- ◆ Pricing Tool Development (Mark)
- ◆ Validation of Results (Owen)
- ◆ Summary (Owen)



# Bid Finance

- ◆ Bid Finance: To support Bids and projects to understand and assure all the financial aspects

#### Typical Activities include

- ◆ Business case support
- ◆ Finance support to bids
- ◆ Production estimating
- ◆ Risk support to bids

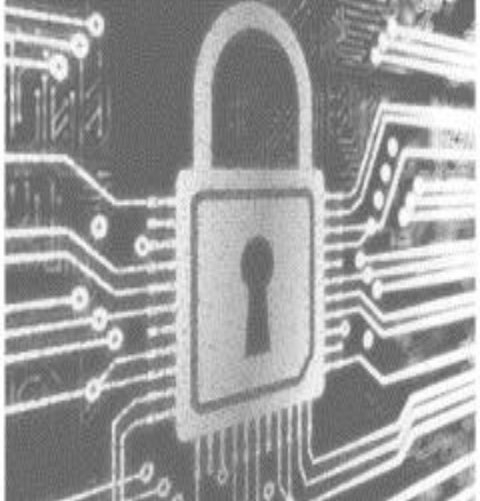


Circa 30 people UK Wide

Present at 13 Sites across the country

Support all Thales UK business units

- Air
- Land
- Sea
- C4ISTAR
- Transport



# The Challenge

- ◆ The Objective

*Allow the pricing of tailored models that meets customer driven specification*

- ◆ The Task

*Produce a Parametric model to provide forecourt staff with a quick pricing tool to achieve the above objective*

- ◆ The Solution

1. Capture Customer needs and interpret them into specification
2. Provide forecourt staff with a simple Parametric tool to price customer driven specification
3. Provide forecourt staff with information to support negotiation

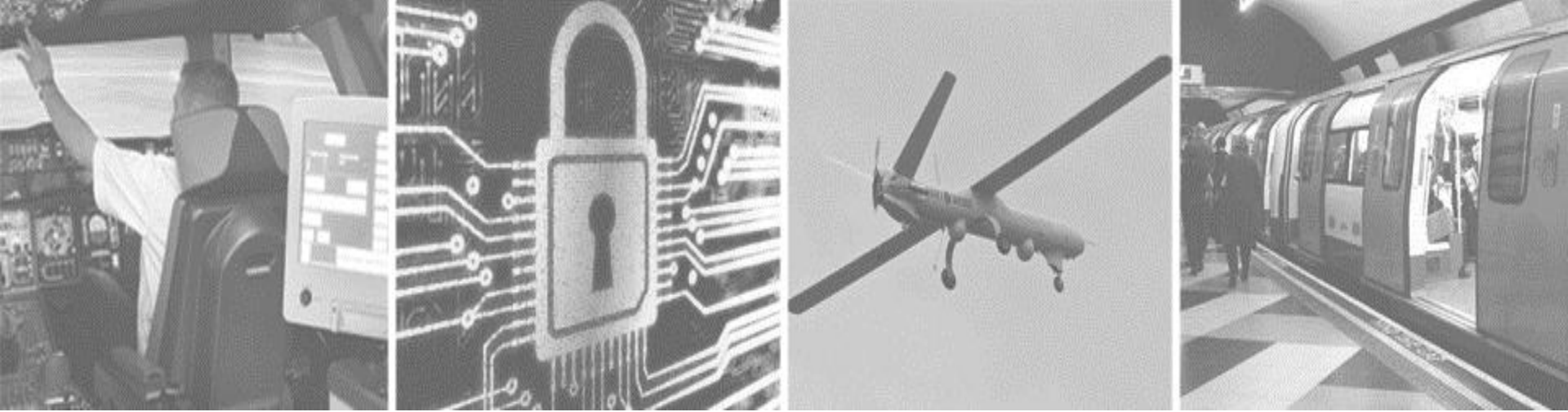
- Analysis based on price list provided, additional models and styles not taken into account or used in data analysis
- Mechanical Components- Engines / gearboxes etc within the Fiesta and Focus price list are assumed to be from a common range of production parts
- Customer driven car tailoring restricted to simplify modeling outputs (I.E. 2.0 Litre can not be fitted to a Fiesta)
- Engines can produce any power required within the minimum and maximum performance boundary
- Each increment in engine size costs £250
- Diesel engines cost 25% more then equivalent Petrol engines
- Turbo's deliver 50ps above standard

\*In order of significance

- ◆ Each car consists of 6 sub-components, each of which may be tailored
  - Body
    - Fiesta      Focus
  - Number of doors
    - 3 Doors      5 Doors
  - Windows
    - Manual      Electric
  - Style
    - Studio      Style      Edge      Zetec      Zetec S      S1600      Titanium      Titanium X
  - Transmission
    - Manual      Auto      Powershift
  - Engine
    - Petrol      Diesel
    - 1.25      1.4      1.6      2.0
    - Turbo      Standard
    - 60ps to 206ps

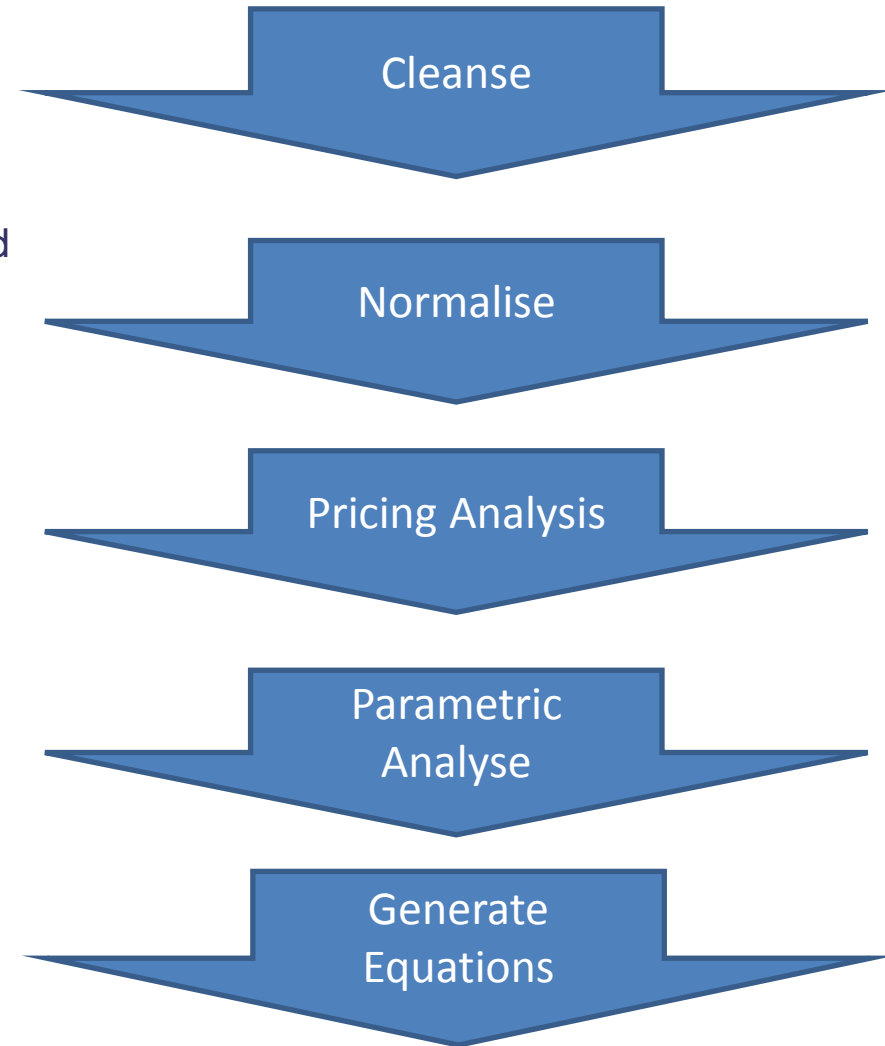
Note: In order to simplify the requirements definition, constraints have been placed on the mix of components available. However the model is capable of producing a price forecast for any mix of components





# Data Analysis

- ◆ Data Cleanse – Structure Data in to analytical format and identify and resolve data gaps
- ◆ Normalisation – Convert data into standardised units
- ◆ Pricing Analysis – Segregate data into constituent parts and identify unit prices
- ◆ Parametric Analysis – Identify Cost Estimating Relationships between key parameters
- ◆ Results – Generate parametric equations for costing



## 1. Duplicate Data

Body	Style	Doors	Fuel	Engine Size	Power	Trans	Price	Price Delta

FIESTA		Unit	BASE PRICE DELTA		
			Min	Avg	Max
<b>Doors</b>	3dr	3	-	-	-
	5dr	5	313	313	313
<b>Windows</b>	Manual				
	Electric		287	287	287
<b>Engine</b>	Petrol	1.25(60ps)	60		
		1.25(82ps)	82	600	619
		1.4 (96ps)	96	1,205	1,224
	1.6(89ps)	89	1,805	1,824	
	1.6(135ps)	135	2,305	2,324	
	Diesel	1.4(71ps)	71	1,969	1,969
		1.6(96ps)	96	2,550	2,569
<b>Transmission</b>	Manual				
	Auto		1,005	1,005	
<b>Style</b>	Studio	35	9,995	9,995	
	Style	37	11,554	11,554	
	Zetec	45	11,577	11,586	
	Zetec S	50	11,372	11,372	
	Titanium	56	12,577	12,586	
	S1600	61	13,577	13,577	

**Base Price** Based on Fiesta Studio 3dr 1.25 (60ps) 9,995

FOCUS		Unit	BASE PRICE DELTA		
			Min	Avg	Max
<b>Engine</b>	Petrol	1.6(105ps)	105	-	-
		1.6(126)	126	500	500
		1,6T(182)	182	1,500	1,500
	Diesel	1.6(105ps)	105	995	995
		1.6(115ps)	115	1,495	1,495
<b>Transmission</b>	Normal	2(140ps)	140	2,495	2,495
		2(165ps)	165	2,995	2,995
	Power Shift			-	-
				1,255	1,255
<b>Windows</b>	Manual				
	Electric		287	287	
<b>Style</b>	Edge	42	16,000	16,000	
	Zetec	48	17,000	17,000	
	Titanium	59	18,250	18,250	
	Titanium X	67	19,750	19,750	

**Base Price** Based on Focus Edge 5dr 1.4(105ps) 15,400

Combine  
Data points

Combine Fiesta and Focus Data to maximise data points

Analyse  
CERs

Identify Cost Estimating Relationships

Remove  
Outliers

Remove Outliers

Establish  
Relationship

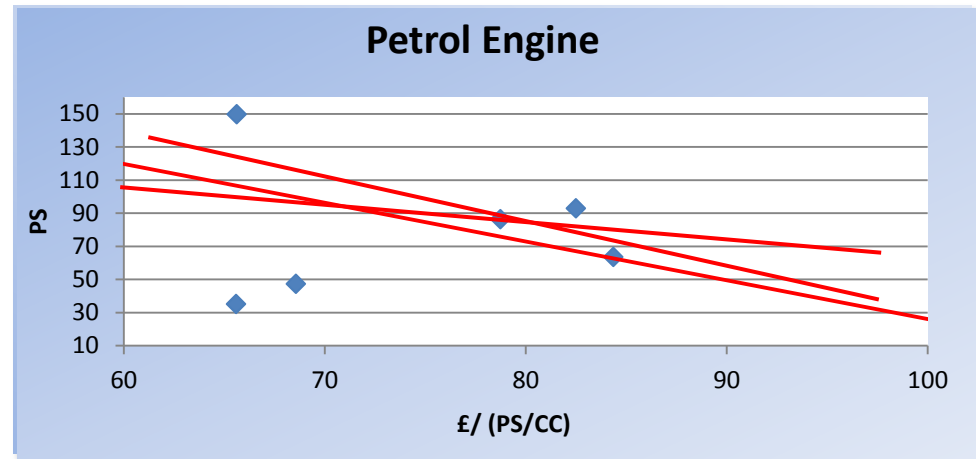
Generate Parametric Equations

Understand  
Uncertainty

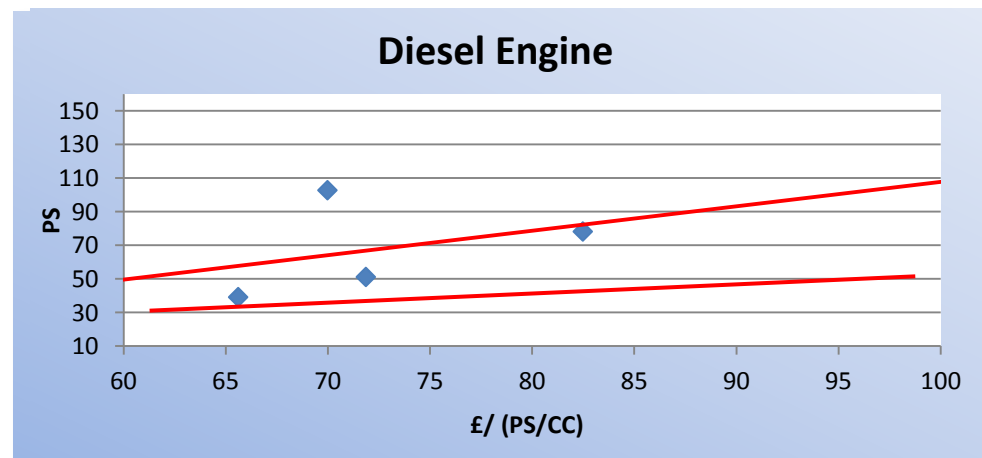
Apply Minimum and Maximum Values

Engine	Size	Power Delta	Cost Delta	PS/CC	£/PS/CC
Petrol	1.25(60ps)	0	0	0	0
	1.25(82ps)	22	618	65.6	35.14205
	1.4 (96ps)	36	1,223	68.57	59.47569
	1.6(89ps)	29	1,823	55.62	239.1475
	1.6(135ps)	75	2,323	84.37	80.81739
	1.6(105ps)	45	1,997	65.62	199.7413
	1.6(126)	66	2,497	78.75	107.9962
	1.6T(182) (132)	72	2,997	82.5	111.5316
Diesel	1.4(71ps)	11	1,968	50.71	38.81549
	1.6(96ps)	36	2,568	60	276.6077
	1.6(105ps)	45	995	65.62	66.73054
	1.6(115ps)	55	1,495	71.87	70.64979
	2(140ps)	60	2,495	70	129.3704
	2(165ps)	105	2,995	82.5	94.22472

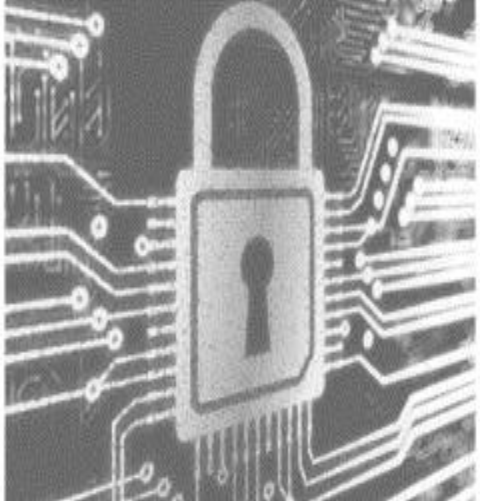
$$\text{£} = (-0.0364(\text{PS}) + 32.567) + \text{Fixed Element}$$



$$\text{£} = (0.0663(\text{PS}) + 16.136) + \text{Fixed Element}$$

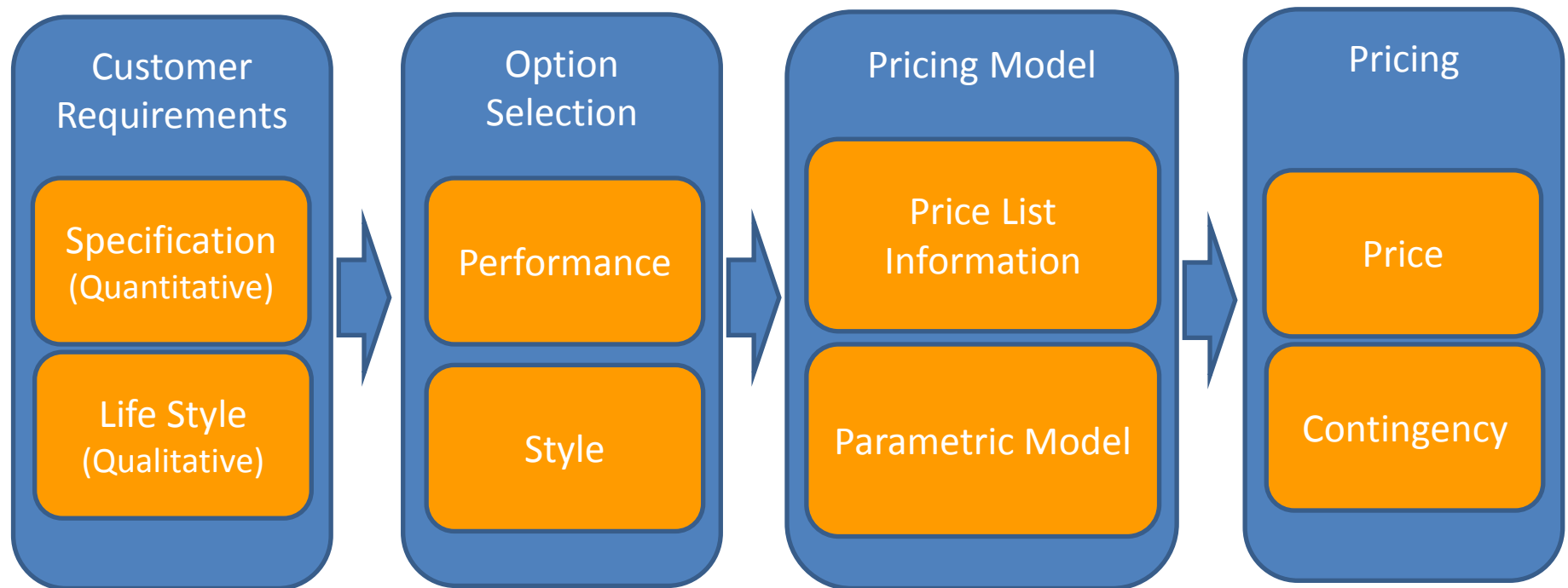


Component	Parameter	Fixed/ Variable	Value	Uncertainty %
Body	Fiesta / Focus	Fixed	£9,995 / £15,400	0%
Doors	Number of Doors	Fixed	0 / £313	0%
Style	Type of style	Fixed	£1,000 - £3,750	+/- 0.8 %
Electric Windows	Manual / Electric	Fixed	0 / £287	0%
Transmission	Manual / Auto / Powershift	Fixed	0 / 1,005 / 1,225	0%
Engine Size	Power	Variable	£ = -0.0364 Power +32.567 + Engine Size	-10% + 25%
			£ = 0.0663Power +16.136 + Engine Size	-15% +30%
Turbo	Fitted / Not Fitted	Fixed	0 / £500	0%



# Pricing Tool





## Performance

### Quantitative

Number of Miles  
Type of Roads

Horse  
Power /  
Engine Size  
Fuel Type

### Qualitative

Performance  
Rating

Horse  
Power  
Turbo

## Style

### Quantitative

Type of Usage  
Load

Body Style  
Number of  
Doors

### Qualitative

Style Rating

Style  
Windows  
Transmission

Customer Requirement  
Medium Usage - Petrol – 80% Life Style Factor

Category	LOW			MED			HIGH		
Tailoring	1	5	10	1	5	10	1	5	10
Power (PS)	65	80	95	110	133	145	160	185	200
Petrol Eng Size	1.25	1.4	1.6			1.8			2.0
Petrol Turbo	NO			YES			YES		

Customer Specification: Petrol 1.6T 143 ps

 Outside Production Scope

 Outside Design Standard Production

**THALES**

Customer Requirement  
Medium Style - 80% Life Style Factor

Category	LOW			MED			HIGH			
Tailoring	1	5	10	1	5	10	1	5	10	
Model	Fiesta						Focus			
Doors	3 Doors			5 Doors						
Style	Style	Studio	S1600	ZETEC	ZETEC S	Titanium	Edge	ZETEC	Titanium	Titan x
Elect Windows	No	Yes		No	Yes		No	Yes		
Transmission	Manual		Auto	Manual			Auto	Manual		Power shift

Customer Specification: Fiesta 5dr Zetec S Manual

Specification

Pricing Model

**Model Base Price**  
Fiesta Focus

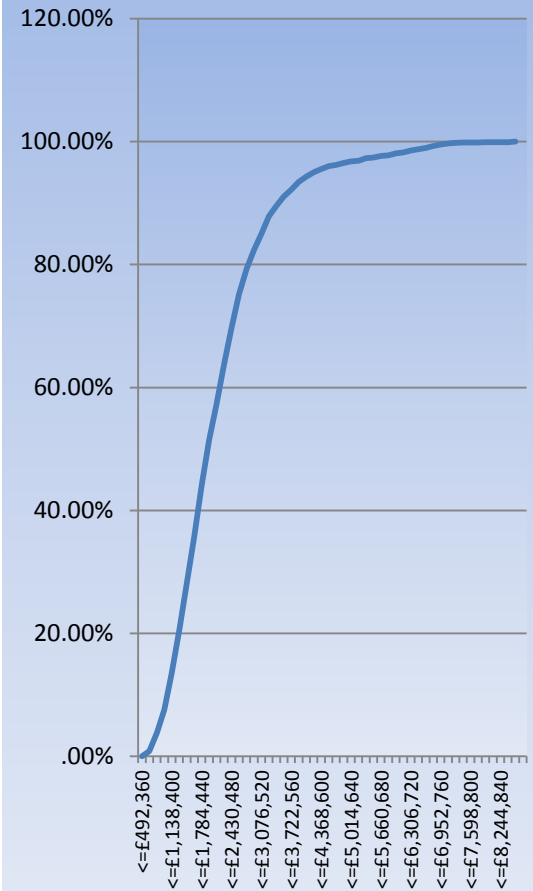
**Fixed Price Items**  
Style  
Doors  
Windows  
Transmission  
Turbo

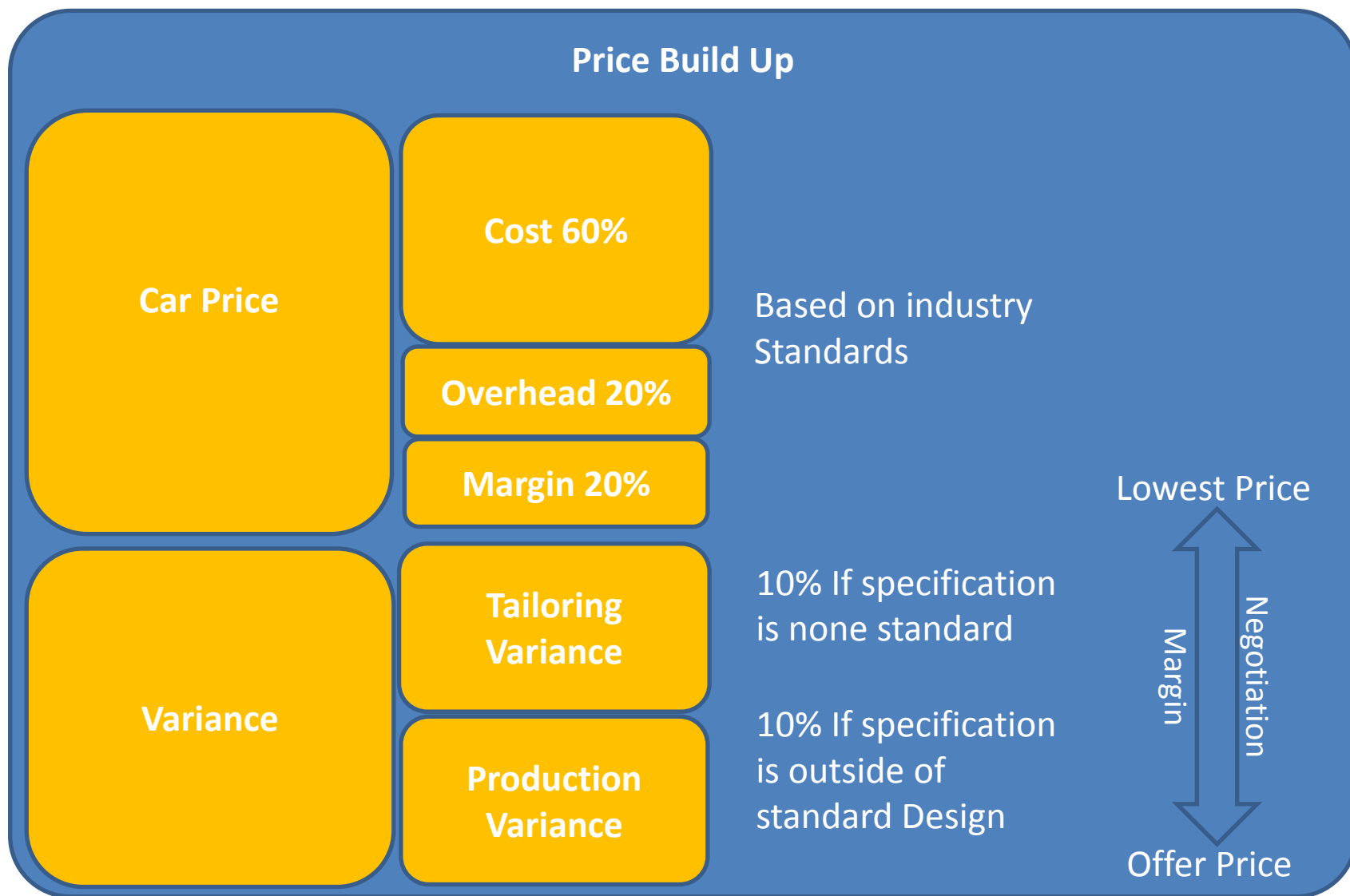
**Parametric Costings**  
Variable Engine  
Fixed Price Element

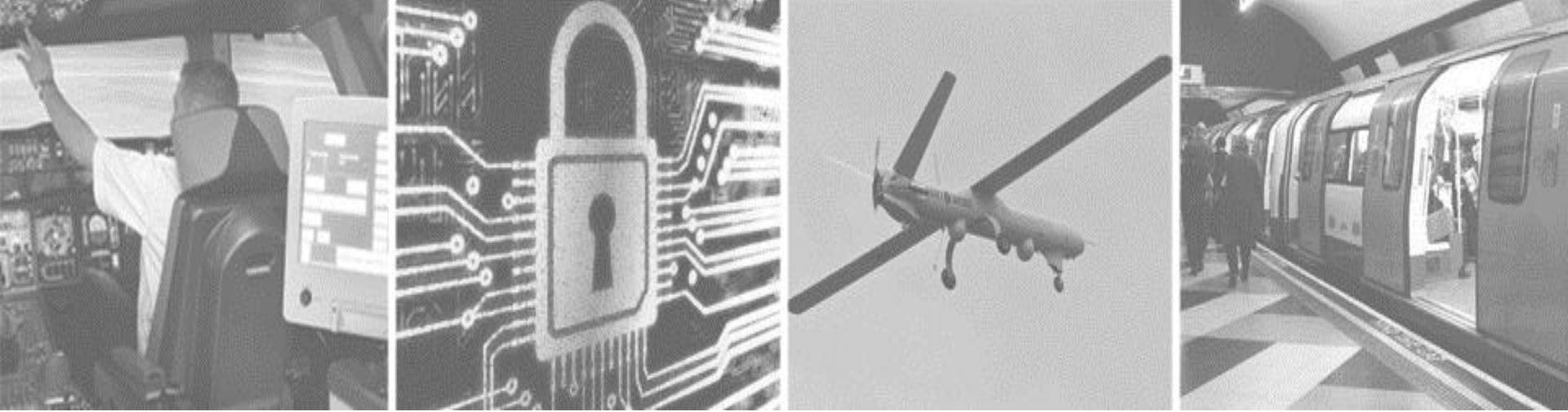
	Min	ML	MAX
Fiesta	9,995	9,995	9,995
5dr	313	313	313
Zetec S	3,581	3,581	3,581
Manual	0	0	0
Elec Windows	287	287	287
Turbo	500	500	500
Petrol 1.6 143ps	1,352	1,462	1,612

Monte-Carlo

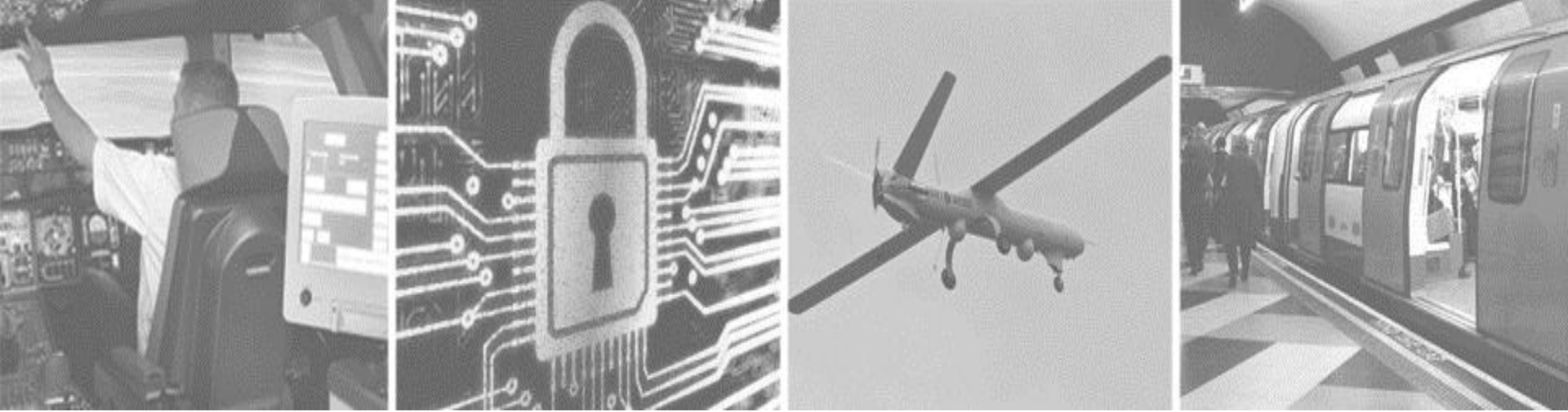
**Percentile Distribution**







# Model Run Through

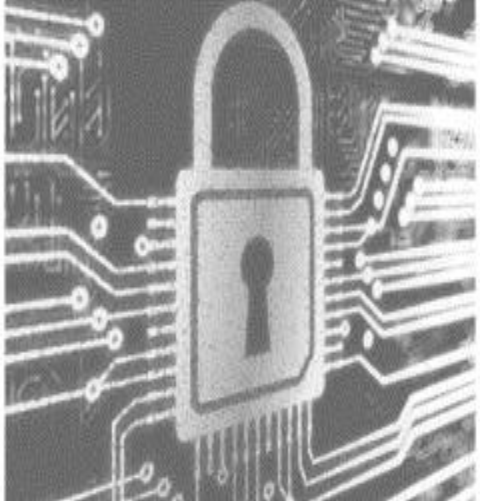


# Validation of Results



Model	10%*	50%*	90%*	List Price	Difference
Fiesta Studio 5dr 1.4 Diesel	11,964	12,394	12,623	12,545	151
Fiesta Zetec 3dr 1.4 Petrol	13,774	13,890	14,045	13,805	-85
Fiesta Titanium 3dr 1.6 Diesel	15,195	15,721	16,060	15,745	24
Focus Titanium 5dr 1.6 Diesel	19,466	19,732	19,884	19,745	13
Focus Titanium 5dr 2.0 Diesel	21,362	21,775	22,000	22,000	225

\* Excluding Variance for the Purpose of comparison



# Summary

- ◆ Dynamic pricing tool, i.e. pricing against specification not from a price list.
- ◆ This has the added benefit of providing Customer with the best value for money by meeting what they NEED from their specification
- ◆ What impact would this have on the profits of the car manufacturer?
  - Cars are an emotional, status-driven purchase. People will always buy more than what their base requirements
- ◆ Future uses for the tool:
  - May prove useful for the general car market where greater choice is available , I.e. Autotrader.co.uk, What Car?
- ◆ How does the model relate to Thales business?
  - Thales business = Customer Requirement driven business
- ◆ A model that captures and interprets customer needs and converts them, using current price lists, into a sales price, would provide the following benefits to Thales:
  - Quicker bid turnaround times, reduced bid costs, improved customer satisfaction through tailored solutions, reducing over-engineering by encouraging design to cost

Questions?