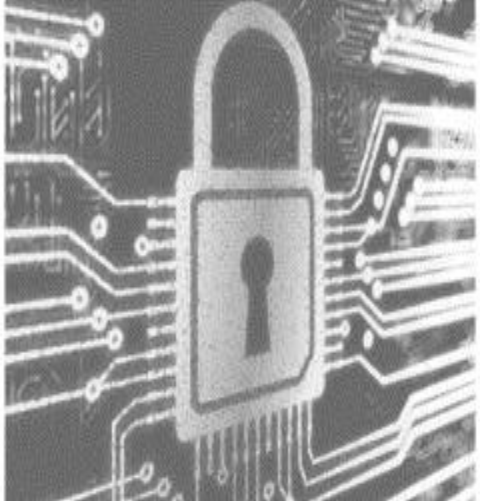# SCAF Challenge Parametric Analysis 24th April 2012

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Owen Brown

Mark Burdett

THALES

- ◆ Thales Bid Finance (Nav)

- ◆ The Challenge (Nav)

- ◆ Data Analysis (Mark)

- ◆ Pricing Tool Development (Mark)

- ◆ Validation of Results (Owen)

- ◆ Summary (Owen)

THALES

Bid Finance

THALES

◆ 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
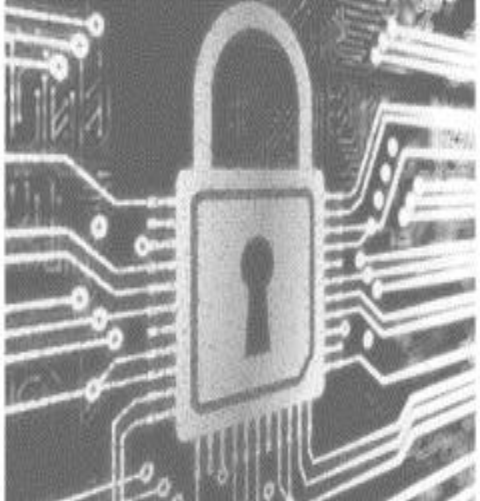◆ Production estimating
◆ Risk support to bids

Circa 30 people UK Wide

Present at 13 Sites across the country

Support all Thales UK business units

❑Air
❑Land
❑Sea
❑C4ISTAR
❑Transport

THALES

The Challenge

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◆ The Objective
 A*llow 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

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- 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

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◆ 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

THALES
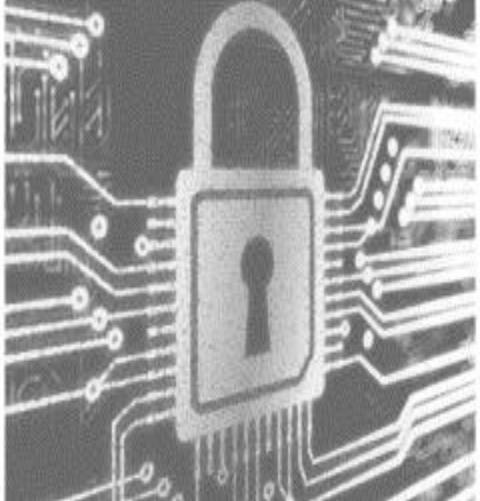
Data Analysis

THALES

◆ 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

Cleanse

Normalise

Pricing Analysis

Parametric Analyse

Generate Equations

THALES

1. Edit Database
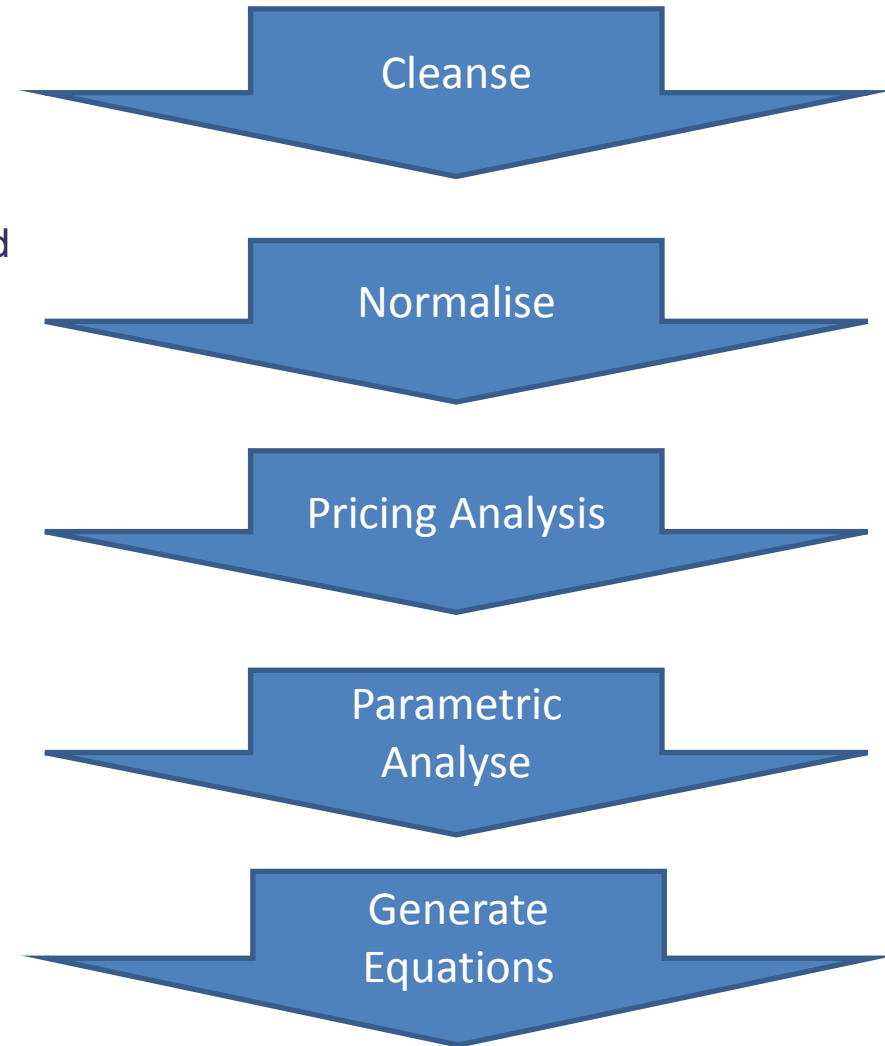
Body	Style	Doors	Fuel	Engine Size	Power	Trans	Price	Price Delta

THALES

FIESTA		Unit	BASE PRICE DELTA		
			Min	Avg	Max
Doors	3dr	3	-	-	-
	5dr	5	313	313	313
Windows	Manual				
	Electric		287	287	287
Engine	Petrol 1.25(60ps)	60			
	1.25(82ps)	82	600	619	637
	1.4 (96ps)	96	1,205	1,224	1,242
	1.6(89ps)	89	1,805	1,824	1,842
	1.6(135ps)	135	2,305	2,324	2,342
	Diesel 1.4(71ps)	71	1,969	1,969	1,969
	1.6(96ps)	96	2,550	2,569	2,569
Transmission	Manual				
	Auto		1,005	1,005	1,005
Style	Studio	35	9,995	9,995	9,995
	Style	37	11,554	11,554	11,554
	Zetec	45	11,577	11,586	11,595
	Zetec S	50	11,372	11,372	11,372
	Titanium	56	12,577	12,586	12,595
	S1600	61	13,577	13,577	13,577
Base Price	Based on Fiesta Studio 3dr 1.25 (60ps)				9,995

FOCUS		Unit	BASE PRICE DELTA		
			Min	Avg	Max
Engine	Petrol 1.6(105ps)	105		-	-
	1.6(126)	126	500	500	500
	1,6T(182)	182	1,500	1,500	1,500
	Diesel 1.6(105ps)	105	995	995	995
	1.6(115ps)	115	1,495	1,495	1,495
	2(140ps)	140	2,495	2,495	2,495
	2(165ps)	165	2,995	2,995	2,995
Transmission	Normal		-	-	-
	Power Shift		1,255	1,255	1,255
Windows	Manual				
	Electric		287	287	287
Style	Edge	42	16,000	16,000	16,000
	Zetec	48	17,000	17,000	17,000
	Titanium	59	18,250	18,250	18,250
	Titanium X	67	19,750	19,750	19,750
Base Price	Based on Focus Edge 5dr 1.4(105ps)				15,400

THALES

|	
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

THALES

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

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

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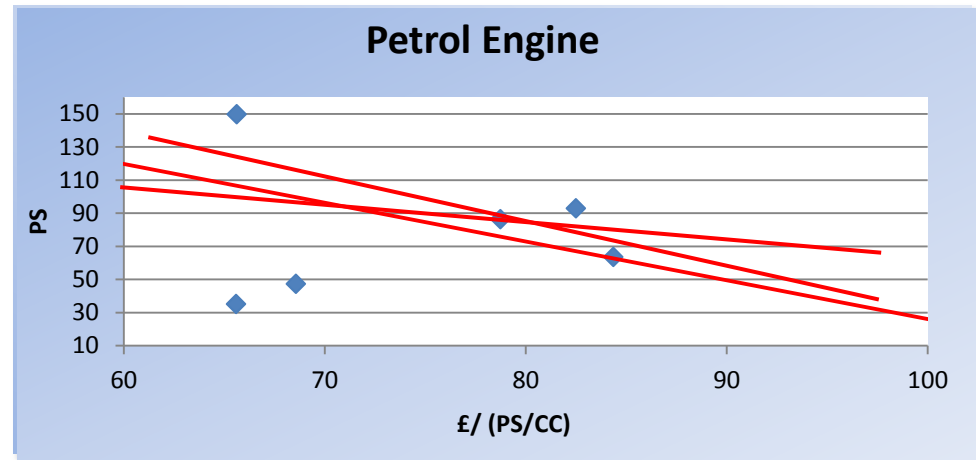
$$£ = (0.0663(PS) + 16.136) + \text{Fixed Element}$$

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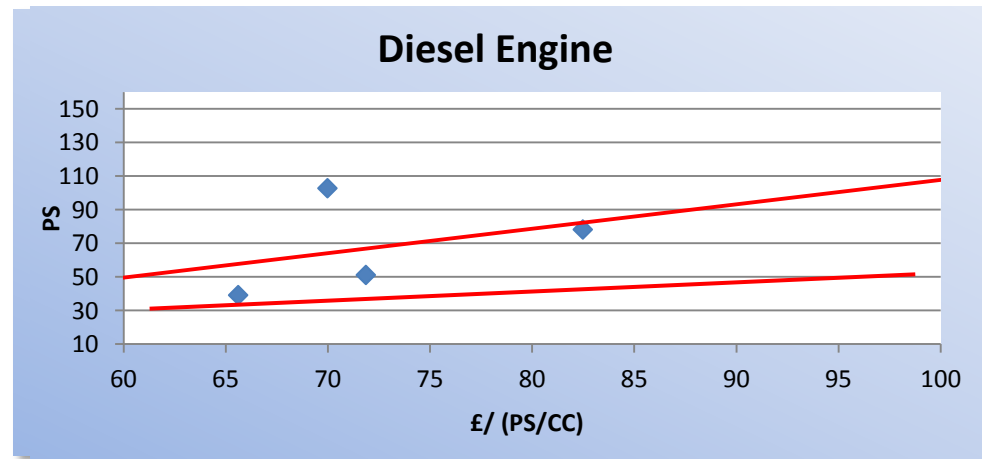
Component	Parameter	Fixed/ Variable	Value	Uncertainty %
Body	Fiesta / Focus	Fixed	£9,995 / £15,400	0%
Doors	Number of Doors	Fixed	0 / £313	0%
Style	Type of style	Fixed	£1,000 - £3,750	+/- 0.8 %
Electric Windows	Manual / Electric	Fixed	0 / £287	0%
Transmission	Manual / Auto / Powershift	Fixed	0 / 1,005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

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Pricing Tool

THALES

THALES
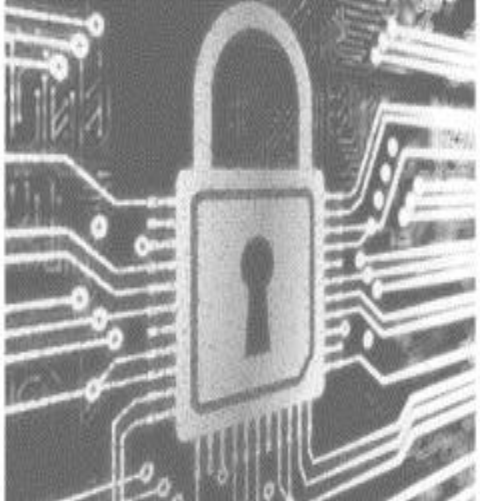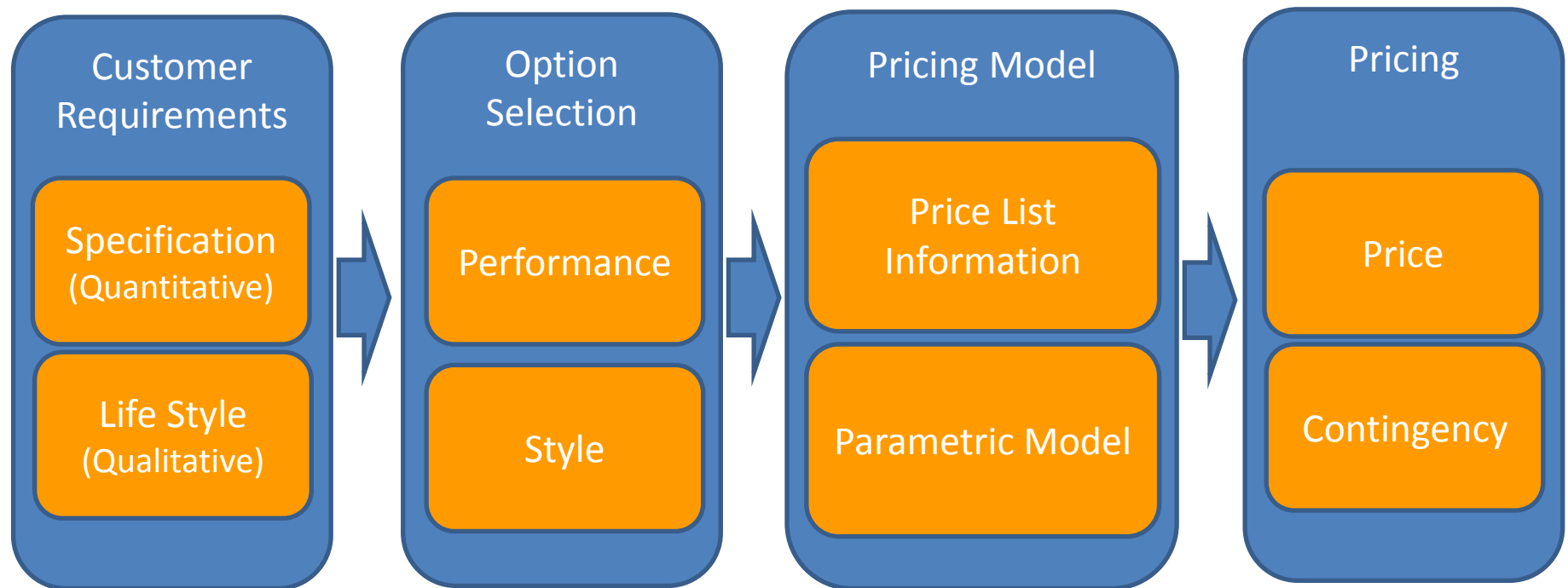
Performance

Quantitative   **Qualitative**

Number of Miles Type of Roads	Horse Power / Engine Size Fuel Type	Performance Rating	Horse Power Turbo

Style

Quantitative   **Qualitative**

Type of Usage Load	Body Style Number of Doors	Style Rating	Style Windows Transmission

THALES

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				
Petrol Turbo	NO					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

THALES

Pricing Model
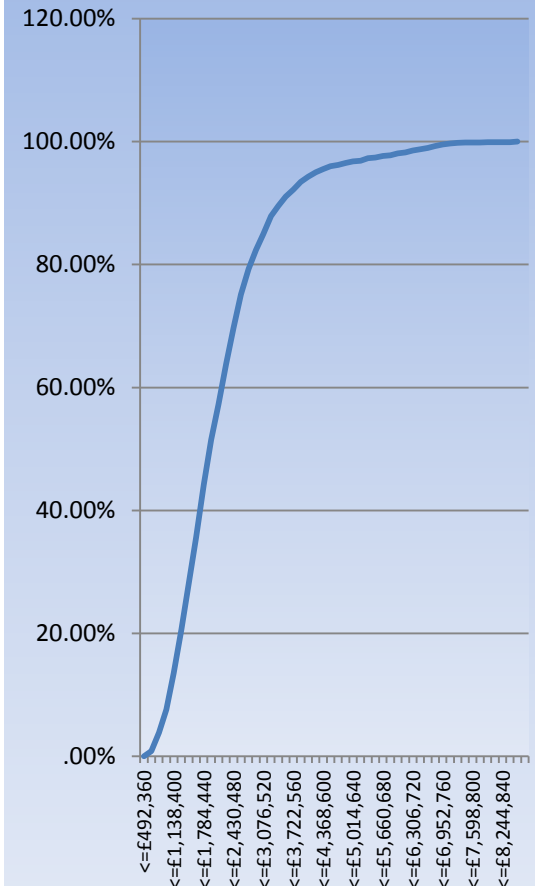
Specification

Model Base Price
Fiesta Focus

Fixed Price Items
Style
Doors
Windows
Transmission
Turbo

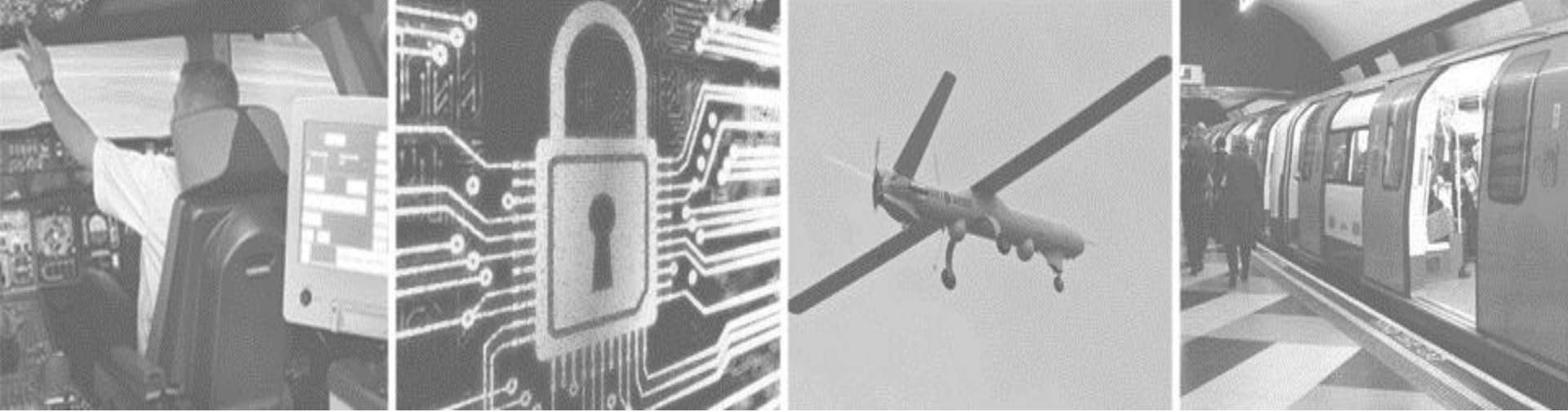**Parametric Costings**
Variable Engine
Fixed Price Element

	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

THALES

Price Build Up

Car Price

Cost 60%

Overhead 20%

Margin 20%

Based on industry Standards

Variance

Tailoring Variance

10% If specification is none standard

Production Variance

10% If specification is outside of standard Design

Lowest Price

Margin

Negotiation

Offer Price

THALES
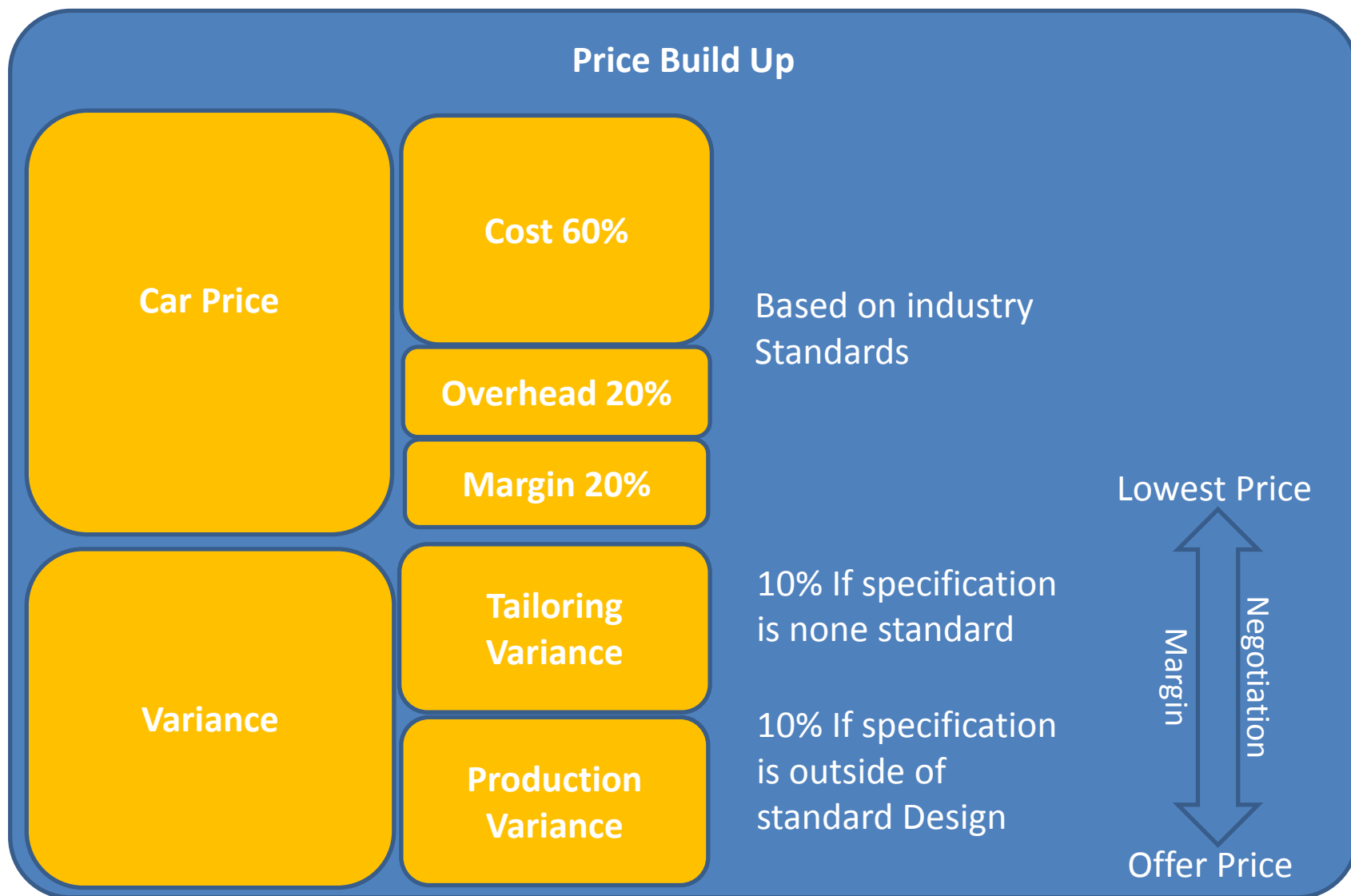
Model Run Through
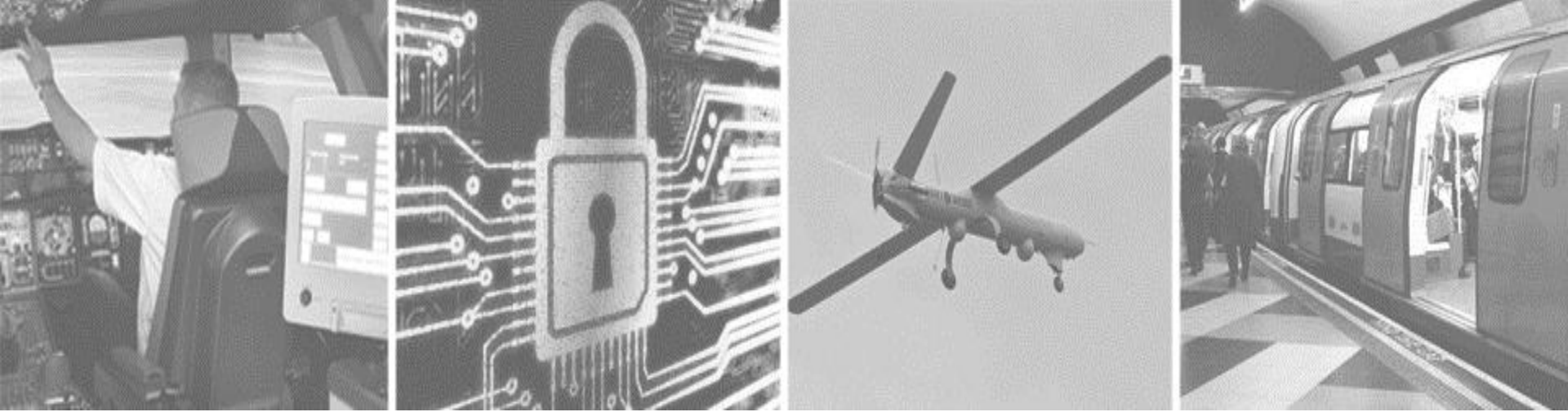
Validation of Results

THALES

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

THALES

Summary

THALES
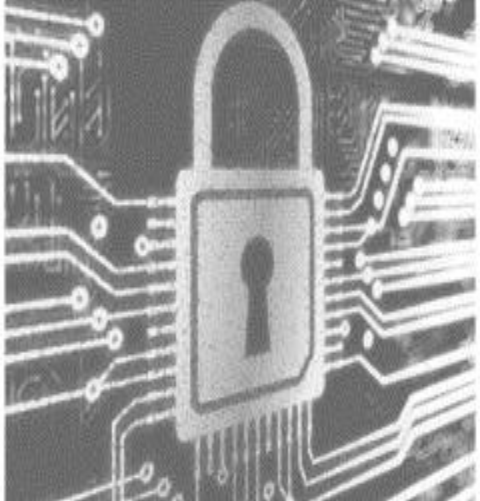
- ◆ Dynamic pricing tool, i.e. pricing against specification not from a price list.

- ◆ 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

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Questions?

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