



June 25 2010

CUSTOMER INSPIRED PRODUCT DESIGN FOR EMERGING MARKETS

*APPLYING VOC AND S-QFD FOR
NEW PRODUCT DEVELOPMENT*

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Where Innovation Operates

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Methodology Overview

Voice of the Customer (VoC)

- The un-stated, observed customer needs
- Customer opportunity requirements

Simplified Quality Function Deployment (S-QFD)

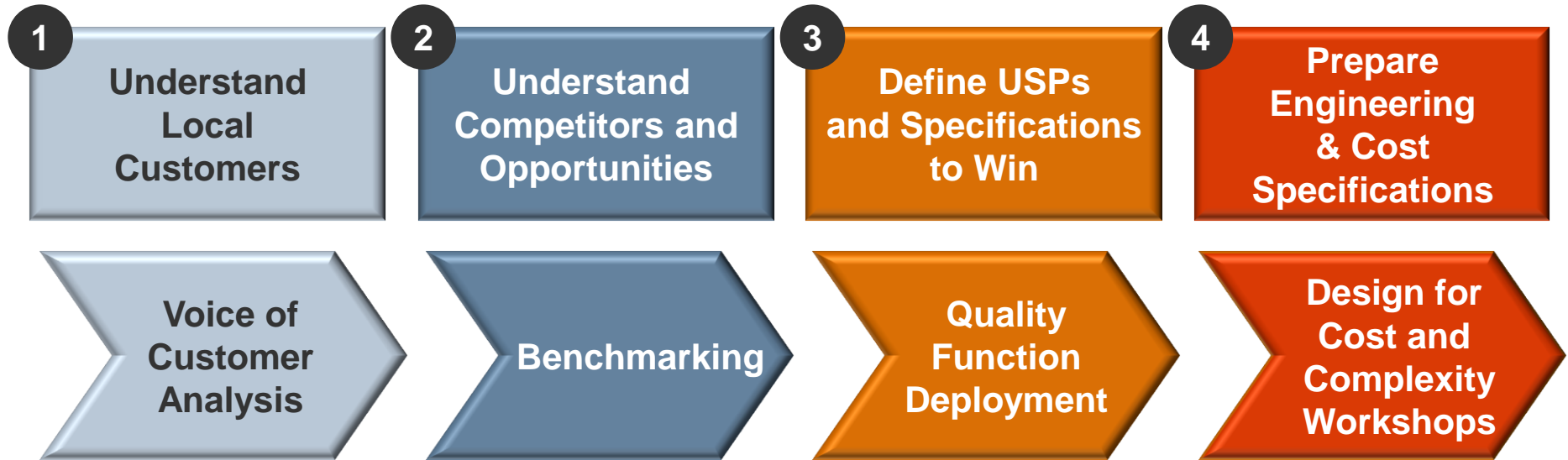
- Link customer requirements with product engineering requirements

Competitive Benchmarking of Customer Requirements

Defining a Winning Unique Selling Proposition (USP)

- Enhancing the product requirements that underscore the USP
- De-contenting the product requirements that do not support customer requirements

Customer Inspired Product Development



Discover

- Stated & unstated needs
- Local market experience and context
- Customer requirements

Assess

- Competitor products
- Performance on customer requirements
- Performance and cost gaps on key systems

Identify

- Links between customer requirements & product attributes
- Product concept USPs
- Performance needed to deliver USPs

Generate

- Cost reduction ideas for non-USPs
- Design improvements for USPs
- Cost analysis and action plan

Identify Target Customers and Key Decision Makers



Example

Truck OEMs



Bus OEMs



Fleet Operators



Government Agencies



Individual Drivers



OEMs

Fleet Buyers

Government Agencies

Individual Drivers

Voice of the Customer (VOC)

Interview Guides

Assess Inputs from Routine Sources to Gain Further Customer Insight



Routine inputs arise from ongoing operational engagement with customers



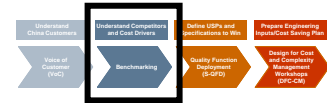
Convert “Voices” Into Opportunity Customer Requirements



Example

Customer Experience Category	# of Voices	# of Selected Voices (Key Issues)	# of Customer Requirements (CRs)	# of Opportunity Requirements
Driving	xxx	xxx	xxx	xxx
Exterior	xxx	xxx	xxx	xxx
Interior	xxx	xxx	xxx	xxx
Ownership	xxx	xxx	xxx	xxx
Total	xxx	xxx	xxx	xxx

Benchmarking Approach to Assess Performance Capabilities and Cost Drivers



Example

1 Define Competitive Vehicle Set

OEM Make	BYD F3	Honda New City	Hyundai Elantra	Hyundai New Elantra	Buick Excelle	Citroen Elysée
Vehicle Photo						
Year	2006	2006	2004	2007	2006	2006
Price/MSRP (USD)	12,000 - 15,000	10,000 - 12,000	10,000 - 12,000	10,000 - 12,000	12,000 - 15,000	12,000 - 15,000
Fuel Econ (MPG)	147	103, 73	104, 104	107, 73	16, 102	16, 102
Engine (HP)	1.3L 60KW (82HP)	1.3L 60KW (82HP)	1.6L 80KW (109HP)	1.6L 80KW (109HP)	1.6L 80KW (109HP)	1.6L 80KW (109HP)
Power (HP)	7000-7000	6000-7000	6000-7000	6000-7000	7000-7000	7000-7000
Transmission	5MT	5MT, 5AT	5MT, 5AT, 5AT	5MT, 5AT, 5AT	5MT, 5AT	5MT, 5AT, 5AT
Weight (kg)	1,050-1,100	1,050-1,100	1,050-1,100	1,050-1,100	1,050-1,100	1,050-1,100
Wheel Base (mm)	2300	2300	2300	2300	2300	2300

2 Collect Benchmark Data

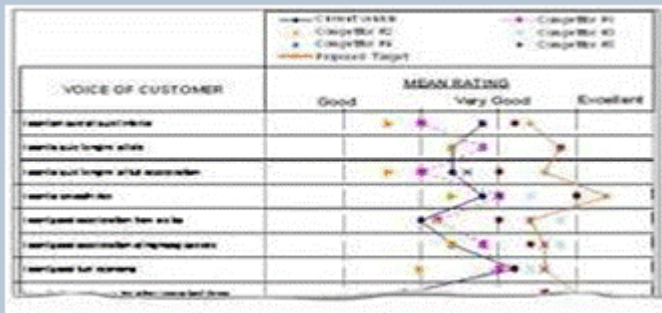
Options/Specifications

Example from Benchmarking Phase 1: Collect Vehicle Options and Specifications

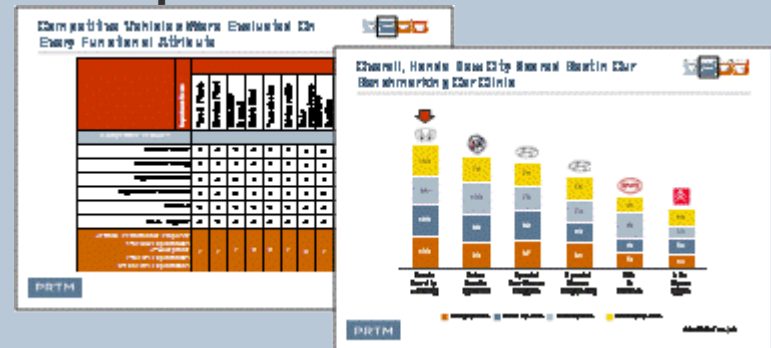
FA Analysis: Car Clinics



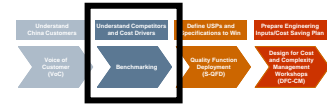
4 Use S-QFD Model to Determine Gaps to Current Vehicle Offering



3 Use S-QFD Model to Evaluate Competitive Vehicles to CRs



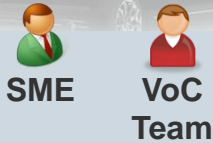
Clinics Provide Hands-on Competitive Intelligence Gathering



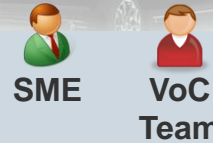
Example

1: Customer Requirements Survey

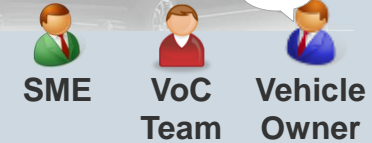
Interior Survey



Exterior Survey



Ride & Drive



2: Functional Attribute BM



Client Expert Team

3: Experts Assess VoC CRs

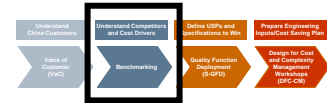


4: Quality Audit



Client Quality Team

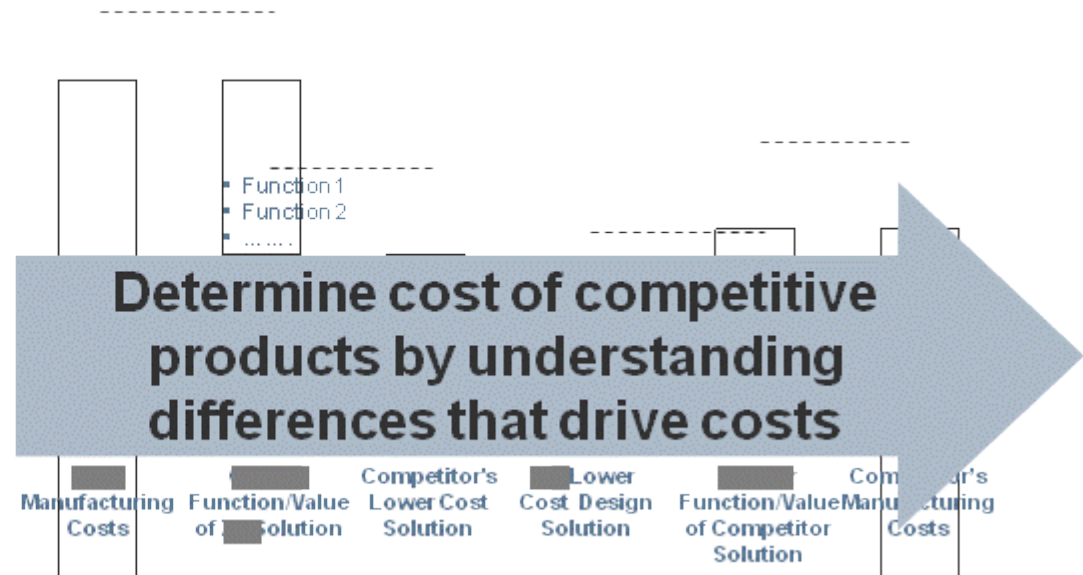
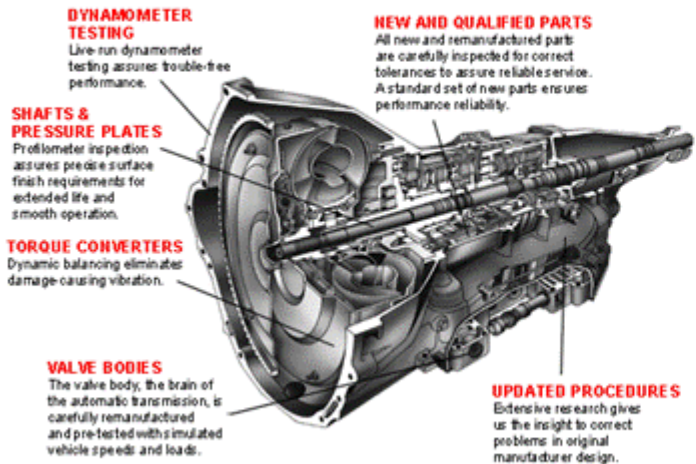
Teardowns Help Understand Competitors' Design and Manufacturing Processes



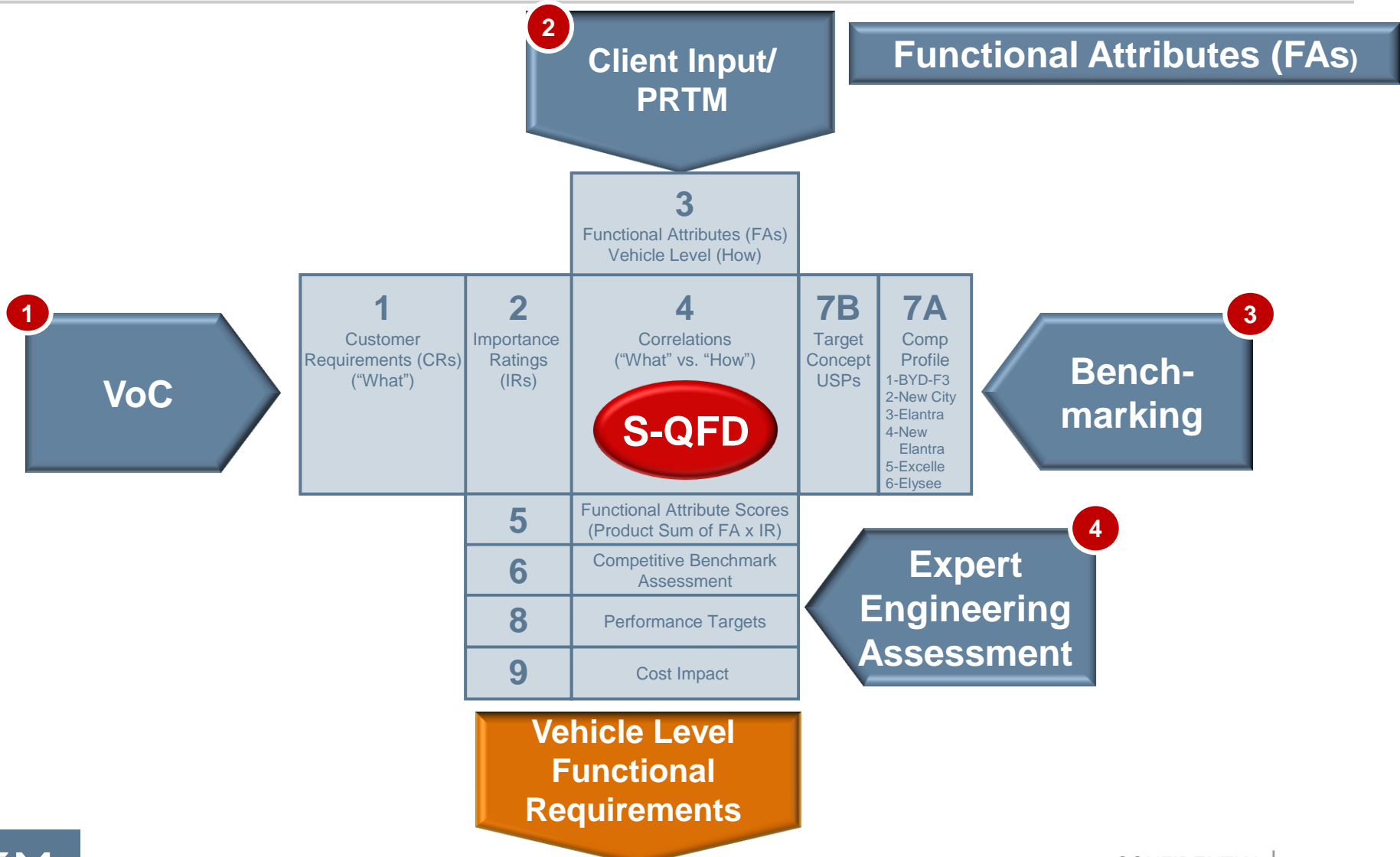
Example

Product and process experts use teardown results to compare designs:

- Which design and manufacturing aspects of the competitive product provide similar function at a lower cost?
- Which design and manufacturing aspects provide more functionality at similar cost?



A Simplified Quality Function Deployment (S-QFD) Uses Four Inputs



Cross-Functional Workshops With Suppliers Create Breakthrough Ideas

Example

1

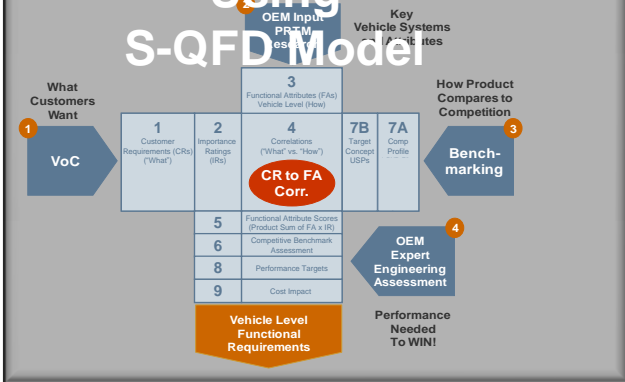
Key suppliers & cross-functional VoC team collaboratively develop concepts that satisfy CRs



Productive Atmosphere & Collaboration Stimulating

2

Evaluate Concepts Using S-QFD Model

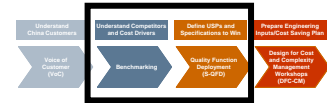


3

Develop USPs Using PRTMs 7-Step Process

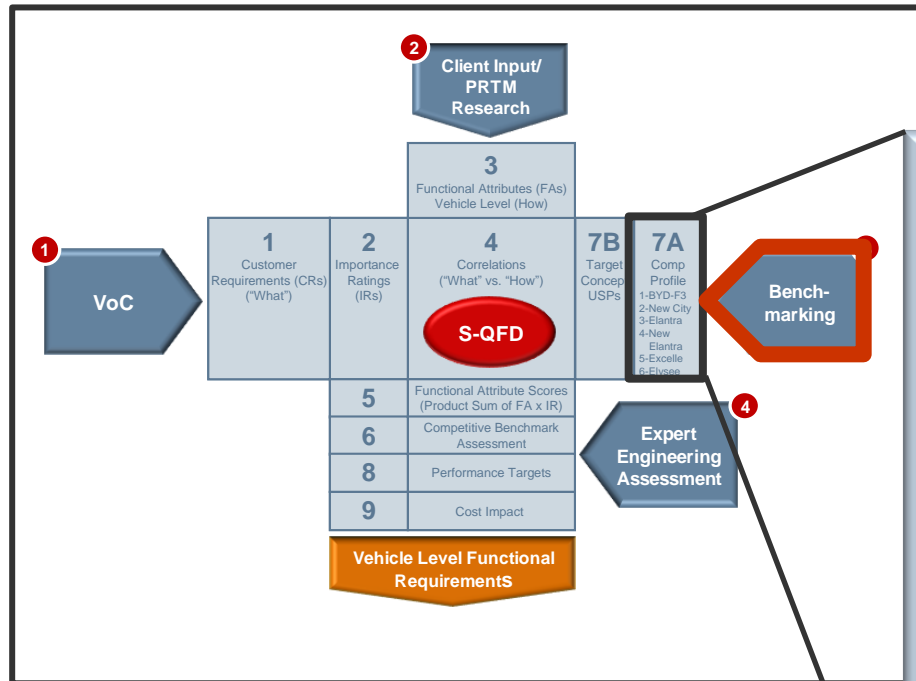


Benchmarking Identifies Where Competitors Do Not Satisfy Customers



Example

S-QFD Model with FA Driven CR Assessment



Direct CR Assessment Based on FA Benchmarks

Additional Benchmarking Takeaways

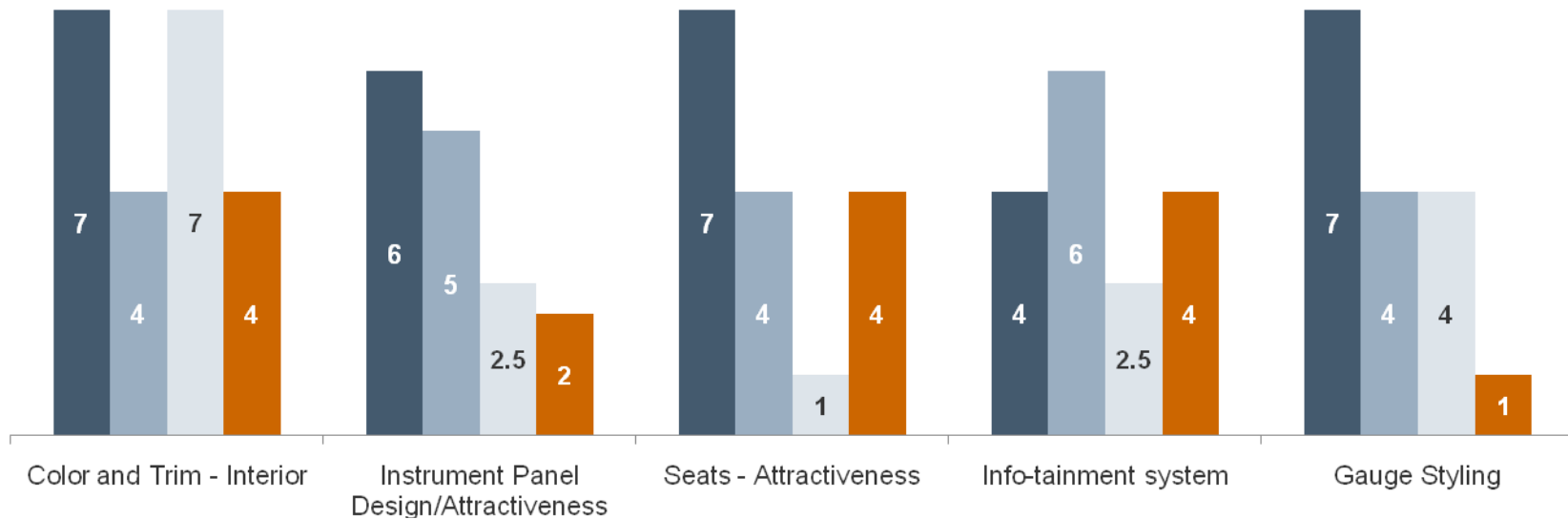
- Most vehicle interiors are difficult to clean
- Difficult to apply seat covers
- Car security systems are inadequate
- Storage areas are limited and not flexible
- Most IP designs lack effective functionality, high quality fit & finish, or attractive appearance

One Market Offer Best Satisfies Requirements Related to Interior Color and Instr. Panel Design



Example

OEM Functional Attributes Performance Ratings



Design for Cost and Complexity Workshops Optimize Product Cost/Value

1 Select Sub-system and Workshop Intensity for Each Selected Component

2 Workshop Inputs

CRs/USPs

S-QFD Model

Bill of Material

Benchmarking Data

Other Relevant Data

3 DFC & Complexity Methodology

- Subsystem benchmarking
- Process benchmarking
- Function analysis
- Specification analysis
- Value analysis
- Material substitution
- Complexity reduction
- De-contenting

4 Conduct Workshops

S-QFD Analysis Identifies Attributes that Can Be De-contented Without Impacting Requirements



Example

S-QFD Model ranks FA importance

Safety & Environment – FAs	Score
Quality – FAs	Score
Cost of Ownership – FAs	Score
Driving Experience– FAs	Score
Exterior Experience– FAs	Score
Interior Experience– FAs	Score
<i>Information system</i>	Green
<i>Steering wheel</i>	Green
<i>Materials resistance to scuffs/dirt</i>	Green
<i>Controls & switch reachability</i>	Green
<i>Storage capacity</i>	Green
<i>IP design & attractiveness</i>	Green
Fit & finish - Interior	Blue
Gauge visibility & position	Yellow
Color & trim - interior	Yellow
Entertainment system	Yellow
Quality of seating material	Red

Low ranking FAs to de-content

Interior Experience– FAs	Score
Quality of seating material	Red
Seats - Attractiveness	Red
Seat surface resistance to dirt	Red
Rear Passengers Entry/Exit	Red
Roominess - Cabin Front	Red
Engine Power	Red
Doors - Fit and Finish	Red
Roominess-Cabin Rear	Red
Front Hood - Ease of Open/Support	Red
<i>Engine Sound</i>	Red
<i>Fit and Finish Exterior</i>	Red
<i>Seat Comfort - Seat Belt</i>	Red
<i>Seat Comfort - Rear</i>	Red
<i>Interior Assist Handle</i>	Red
<i>Ride Smoothness</i>	Red

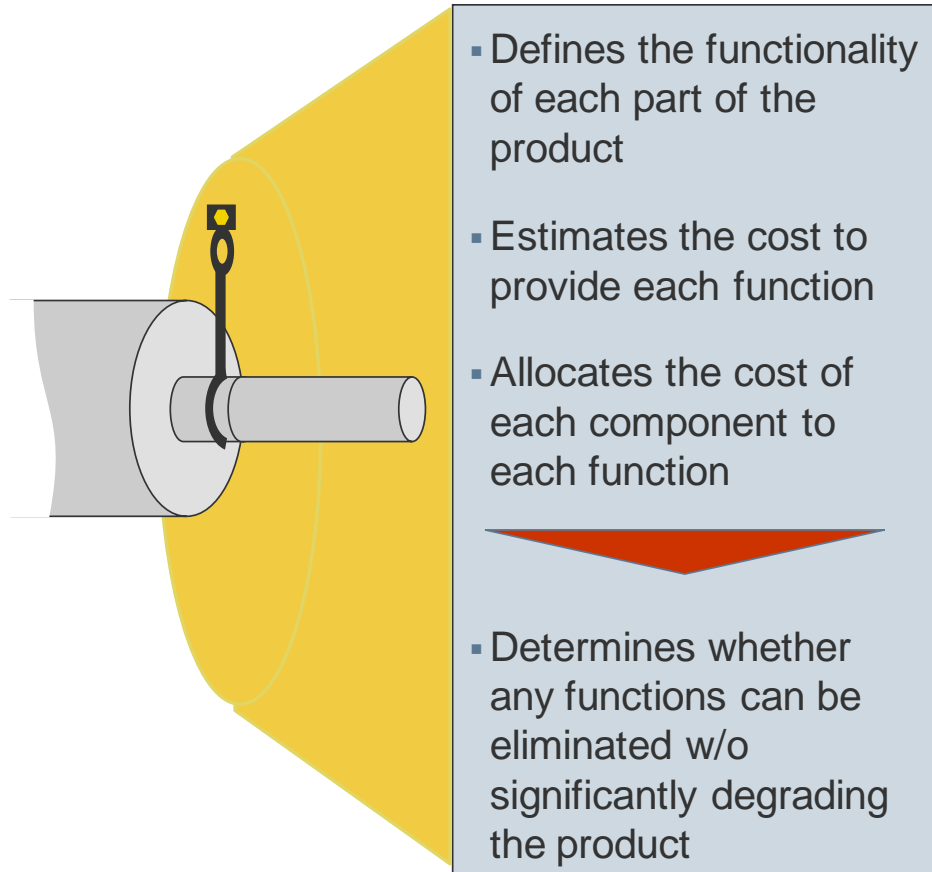
■ Highest Impact FAs
 ■ 2nd Highest Impact FAs
 ■ 3rd Highest Impact FAs
 ■ Lowest Impact FAs



Example DFC Methodology: Muffler Hanger

Example

A portion of the cost is in a non-supporting function and can be eliminated; another portion is supporting, but not critical and can be reduced



Example—Muffler Hanger	
Parts / Components	Cost of components
Hanger Strap	
Self-Tapping Bolt	
Rubber Insulator	
Clamp	
Total	

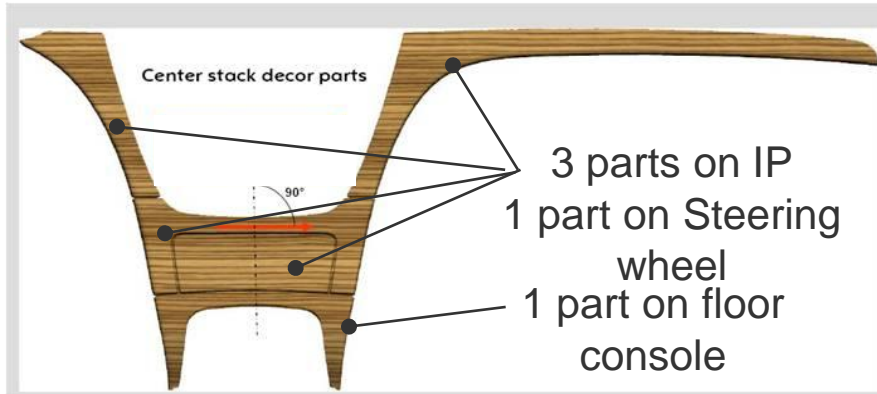
Classification of functions	
Basic	
Critical	
Supporting	
Non-supporting	

Example Complexity Management: Interior Décor Moldings

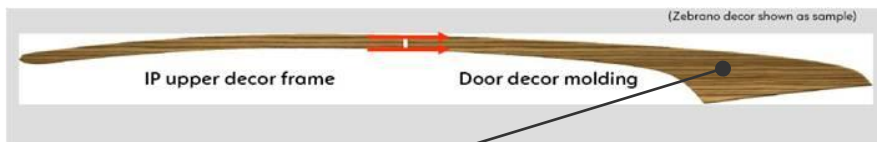
Example

Limit the subsystems to which moldings are applied, limit the part count, color choices and material choices of décor moldings

9 décor molding parts
on 5 subsystems



*Not all parts displayed



4 parts on door trim

Buick: LaCrosse

4 décor molding parts
on 1 subsystem



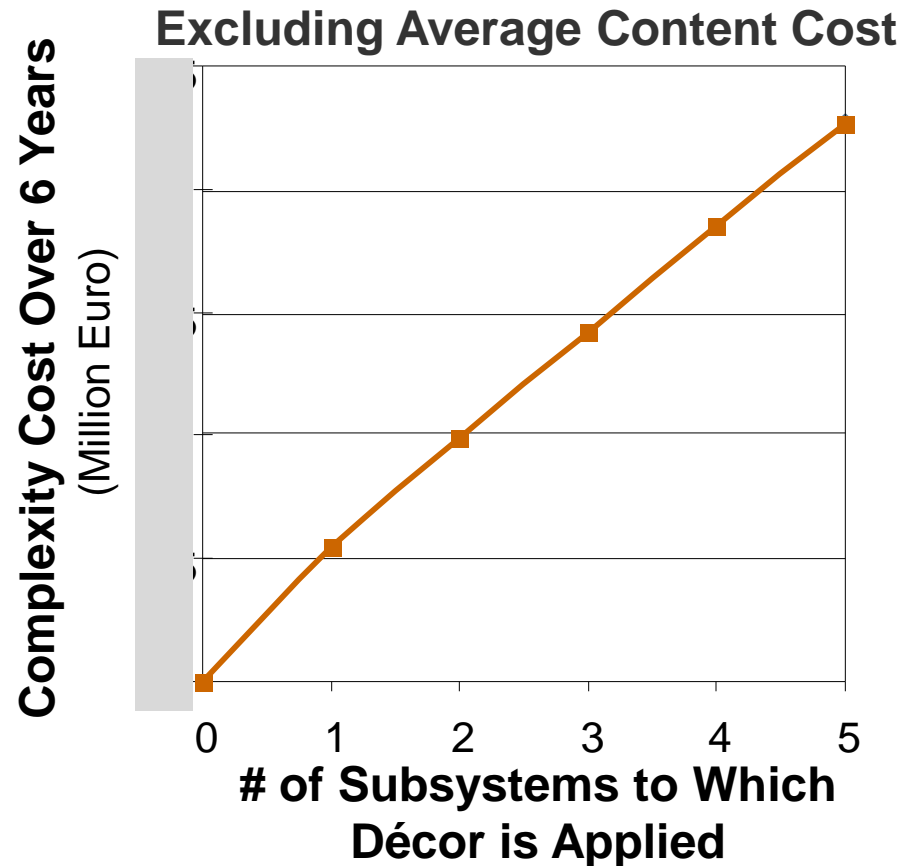
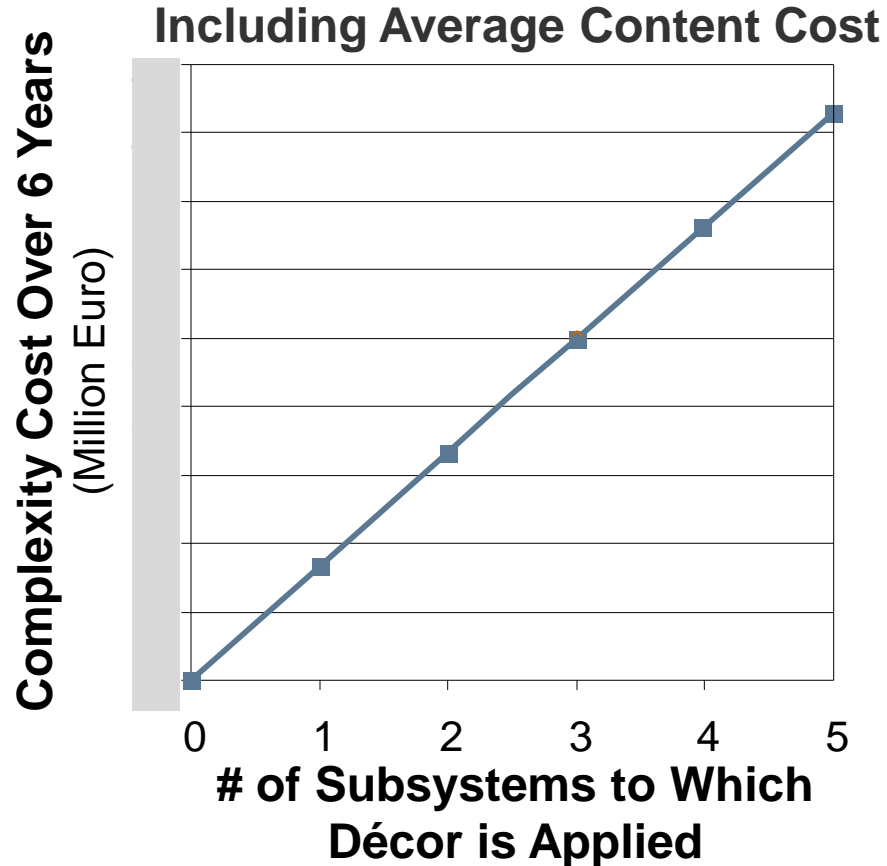
Ford Fusion

Source: Ford Motor Company Brochure

Complexity Costs of Interior Décor Molding Proliferation

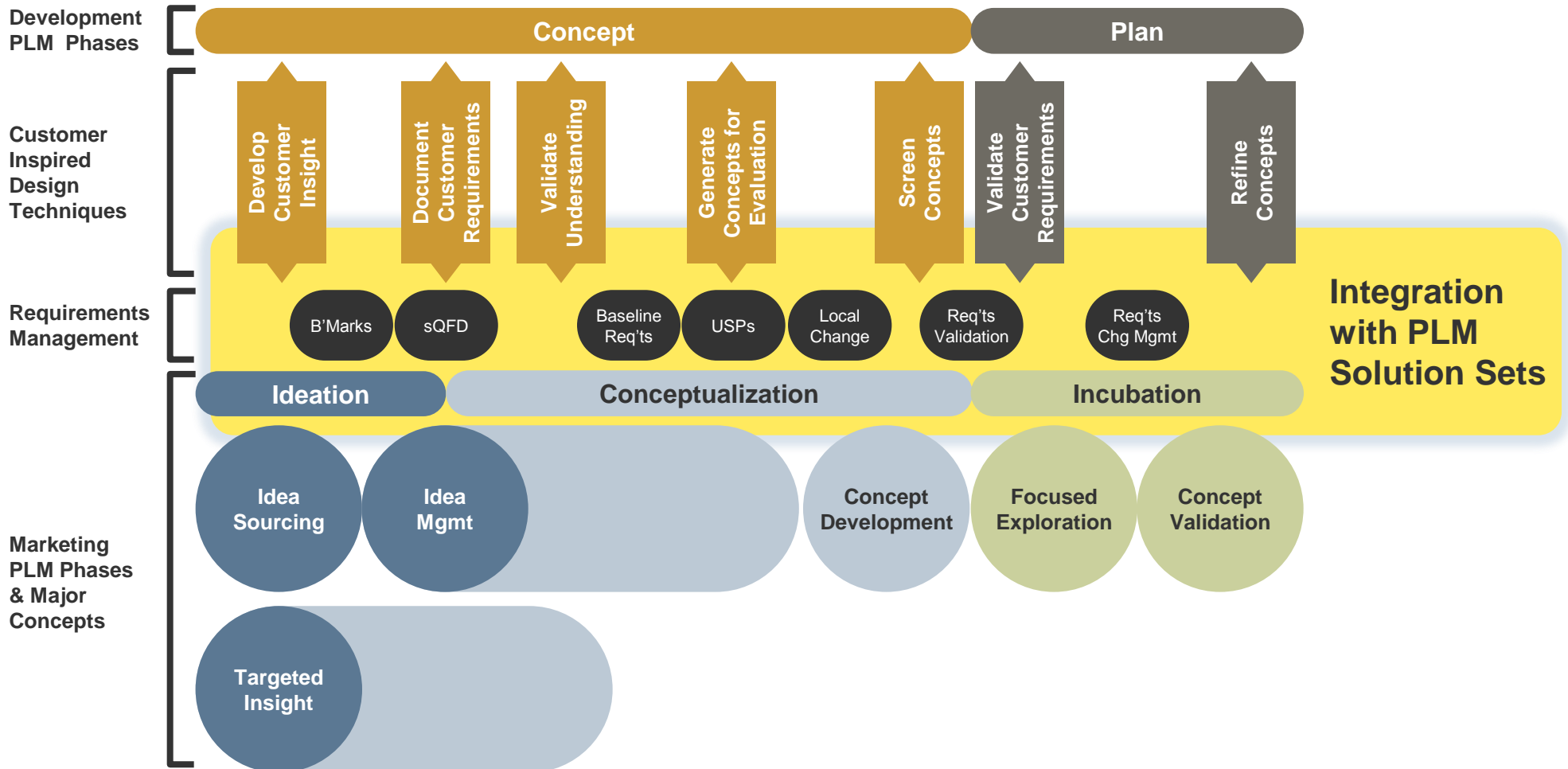
Example

Cost of Décor Applied to Different Subsystems



Model includes Engineering, Material (for left graph), Logistics, Manufacturing and Overhead Cost

A CID Approach Targeted to Emerging Markets Integrates with PLM Solution Sets



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JAMES SO
Partner

PRTM

T +81-3-5326-9090
F +81-3-5326-9071
M +81-90-7829-3249

Shinjuku Mitsui Building 30F
2-1-1 Nishi-Shinjuku
Shinjuku-ku, Tokyo 163-0430
Japan

jso@prtm.com

www.prtm.com

RYAN CHUNG
Associate

PRTM

T +1-202-756-1768
F +1-202-625-7256
M +82-10-7133-4438

1750 Pennsylvania Avenue NW
Washington, DC 20006
USA

rchung@prtm.com

www.prtm.com

Thank you!