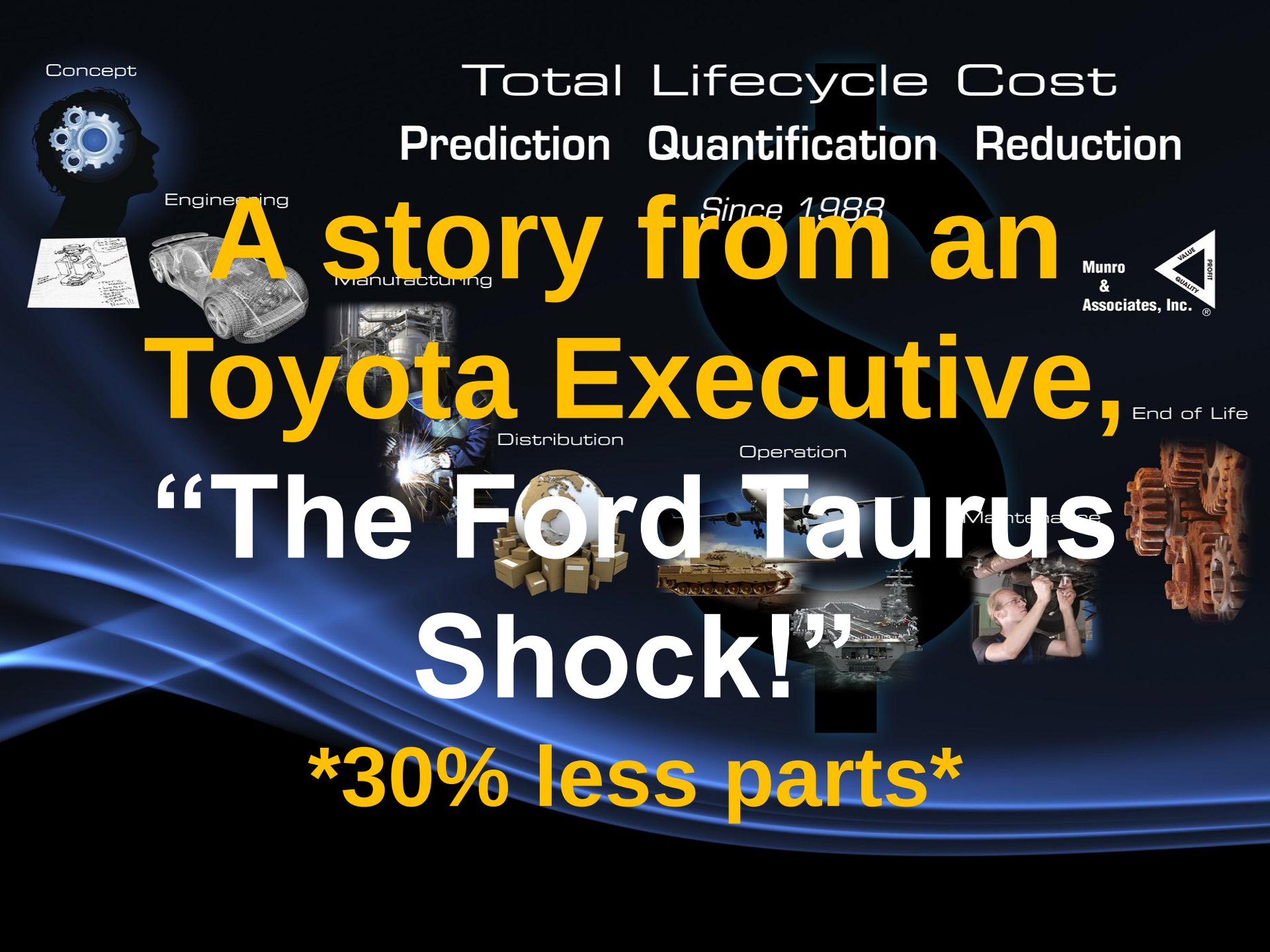
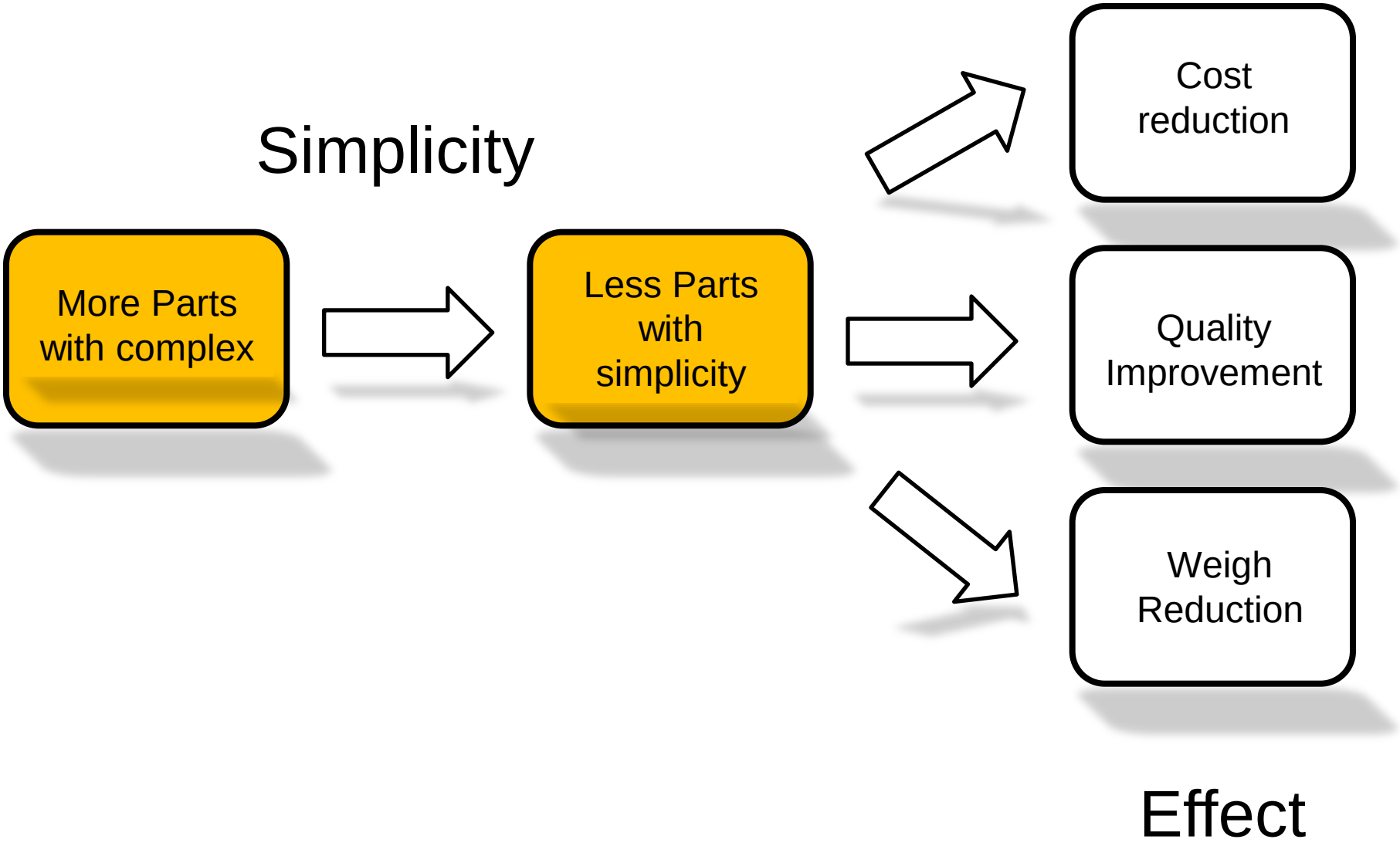
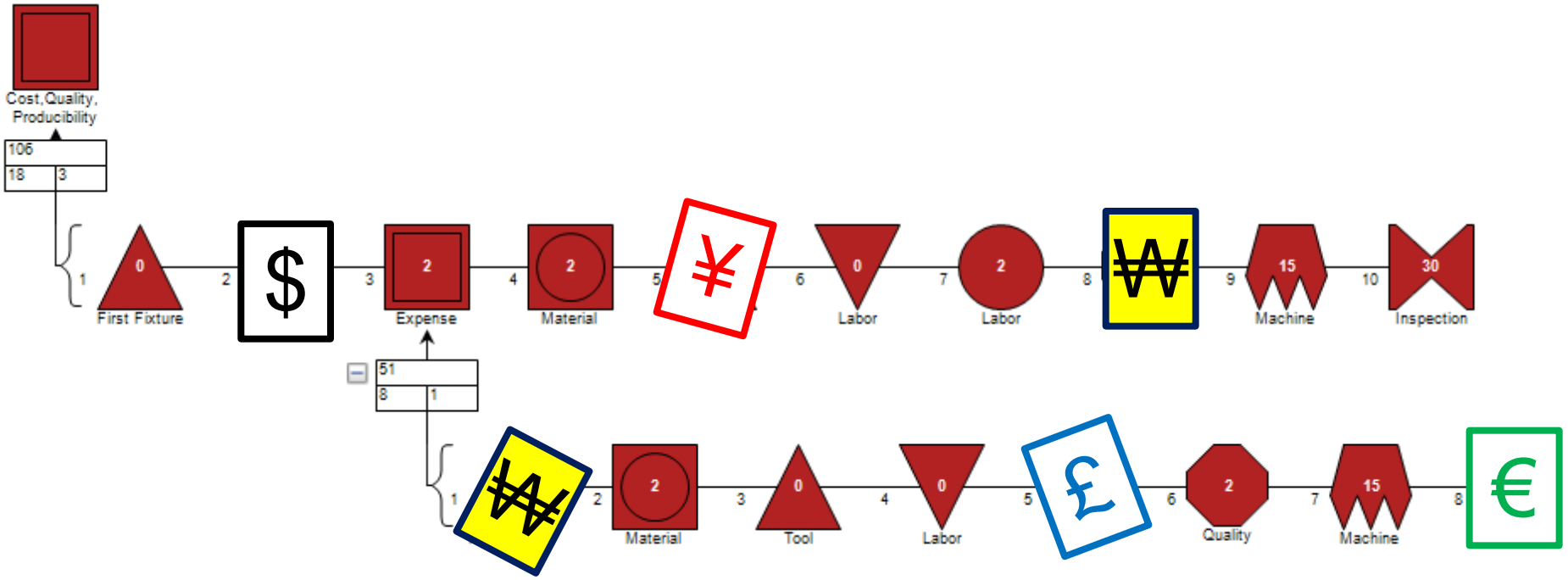
Design Profit® Cost Map을 이용한 제품 개발 혁신 전략

Lean Design Asia Inc.
(Design Profit Inc., Munro & Associates Inc.)

Steve Han (Ph. D.)


Concept
Total Lifecycle Cost
Prediction Quantification Reduction
Engineering
Since 1988
A story from an
Manufacturing
Munro & Associates, Inc.
VALUE
PROFIT
QUALITY
Toyota Executive,
End of Life
Distribution
Operation
"The Ford Taurus
Shock!"
30% less parts


Simplicity
More Parts with complex
Less Parts with simplicity
Cost reduction
Quality Improvement
Weigh Reduction
Effect


Cost,Quality,
Producibility
106
18
3
1
0
First Fixture
2
$
3
2
Expense
4
2
Material
5
¥
6
0
Labor
7
2
Labor
8
₩
9
15
Machine
10
30
Inspection
51
8
1
1
₩
2
2
Material
3
0
Tool
4
0
Labor
5
£
6
2
Quality
7
15
Machine
8
€

Summary of Cost Map

Design Profit® EXECUTIVE SUMMARY

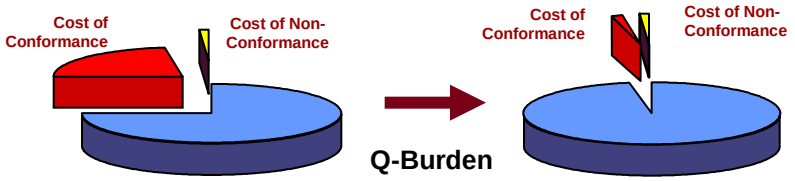
Munro & Associates, Inc.

	Baseline	Redesign 1	Redesign 2	Redesign 3
Parts	131	70	42	32
Good Parts	4	4	2	1
Steps	636	494	346	265
Score	3,394	2,557	1,885	917
Fasteners	87	29	14	0
Tools	113	94	64	29
Poke Yokes	1	0	0	0
Total Defects	1.3476	1.0742	.8194	.6735
Right First Time	25.81%	33.97%	41.48%	66.54%
Total Labor Cost	$55.78	$41.26	$31.23	$14.39
Piece Cost	$240.36	$229.62	$201.12	$112.16
Q Burden	$53.38	$43.50	$34.73	$10.96
Total Cost	$349.52	$314.38	$267.08	$137.51
Annual Production	8600	8600	8600	8600
Annual Savings	N/A	$302,160	$708,984	$1,823,286

The dollars are in the details!

Munro delivers the details to ensure *you* achieve the highest quality at the lowest costs.

Hidden Cost? The cost of quality



Before Design Profit®

After Design Profit®

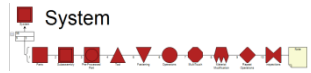
Simple

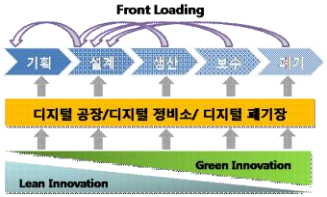
Exposure

Lean

Front loading

Complexity





What is "SELF" Framework?

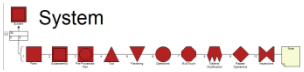
" Process and approach to drive the evolution pushing from the complex to the simple by lean principle and the front loaded innovation through the New Product Development Process "

Source : "The Secrete of Cost Map", Seokhee Han(2012)

Simple

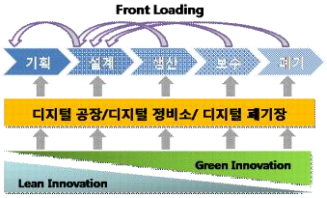
Exposure

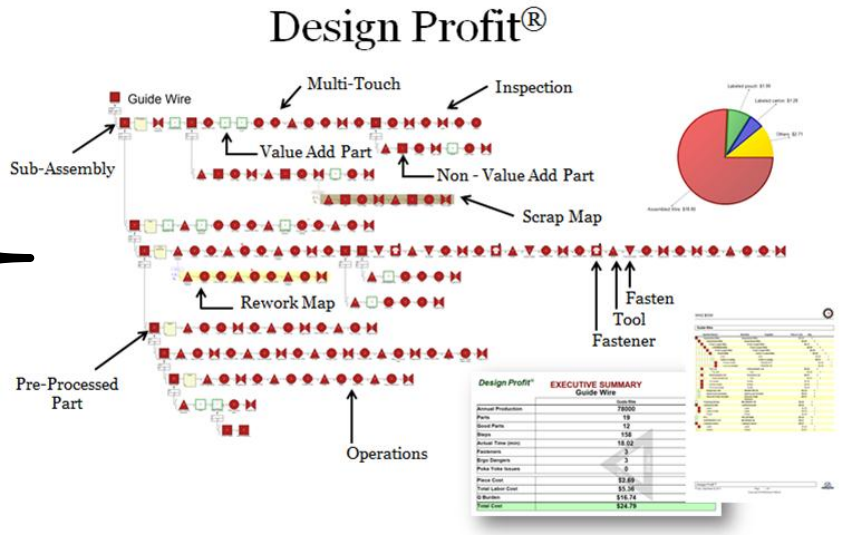
Complexity



Lean

Front loaded





If you know problem, you will try to solve it.
If you don't know, it is hard to know what to do.

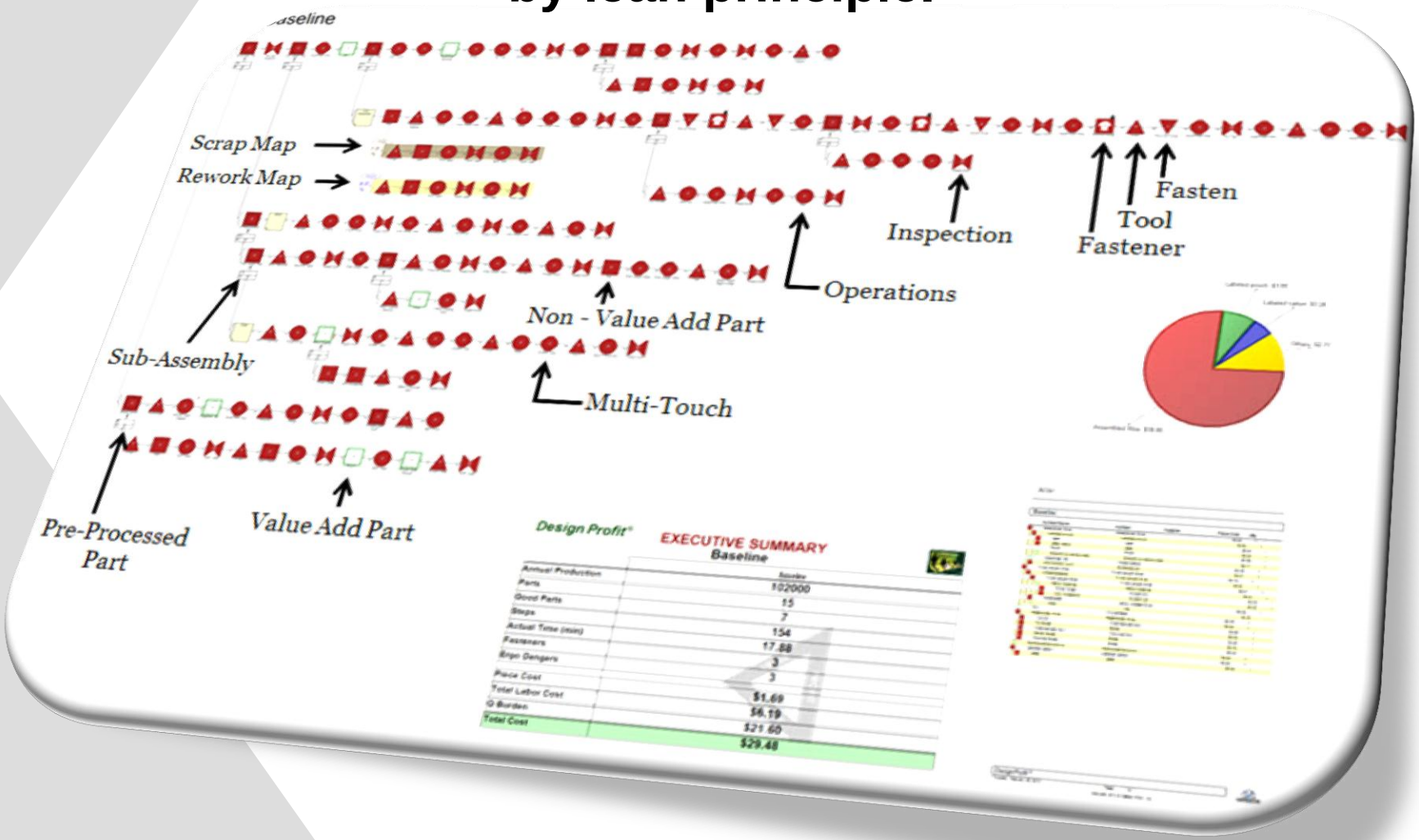
The Design Profit® System delivers SELF Framework through the Munro Map.

A process built on 20+ years of best practices

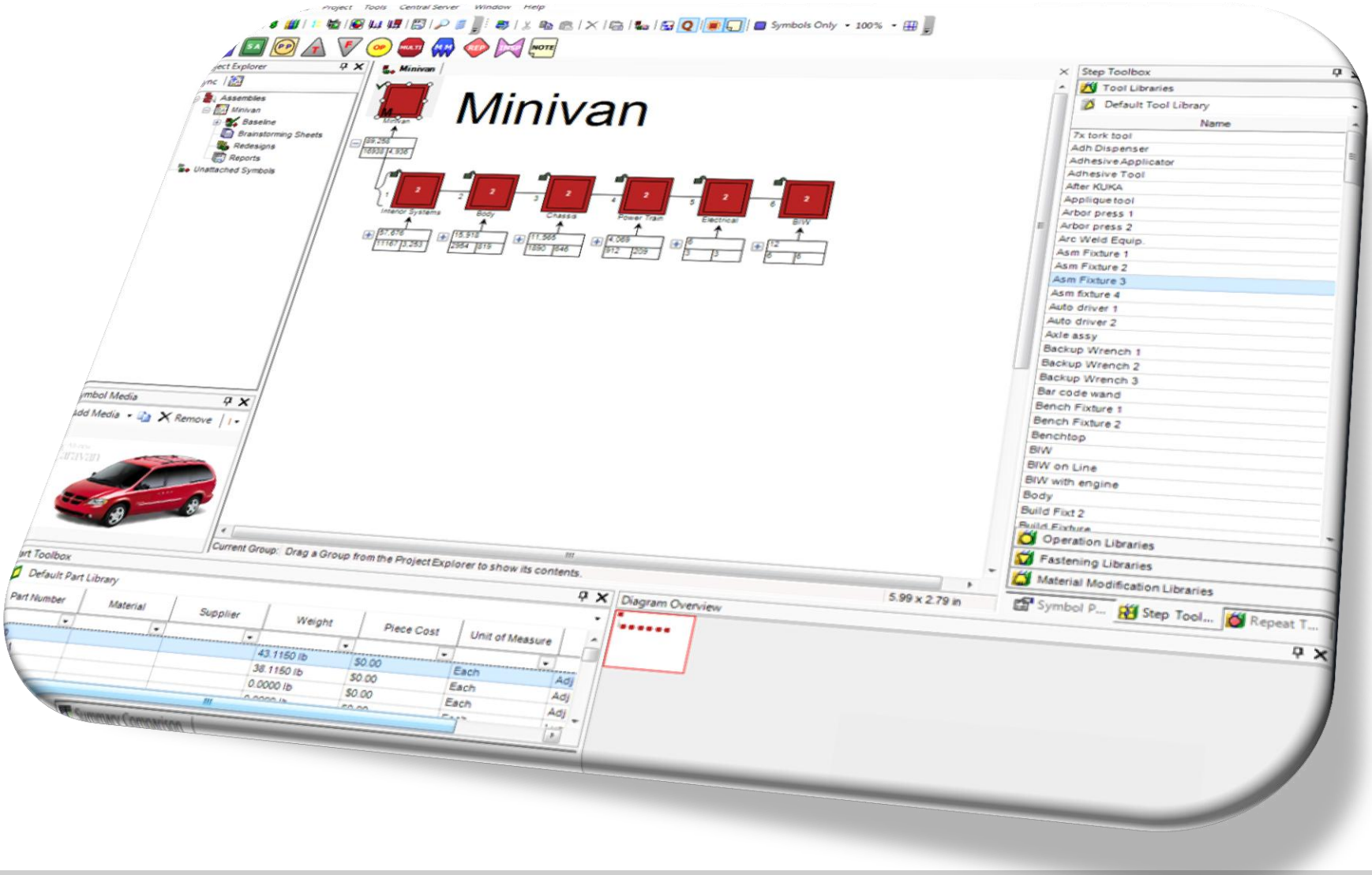
- Lean Design
- DFSS
- DFM
- DFA
- DFX
- Lean Manufacturing
- DTPUC (Design to Production Unit Cost)
- MRL (Manufacturing Readiness Assessment)
- Bench Marking
- Lean Manufacturing
- VSM
- Producibility
- Maintainability
- Sustainment

HOW?

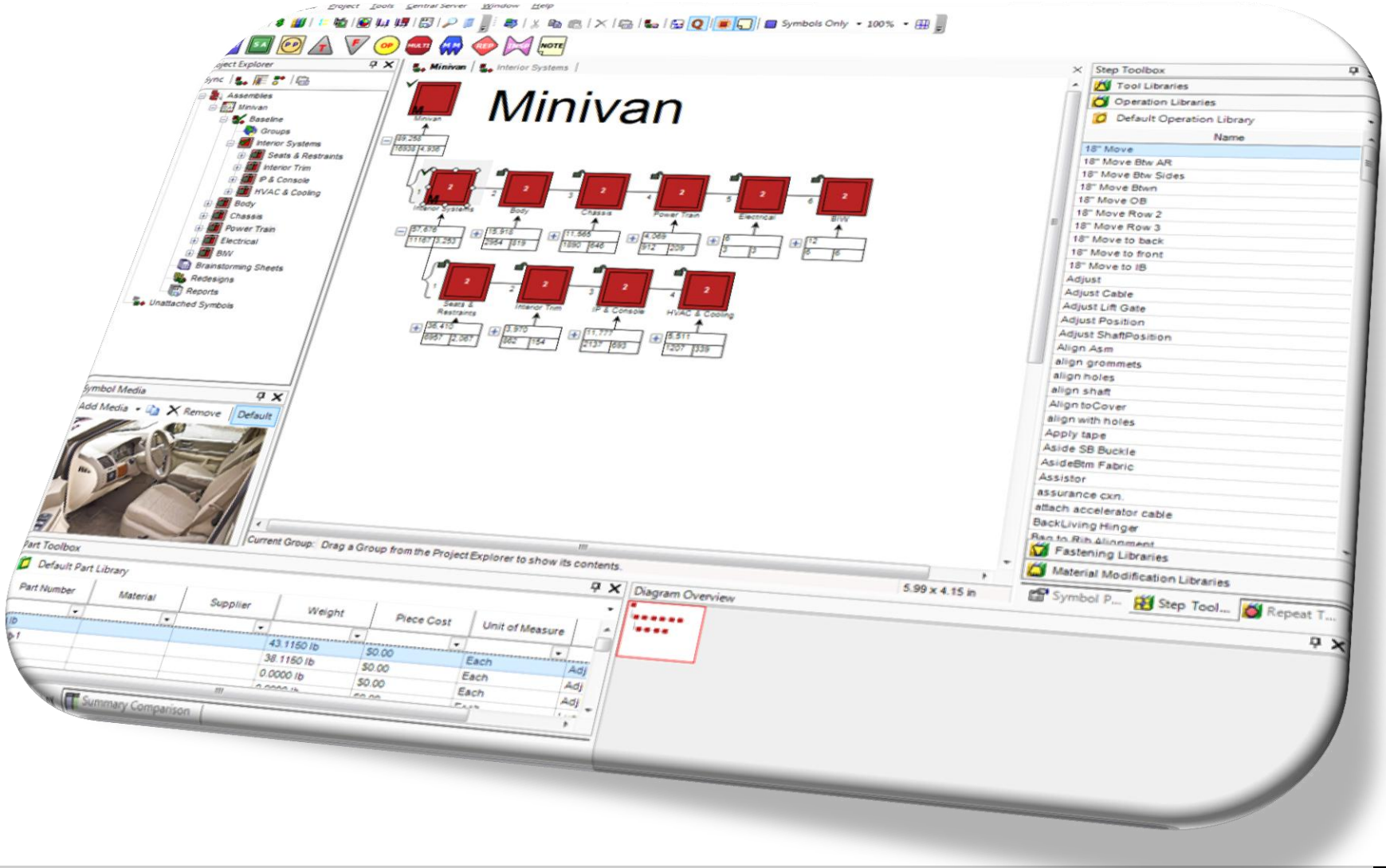
Cost Map provides so powerful analytical and qualitative guidance for the complex to the simple by lean principle.



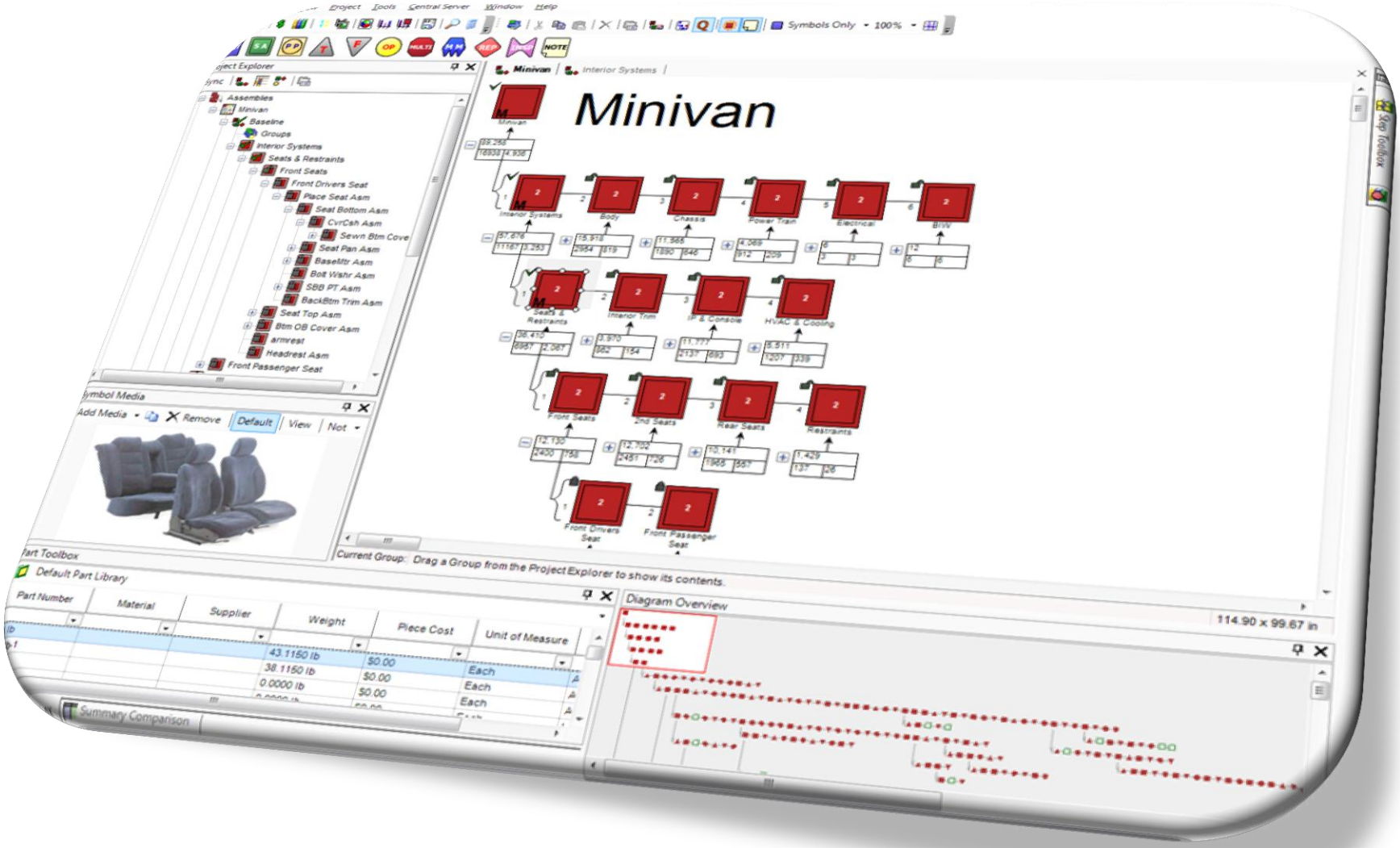
Cost Map for a full vehicle



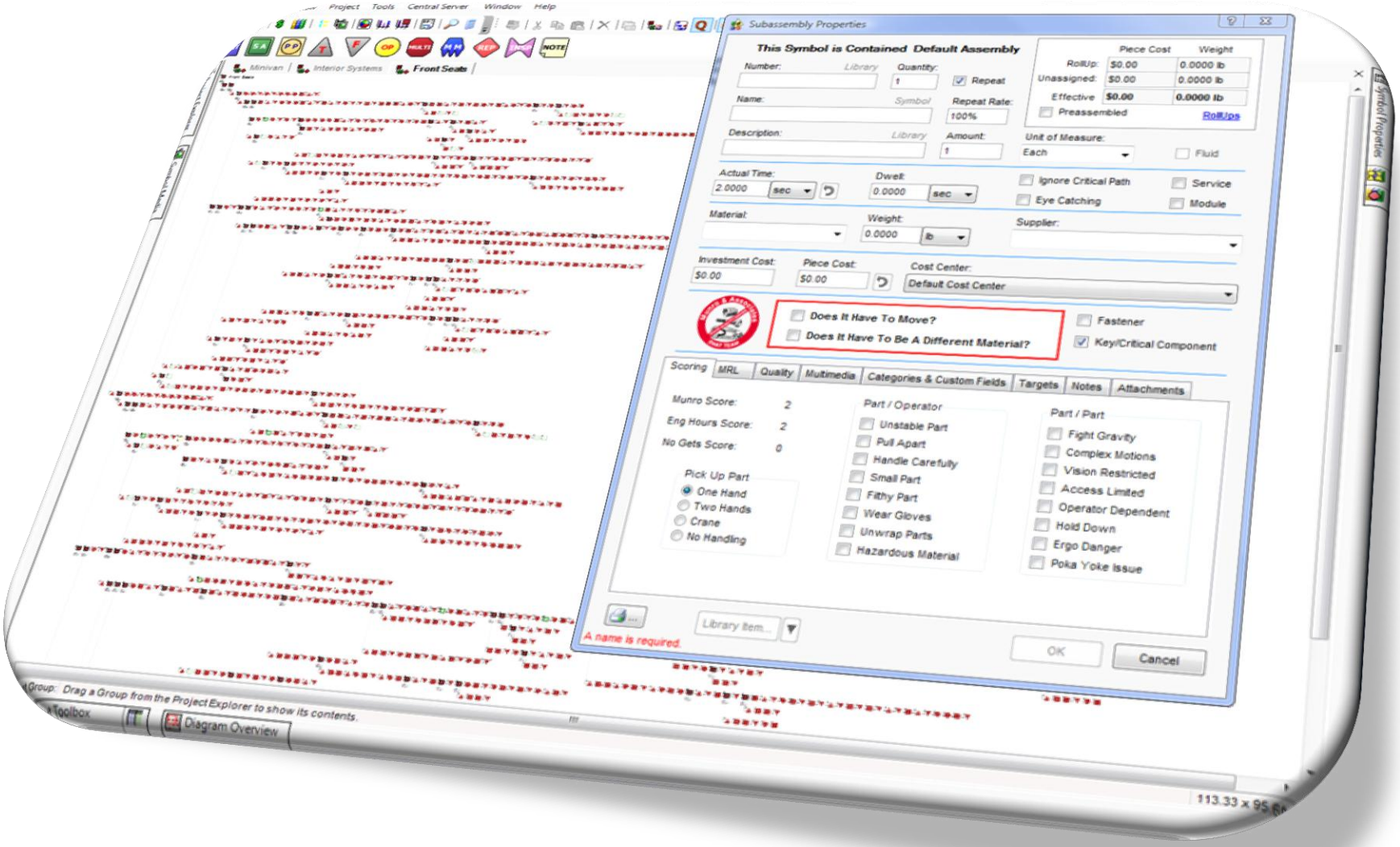
You will be able to go deeper and deeper depending on the data readiness for analysis.



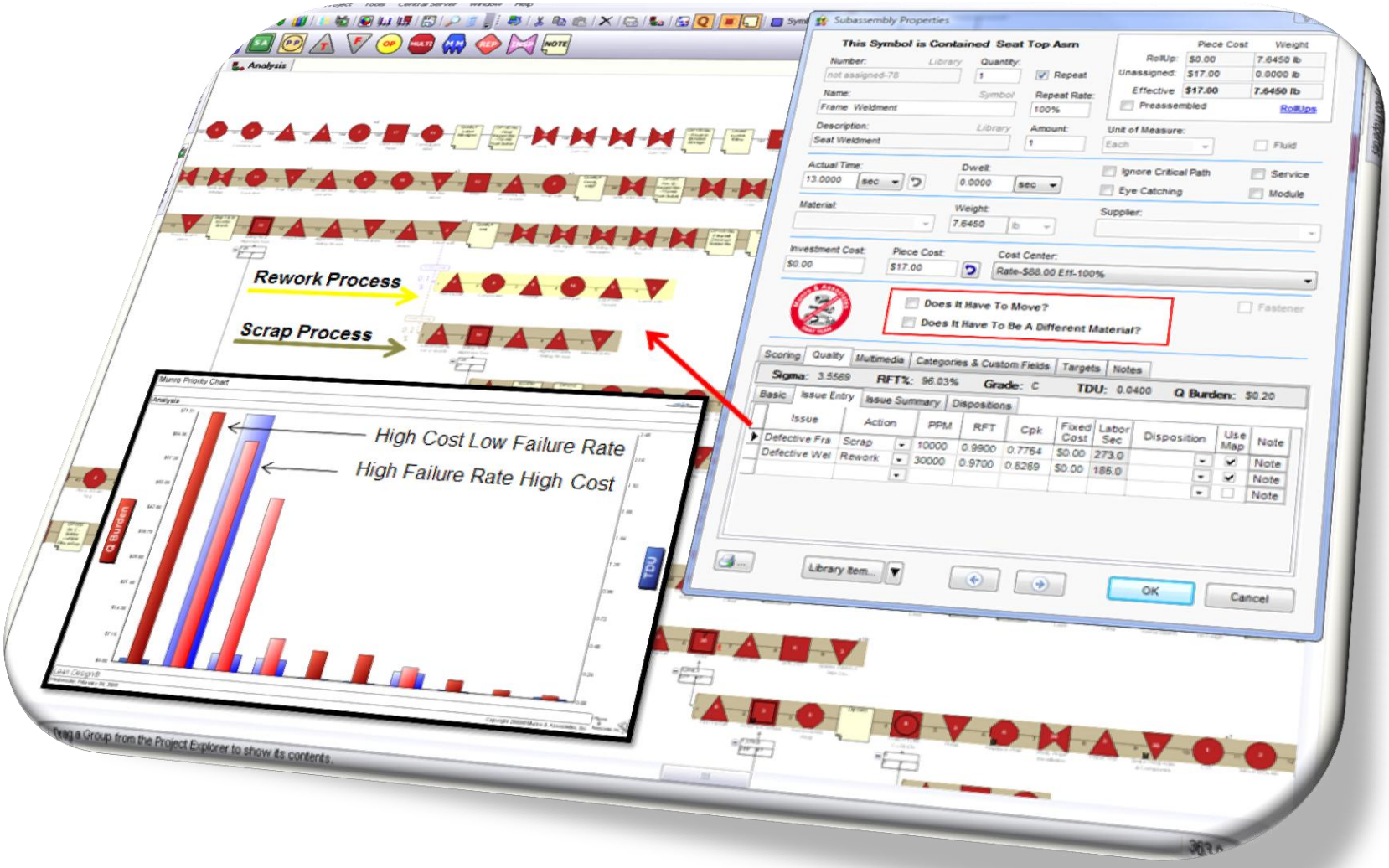
You can build Cost Map until you are fully understand the complexity of product.



This is the typical Cost Map we manage so easily.



Cost Map exposures the hidden cost from the potential various quality issues.



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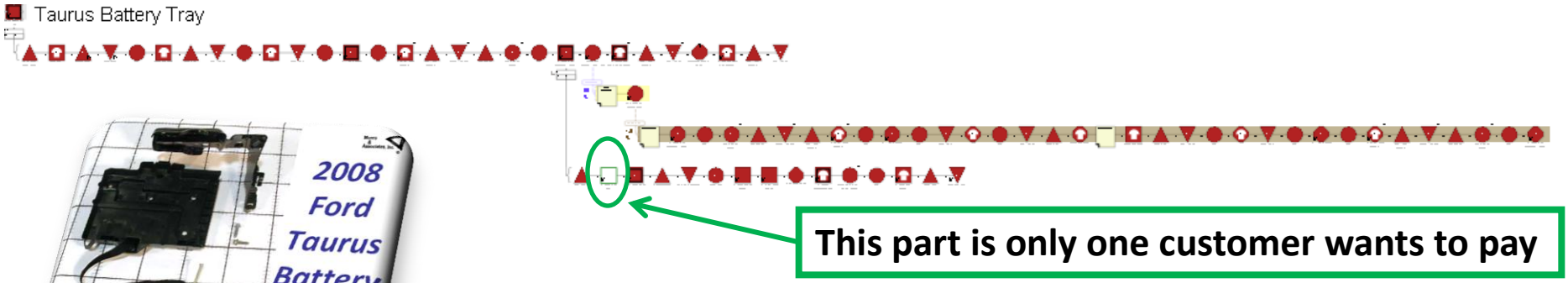
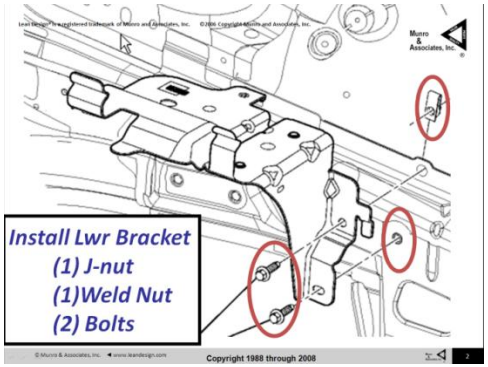
A process built on 20+ years of best practices

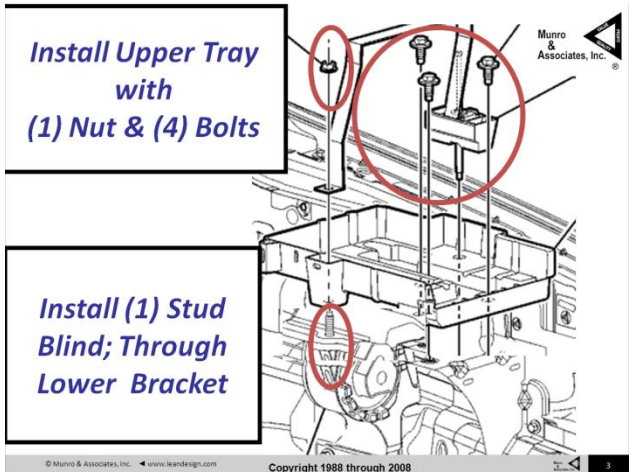
- Lean Design
- DFSS
- DFM
- DFA
- DFX
- Lean Manufacturing
- Bench Marking
- Lean Manufacturing
- VAM
- Produ
- Maint
- Sustainment
- DTPUC (Design to Production Unit Cost)
- MRL (Manufacturing Readiness Assessment)

Case 1

Case Study: Complex to Simple







Case Study: Complex to Simple

Next page

Why don't you reduce Fasteners?

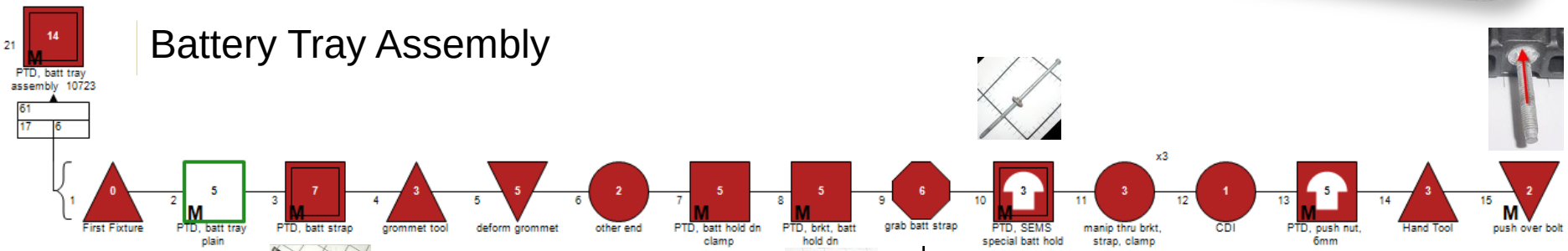
Why don't you delete this Multi-Touch part?

Red colored symbols mean potentially target to be simplified or deleted.

Case Study: Complex to Simple

Red colored symbols mean potentially target to be simplified or deleted.

Battery Tray Assembly



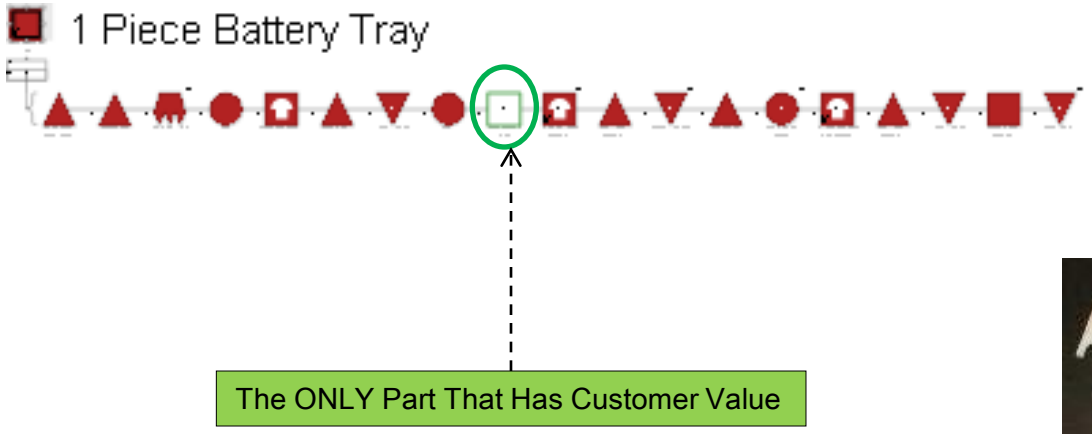
This is the only part valuable

Why not integrate parts with a Good Part or delete?

Why don't you delete this Multi-Touch part

Why don't you reduce Fasteners?

Redesign Result



$2,286,060.00

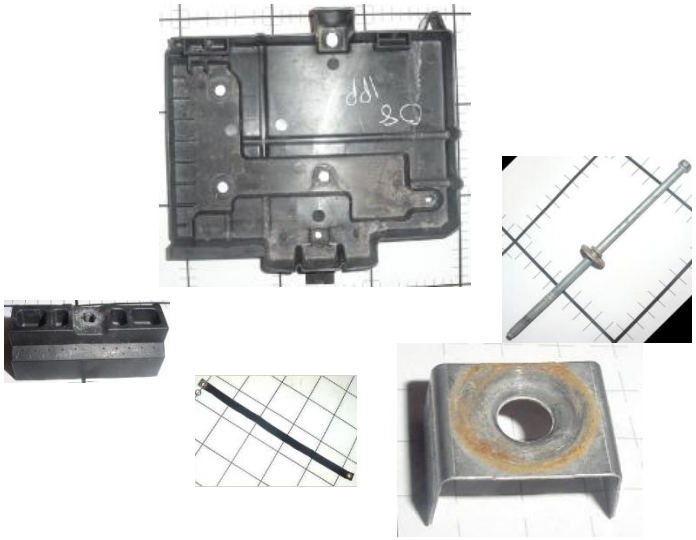
New Profit/Year

Brainstorming

Q1: How to integrate all other parts into a good part?
A1: Die-casting with Nylon 66

Q2: How to reduce Fasteners?
A2: Imbed nuts into tray plate of plastic

Q3: How to reduce Quality Cost?
A3: Avoid the misalignment of stud itself by one piece tray generated idea at Q1.

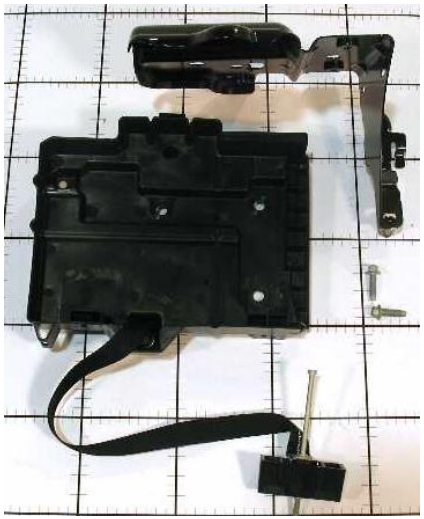


Several Parts

One Part

Battery Tray Comparison

Taurus Battery Tray



Cost of Quality for alignment = .08 added to every good part

Scrap & Rework of Stud Due to Misaligned Parts

1 Piece Battery Tray

63% Less Parts!
52% less Labor!
48% Less Weight!
65% Less Cost!

And Quality Improvement!

Design Profit®

EXECUTIVE SUMMARY
Taurus Battery Tray

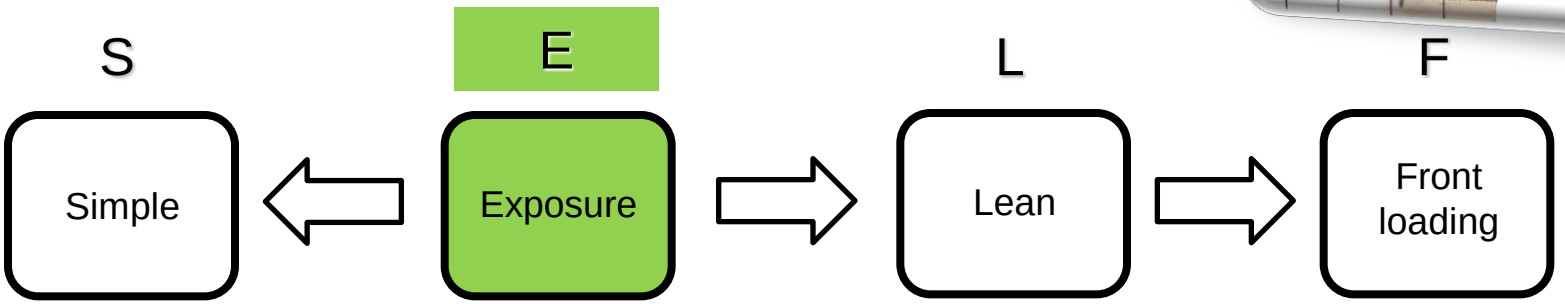
DESIGNPROFIT®

	Taurus Battery Tray	1 Piece Battery Tray	% ↓
Parts	16	6	63%
Good Parts	1	1	0%
Steps	53	24	55%
Actual Time	210.00 sec	101.00 sec	52%
Fasteners	11	4	64%
Ergo Dangers	0	0	0%
Poka Yoke Issues	1	0	100%
Total Weight	1,736.54 gm	899.87 gm	48%
Piece Cost	$11.08	$3.22	71%
Total Labor Cost	$2.36	$1.40	40%
Q Burden	$0.59	$0.26	56%
Total Cost	$14.03	$4.89	65%
Investment Cost	$476,316	$85,000	82%
Annual Savings	N/A	$2,286,060	0%
Right First Time	9.83%	99.13%	-908%
Sigma	3.61	4.88	-35%

$2.5M/year

*** Delta Values ***

SELF framework

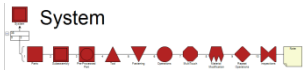


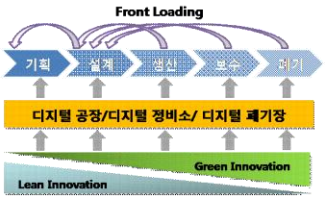
- How to integrate all other parts into a good part?

- Part Number: 16
- Good Design: 1
- Fastener: 11
- Assembly Step: 53
- Assembly Time: 210 Sec
- Weight: 1736g
- Piece Cost: $11.08
- Labor Cost: $2.36
- Quality Cost:$0.59
- Total Cost: $14.03

- How to reduce Fasteners?
- How to reduce Quality Cost?

- Not Applicable for this case





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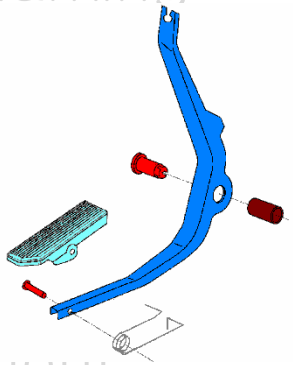
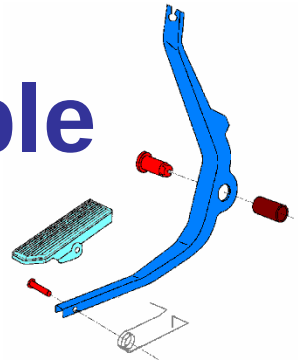
Case2



Case Study: Complex to Simple



Red colored symbols mean potentially target to be simplified or deleted.

Pedal Assembly

How to make simple of these parts?

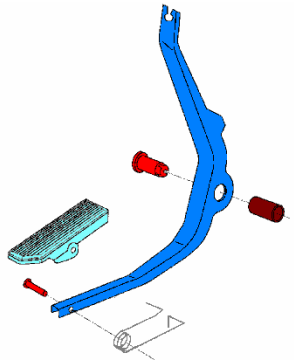
How to integrate it with a Good Part?

This is the only part valuable : Arm

How to integrate bushing into Arm?

How to delete spring?

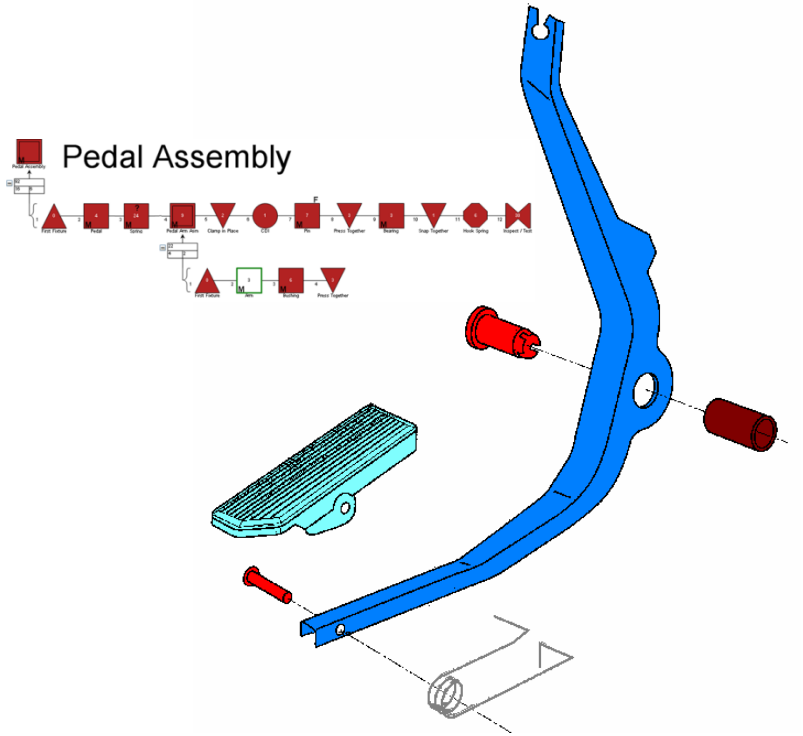
Brainstorming

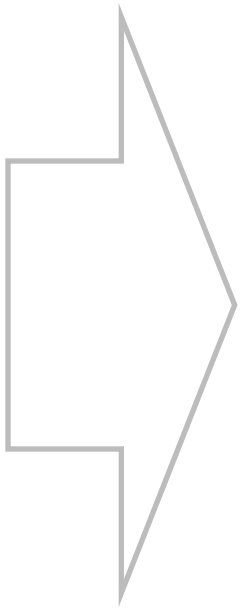


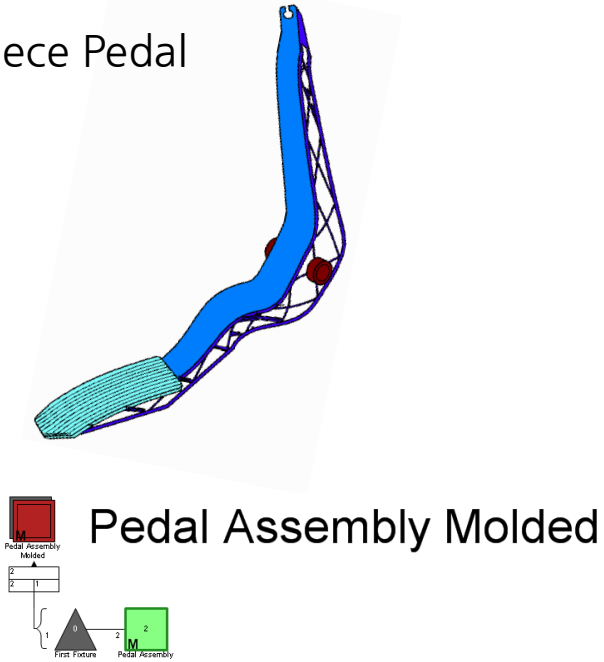
Q1: How to integrate all other parts into a good part-Arm?
A1: integrate pedal to Arm

Q2: How to delete Spring?
A2: Spring was deleted due to the integration at Q1.

Q3: How to integrate bearing?
A3: Imbed bearing into Arm.



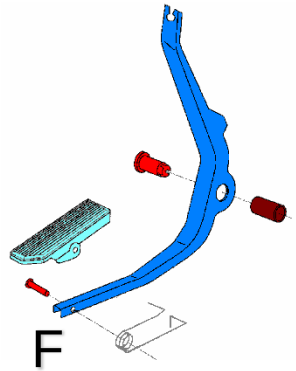




EXECUTIVE SUMMARY
Pedal Assembly

	Pedal Assembly	Pedal Molded
Part Count	6	1
Good Part Count	1	1
Step Count	18	3
Score	95	3
Fastener Count	1	0
Fastening Count	5	0
Tool Count	4	1
Poka Yoke Count	1	0
Weight	0.6550 lb	0.3200 lb
Investment Cost	$195,000.00	$80,000.00
Labor Cost	$1.68	$0.05
Piece Cost	$5.74	$0.78
Q Burden	$0.18	$0.00
Annual Q Cost	$177,484.27	$3,000.00
Total Cost	$7.59	$0.83
Annual Savings	$0.00	$6,763,095.38

SELF



S — Simple

- How to integrate it with a Good Part-Arm?
- How to integrate bearing?

E — Exposure

- No of parts: 6
- Good Part: 1 (Arm)
- Fastener: 1개
- Assembly Steps: 18
- Poka-yoke Part: 1
- Weight: 0.6 lb
- Piece Cost: $ 5.74
- Labor Cost:$ 21.68
- Annual Quality Cost : $177,000
- Total Cost: $ 7.59

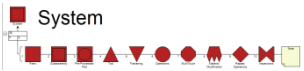
L — Lean

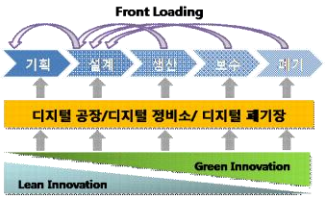
- How to delete spring?
- How to use same material?

F — Front loading

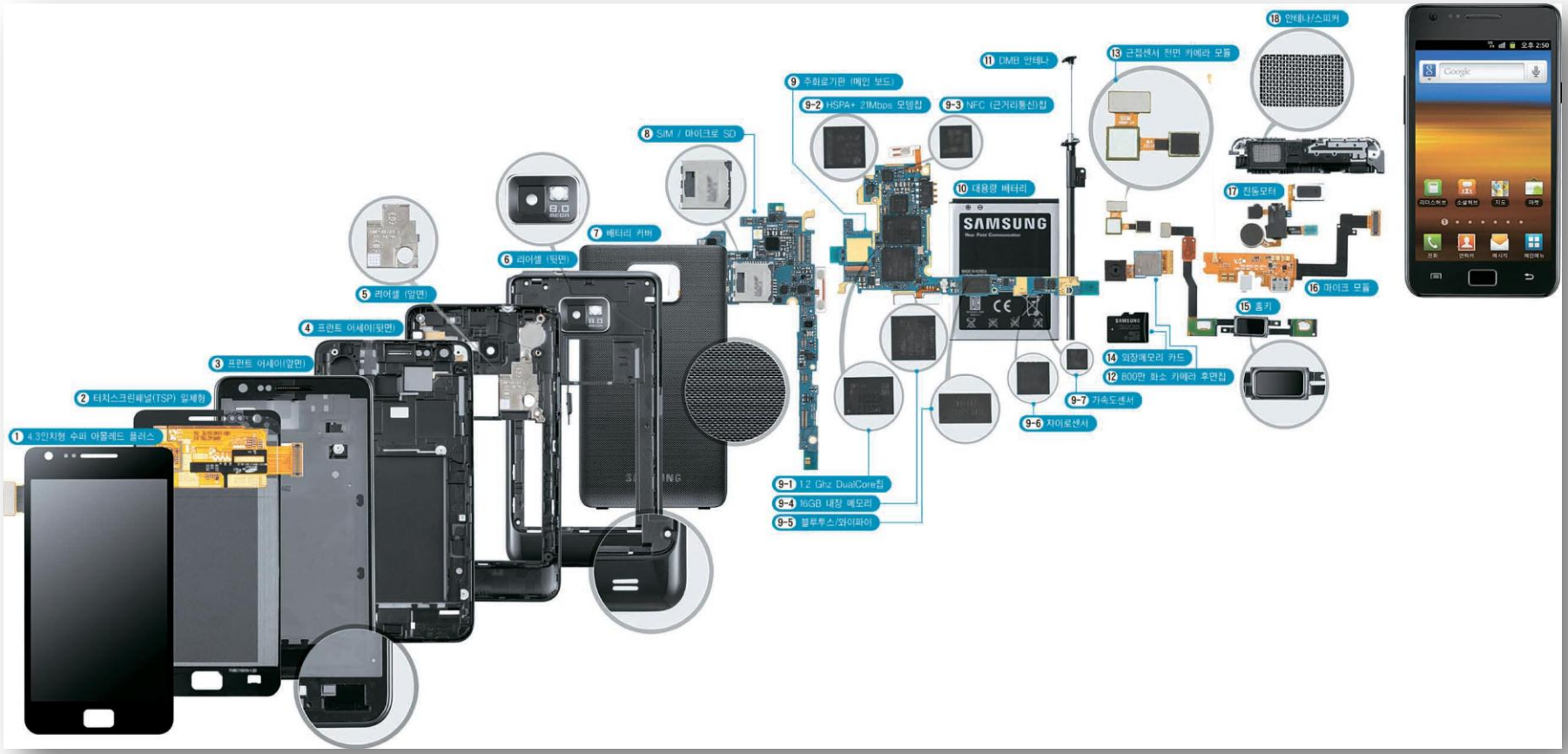
- Not applicable for this case

Complexity

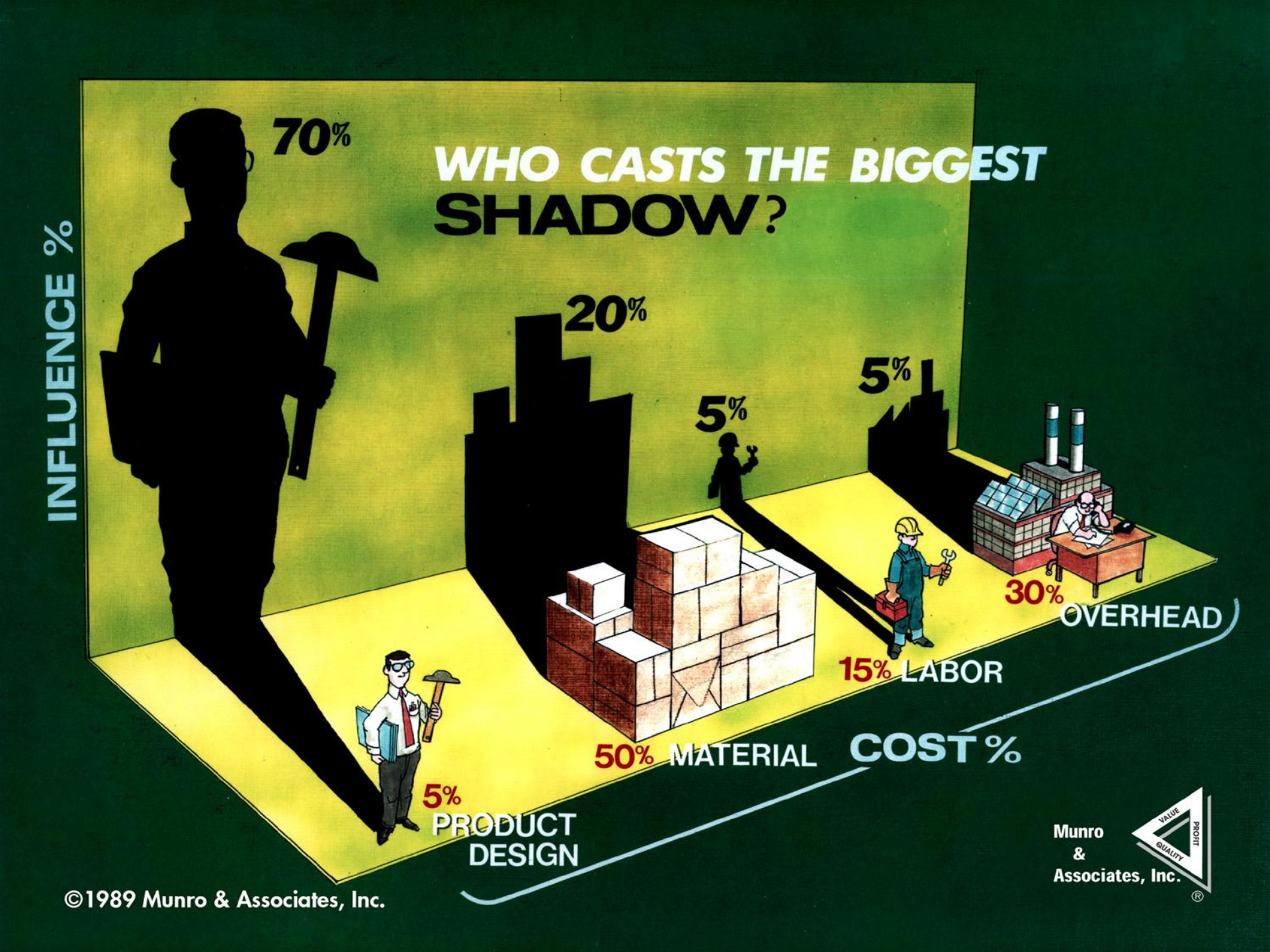




Why Lean Design?



Samsung Mobile Device 2011


WHO CASTS THE BIGGEST SHADOW?
INFLUENCE %
70%
20%
5%
5%
5%
PRODUCT DESIGN
50% MATERIAL
15% LABOR
30% OVERHEAD
COST %
VALUE
QUALITY
PROFIT
Munro & Associates, Inc.
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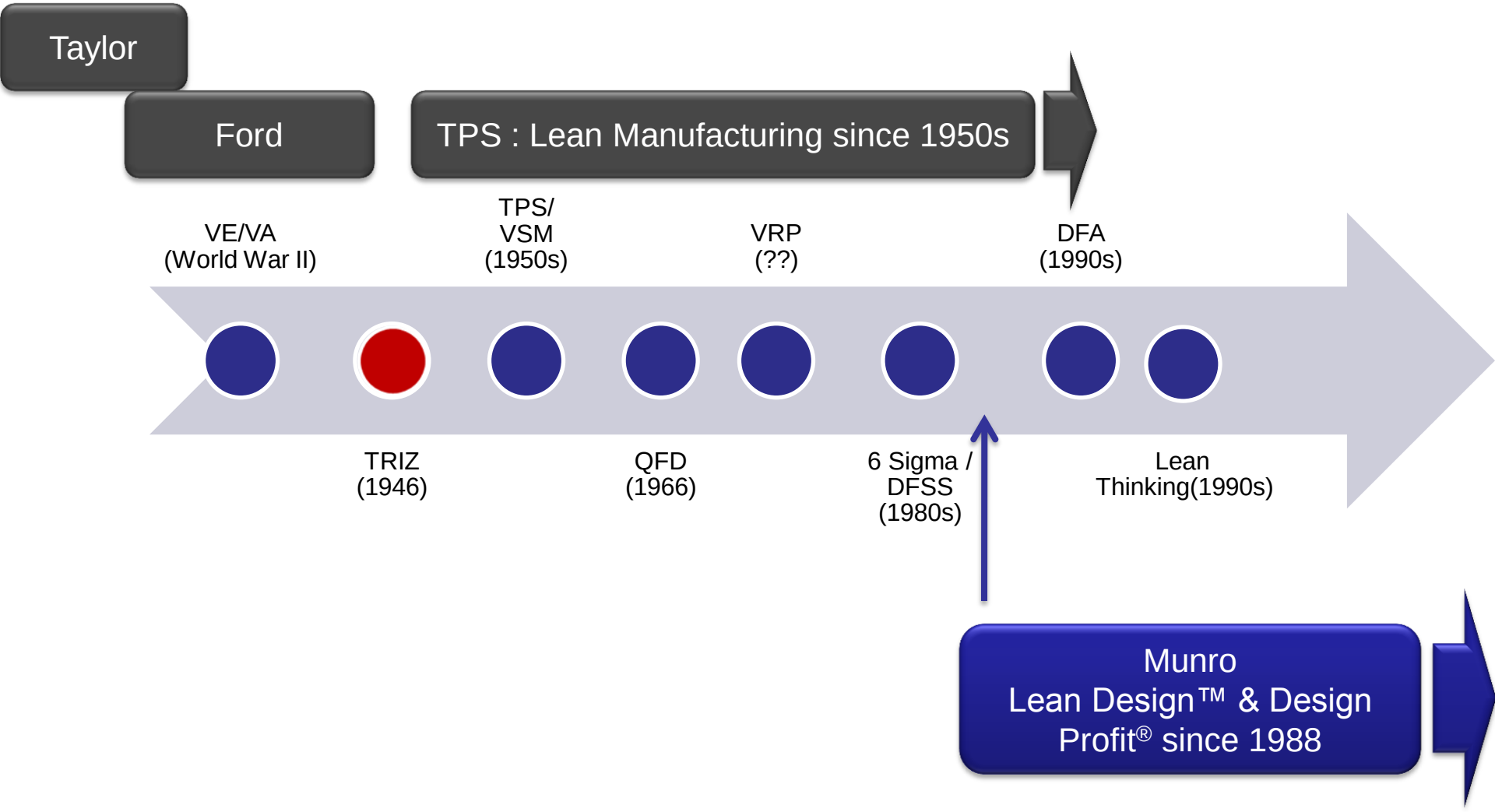
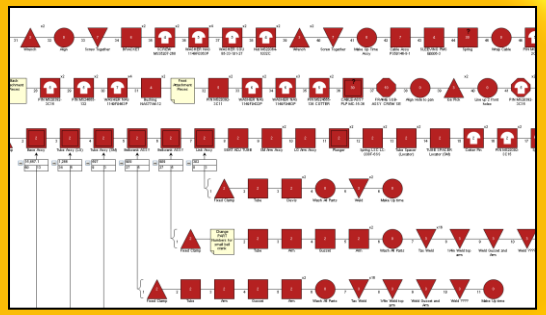
Lean Methods in History



Cost Map Based Visualization



I don't know where to lean?

Now I know where to lean!

Cost Map shows where to be improved and so what to do.

Conclusion

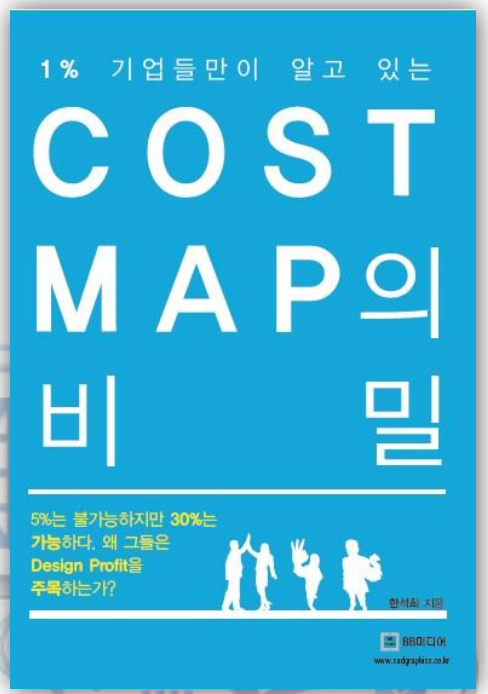
Please Remember…

Cost Map

SELF

BOB

5%는 불가능하지만
30%는 가능하다!



Curriculum Vitae

- Managing Director for Asia Operation of Lean Design, since 2011
- Member of advisers for Defense Acquisition Program Administration (DAPA) since 2012
- Board directors of Korea Defense Software Association since 2012
- Adjunct Professor at Seoul School of Integrated Science and Technology since 2011
- Adjunct Professor at Konkuk University MOT School since 2009
- Adviser to Journal of CAD& Graphics since 2007

- Education
  - Master Degree, Mechanical Engineering at Yonsei University
  - Bachelor Degree, Mechanical Engineer at Yonsei University
  - MBA at Helsinki School of Economics
  - Ph. Degree, Business Administration at Seoul School of Integrated Science and Technology
- Publication
  - Frontloading Innovation(2009)
  - Digital Manufacturing(2004)

shhan@assist.ac.kr
stevehan@leandesign.com