

# MEASURING THE FINANCIAL IMPACT OF DFMA USING THE BOX SCORE

Nick Katko,  
Senior Consultant



# Agenda

## The Box Score

- What is it?
- How it is used in decision making

## Financial Benefits of DFMA

- Capacity Defined
- Determining Financial Impact

## DFMA Examples

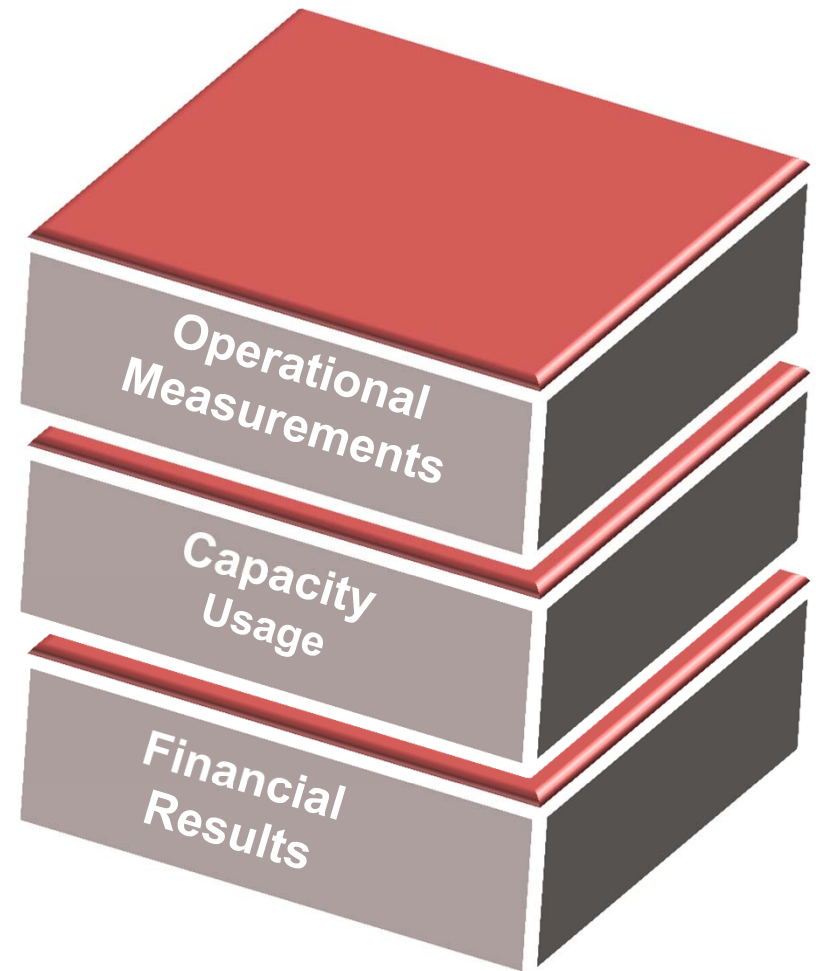
- Decrease Inventory
- Decrease Assembly Time
- Decrease Development Time
- Decrease Part Content



# **THE BOX SCORE**

# The Box Score Summarizes the Performance of the Value Stream

- The Box Score shows a *Three Dimensional* view of the value stream
- Provides an understanding of the operational, financial, and capacity impact of actions and decisions
- Leads to better understanding and better decisions



# What is a Box Score?

<b>Value Stream Performance Measurements</b>	Productivity (\$/person in the value stream)				
	On Time Shipment to Customer Request				
	Inventory Days				
	First Pass Quality				
	Average Product Cost				
	Employee Engagement in Lean				
<b>Value Stream Capacity</b>	Productive Time %				
	Non-Productive Time %				
	Available Time %				
<b>Value Stream Financials</b>	REVENUE				
	Materials				
	Labor Costs				
	Machine Cost				
	Other Costs				
	PROFIT				
	Return on Revenue				

# What is a Box Score?

<b>Value Stream Performance Measurements</b>	Productivity (\$/person in the value stream)				
	On Time Shipment to Customer Request				
	Inventory Days				
	First Pass Quality				
	Average Product Cost				
	Employee Engagement in Lean				
<b>Value Stream Capacity</b>	Productive Time %				
	Non-Productive Time %				
	Available Time %				
<b>Revenue</b>	REVENUE				
	Materials				
<p>Shows the Weekly Operational Performance Measurements.            These are also shown on the Value Stream Weekly Improvement Board</p>					
<b>Profit</b>	PROFIT				
	Return on Revenue				

# What is a Box Score?

Value Stream Performance Measurements	Productivity (\$/person in the value stream)				
	On Time Shipment to Customer Request				
	Inventory Days				
	First Pass Quality				
	Average Product Cost				
	Employee Engagement in Lean				
Value Stream Capacity	Productive Time %				
	Non-Productive Time %				
	Available Time %				
Value Stream Financials	Shows the Weekly Financial Results for the Value Stream. Are our costs under control? Are our costs reducing? Are our revenues & profits what they should be? This is also shown on the Value Stream Income Statement.				
	PROFIT				
	Return on Revenue				

# What is a Box Score?

Value Stream Performance Measurements	Productivity (\$/person in the value stream)				
	On Time Shipment to Customer Request				
	Inventory Days				
	First Pass Quality				
	Average Product Cost				
	Employee Engagement in Lean				
Value Stream Capacity	Productive Time %				
	Non-Productive Time %				
	Available Time %				
Financials	REVENUE				
	Materials				
<p>Are we making good use of our resources?          How much of our time is spent “productively”?          How much is spent “non-productively”?          How much available capacity do we have in the value stream?</p>					



# What is a Box Score?

		CURRENT STATE			
<b>Value Stream Performance Measurements</b>	Productivity (\$/person in the value stream)	\$23,087			
	On Time Shipment to Customer Request	82%			
	Inventory Days	14			
	First Pass Quality	88%			
	Average Product Cost	\$15.97			
	Employee Engagement in Lean	33%			
<b>Value Stream Capacity</b>	Productive Time %	62%			
	Non-Productive Time %	32%			
	Available Time %	6%			
<b>Value Stream Financials</b>	REVENUE	\$1,408,333			
	Materials	\$765,000			
	Labor Costs	\$267,083			
	Machine Cost	\$59,433			
	Other Costs	\$74,233			
	PROFIT	\$242,584			
	Return on Revenue	17%			

**We must measure the right things. A few key measurements, linked to strategy and exposing waste.**

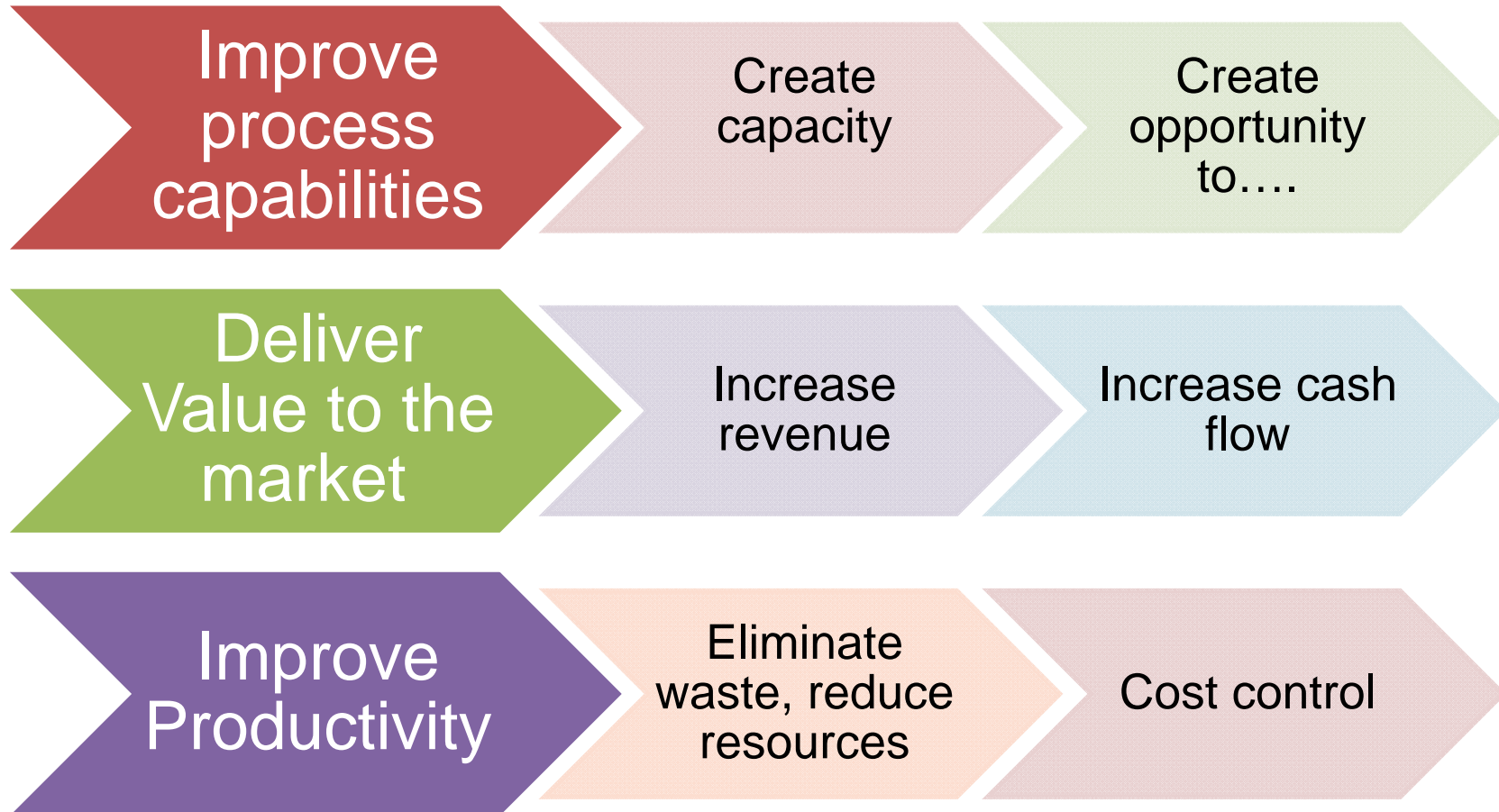
**Increase productive time. Reduce non-productive time. Use available capacity to serve the customers and grow the business.**

**Timely financial information that is readily understood by everyone. Control costs and reduce costs. Increase revenue & profits.**

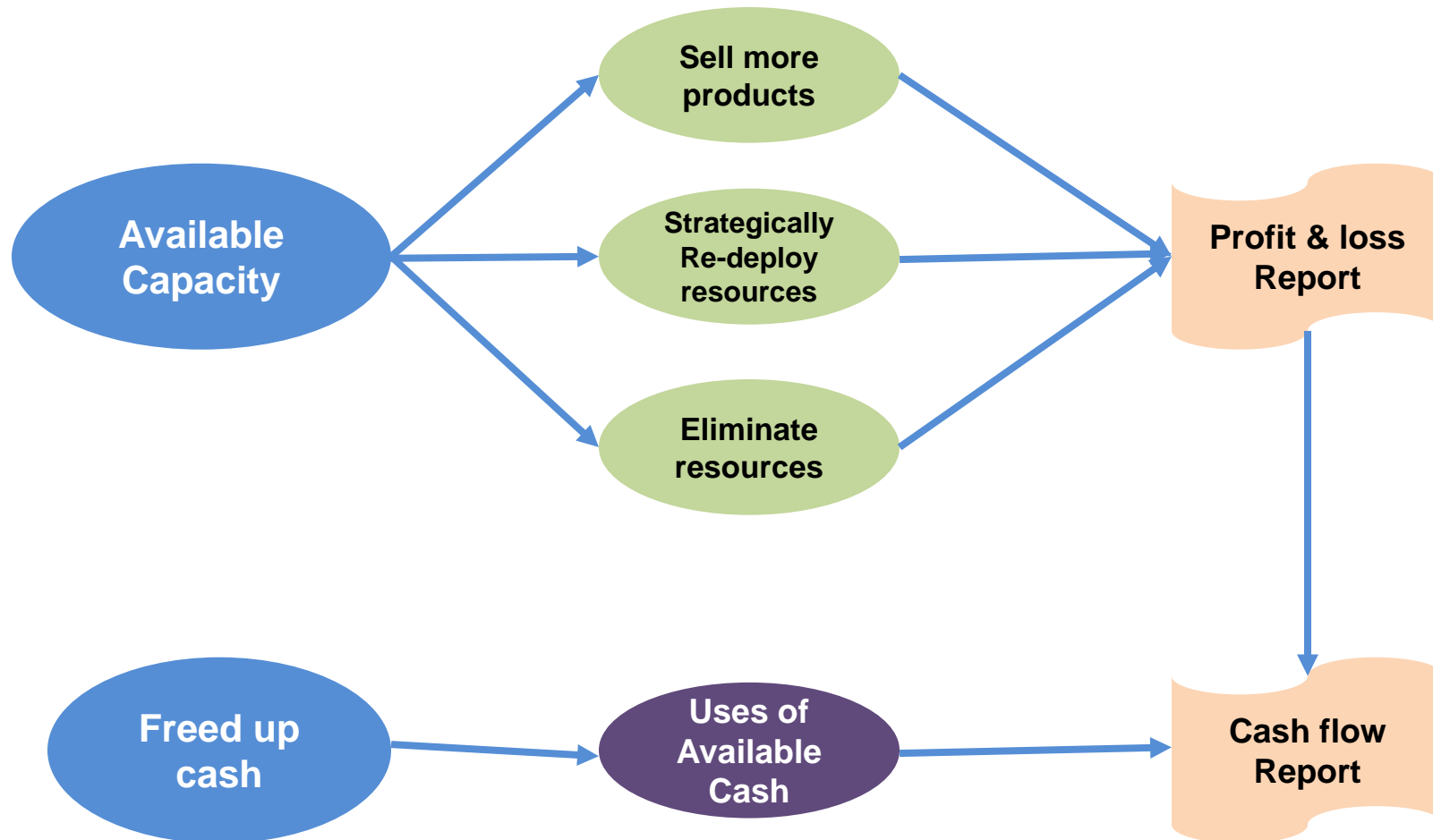
# What is a Box Score?

		CURRENT STATE							
Value Stream Performance Measurements	Productivity (\$/person in the value stream)	\$23,087							
	On Time Shipment to Customer Request	82%							
	Inventory Days	14							
	First Pass Quality	88%							
	Average Product Cost	\$15.97							
Value Stream Capacity	<p style="text-align: center;"><b>The Box Score is <u>standard work</u> for showing value stream performance.</b></p>								
Value Stream Financials									
REVENUE						\$1,408,333			
Materials						\$765,000			
Labor Costs						\$267,083			
Machine Cost						\$59,433			
Other Costs						\$74,233			
PROFIT	\$242,584								
Return on Revenue	17%								

# Operational Impact of DFMA



# Financial Impact of DFMA: How Capacity is Used





# **DFMA REDUCES INVENTORY**

# Operational Impact of Inventory Reduction

		Current State	Future State
<b>Operational</b>	<b>Sales per Person</b>	\$131,429	\$131,429
	<b>On-Time Delivery</b>	82%	96%
	<b>Dock-to-Dock Time - Days</b>	23.60	4.50
	<b>First Time Through</b>	90%	90%
	<b>Average Cost per Part</b>	\$4.94	\$4.94
	<b>AR Days Outstanding</b>	30	30
<b>Capacity</b>	<b>Productive Capacity</b>	25%	22%
	<b>Non-Productive Capacity</b>	30%	8%
	<b>Available Capacity</b>	45%	70%
<b>Financial</b>	<b>Annual Revenue</b>	\$1,840,000	\$1,840,000
	<b>Annual Material Cost</b>	\$772,800	\$772,800
	<b>Annual Conversion Cost</b>	\$317,752	\$317,752
	<b>Value Stream Profit</b>	\$749,448	\$749,448
	<b>Value Stream Cash Flow</b>	\$749,448	\$1,813,672

Improved Flow

Create Capacity

# Financial Impact of Inventory Reduction

<i>Inventory Savings for Acme Stamping</i>										
		<b>Inventory Current State</b>				<b>Inventory Future State</b>				
		Items	Cost per	Value	Days	Items	Cost per	Value	Days	
Raw materials		5 coils	\$64,400	\$322,000	5.0	1 coil	\$64,400	\$64,400	1	
Stamping		7000	\$47.60	\$333,200	7.6	920	\$47.60	\$43,792	1	
Weld #1		1700	\$53.20	\$90,440	1.8					
Weld #2		2450	\$58.80	\$144,060	2.7					
Assembly#1		1840	\$64.40	\$118,496	2.0					
Assembly #2		4140	\$70.00	\$289,800	4.5					
Lean Weld & Assembly						1840	\$68.25	\$125,580	2	
	TOTAL			\$1,297,996				\$233,772		
	INVENTORY SAVING			\$1,064,224						

Use of Cash: Invest in Capital, Reduce Debt, Spend or Save



# **DFMA DECREASES ASSEMBLY TIME**



# Operational Impact of Decreased Assembly Time

**Value Stream Box Score**

		CURRENT STATE	Decrease in Assembly time due to DFMA	FUTURE STATE
<b>Value Stream Performance Measurements</b>	Productivity (\$/person in the value stream)	\$23,087	0.00	23,087
	On Time Shipment to Customer Request	82%	9%	91%
	Inventory Days	14	(6)	8
	First Pass Quality	88%	8%	96%
	Average Product Cost	\$15.97		\$15.97
	Employee Engagement in Lean	33%		33%
<b>Value Stream Capacity</b>	Productive Time %	69%	0%	69%
	Non-Productive Time %	32%	-14%	18%
	Available Time %	-1%	14%	13%
<b>Value Stream Financials</b>	REVENUE	\$1,408,093	\$0	\$1,408,093
	Materials	\$765,000	\$0	\$765,000
	Labor Costs	\$267,058	\$0	\$267,058
	Machine Cost	\$59,433	\$0	\$59,433
	Other Costs	\$74,233	\$0	\$74,233
	PROFIT	\$242,369	\$0	\$242,369
	Return on Revenue	17%		17%

Improved Flow, Quality and Delivery

Eliminate Waste and Create Capacity

# Financial Impact of Decreased Assembly Time

Value Stream Box Score		CURRENT STATE	Decrease in Assembly time due to DFMA	FUTURE STATE	MOVE PEOPLE OUT OF THE VALUE STREAM	SELL MORE PRODUCTS	SELL NEW PRODUCTS WITH HIGHER PRICES
Value Stream Performance Measurements	Productivity (\$/person in the value stream)	\$23,087	0.00	23,087	\$24,703	\$24,238	\$29,212
	On Time Shipment to Customer Request	82%	9%	91%	89%	90%	90%
	Inventory Days	14	(6)	8	8.0	7.6	7.0
	First Pass Quality	88%	8%	96%	96%	95%	95.0%
	Average Product Cost	\$15.97		\$15.97	\$15.73	\$15.64	\$15.63
	Employee Engagement in Lean	33%		33%	33%	35%	35%
Value Stream Capacity	Productive Time %	69%	0%	69%	74%	76%	69%
	Non-Productive Time %	32%	-14%	18%	19%	20%	22%
	Available Time %	-1%	14%	13%	7%	4%	10%
Value Stream Financials	REVENUE	\$1,408,093	\$0	\$1,408,093	\$1,408,093	\$1,478,497	\$1,781,912
	Materials	\$765,000	\$0	\$765,000	\$765,000	\$802,118	\$865,000
	Labor Costs	\$267,058	\$0	\$267,058	\$249,546	\$267,058	\$267,058
	Machine Cost	\$59,433	\$0	\$59,433	\$59,433	\$59,433	\$59,433
	Other Costs	\$74,233	\$0	\$74,233	\$74,233	\$70,150	\$74,132
	PROFIT	\$242,369	\$0	\$242,369	\$259,881	\$279,738	\$516,289
	Return on Revenue	17%		17%	18%	19%	29%



# **DFMA REDUCES PRODUCT DEVELOPMENT CYCLE TIME**

# Operational Impact of Decreasing Product Development Cycle Time

New Product Development Monthly Box Score		Current State	DFMA Decrease in NPD cycle Time	Future State
Value Stream Performance Measurements	Productivity (units per hour worked)	200	25.00	225
	On Time Design Projects	75%	15%	90%
	Average Lead Time (Days)	150	(25)	125
	First Pass Quality	80%	10%	90%
	Product Development Cost per New Prod Sales \$	\$25.00	(4)	\$21.00
	% Sales from New Products	20%	10%	30%
Value Stream Capacity	Productive Time %	63%	14%	77%
	Non-Productive Time %	27%	-14%	13%
	Available Time %	10%		10%
Value Stream Financials	Materials	\$13,867	-\$899	\$12,968
	Labor Costs	\$215,800	-\$2,149	\$213,651
	Machine Cost	\$5,280		\$5,280
	Other Costs	\$2,345		\$2,345
	Total Costs	\$237,292		\$237,292

Faster NPD: Less time spent on waste, more time on productive work

Less spending on materials & overtime

# Financial Impact of Faster NPD

Monthly Order Fulfillment Value Stream Box Score		Current State	Increase Sales of New Products	Future State
Value Stream Performance Measurements	Productivity (\$/person in the value stream)	\$7,472	2,432.00	9,904
	On Time Shipment to Customer Request	94%		94%
	Dock to Dock Days	19		19
	First Pass Quality	78%		78%
	Average Product Cost	\$413.97	(49.54)	\$364.43
Employee Capacity	Productive Time %	43%	17%	60%
	Non-Productive Time %	19%	5%	24%
	Available Time %	37%	-21%	16%
Machine Capacity	Productive Time %	53%	16%	69%
	Non-Productive Time %	17%	3%	20%
	Available Time %	29%	-17%	12%
Value Stream Financials	REVENUE	\$332,569	95,369	\$427,938
	Materials	\$108,446	31,099	\$139,545
	Conversion Costs	\$116,753		\$116,753
	Total Costs	\$225,199	31,099	\$256,298
	PROFIT	\$107,370	64,270	\$171,640
	Return on Sales	32%	67%	40%

Incremental sales added with no increase in conversion costs, because of available capacity in value stream



# **DFMA DECREASES PART CONTENT**

# Operational Impact of Fewer Parts

		Current State	30% decrease in parts	Decrease Cycle Time
Performance Measures	Productivity	54.55	54.55	54.55
	Flow	24	16.8	16.8
	On-time Delivery	86%	86%	95%
	Quality	60%	90%	90%
	Average Cost Per Unit	\$426.54	\$343.56	\$343.56
Capacity	Productive	49%	38%	29%
	Non-Productive	31%	16%	15%
	Available Capacity	20%	46%	56%
Income Statement	Revenue	\$1,875,000	\$1,875,000	\$1,875,000
	Material Costs	829,835	580,885	580,885
	Conversion Costs			
	Labor	307,130	307,130	307,130
	Machines	88,800	88,800	88,800
	Outside Processing	36,000	36,000	36,000
	Facilities	15,450	15,450	15,450
	Other	2,416	2,416	2,416
	Total Costs	\$1,279,631	\$1,030,681	\$1,030,681
	Value Stream Profit	\$595,369	\$844,320	\$844,319
	Return on Sales	31.75%	45.03%	45.03%

Fewer Parts

Improve Quality

Decrease labor content

# How can the available capacity be used?

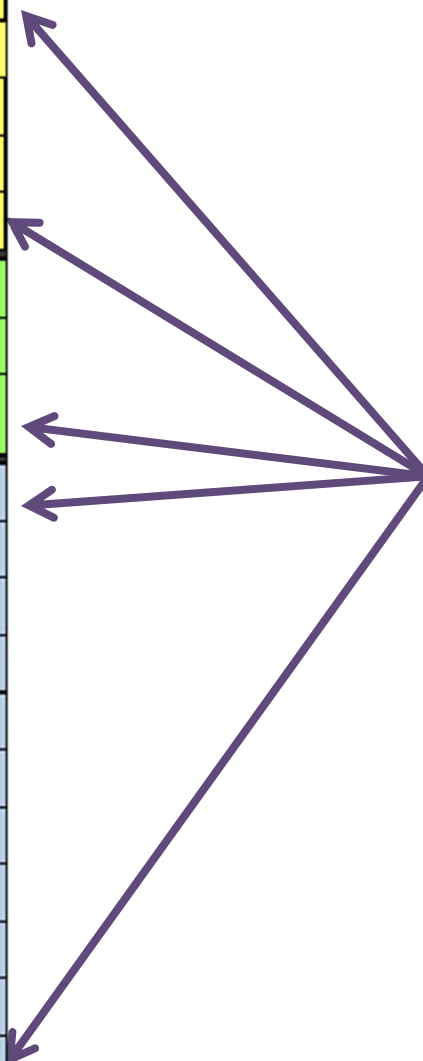
		Current State	30% decrease in parts	Decrease Cycle Time
Performance Measures	Productivity	54.55	54.55	54.55
	Flow	24	16.8	16.8
	On-time Delivery	86%	86%	95%
	Quality	60%	90%	90%
	Average Cost Per Unit	\$426.54	\$343.56	\$343.56
Capacity	Productive	49%	38%	29%
	Non-Productive	31%	16%	15%
	Available Capacity	20%	46%	56%
Income Statement	Revenue	\$1,875,000	\$1,875,000	\$1,875,000
	Material Costs	829,835	580,885	580,885
	Conversion Costs			
	Labor	307,130	307,130	307,130
	Machines	88,800	88,800	88,800
	Outside Processing	36,000	36,000	36,000
	Facilities	15,450	15,450	15,450
	Other	2,416	2,416	2,416
	Total Costs	\$1,279,631	\$1,030,681	\$1,030,681
	Value Stream Profit	\$595,369	\$844,320	\$844,319
	Return on Sales	31.75%	45.03%	45.03%

Decisions on using available capacity will impact the DFMA financial analysis



		Decrease Parts & Cycle Time	Increase demand 33%
Performance Measures	Productivity	54.55	70.91
	Flow	16.8	16.8
	On-time Delivery	95%	95%
	Quality	90%	90%
	Average Cost Per Unit	\$343.56	\$316.48
Capacity	Productive	29%	38%
	Non-Productive	15%	16%
	Available Capacity	56%	45%
Income Statement	Revenue	\$1,875,000	\$2,493,750
	Material Costs	580,885	772,577
	Conversion Costs		
	Labor	307,130	307,130
	Machines	88,800	88,800
	Outside Processing	36,000	47,880
	Facilities	15,450	15,450
	Other	2,416	2,416
	Total Costs	\$1,030,681	\$1,234,253
	Value Stream Profit	\$844,319	\$1,259,497
	Return on Sales	45.03%	50.51%

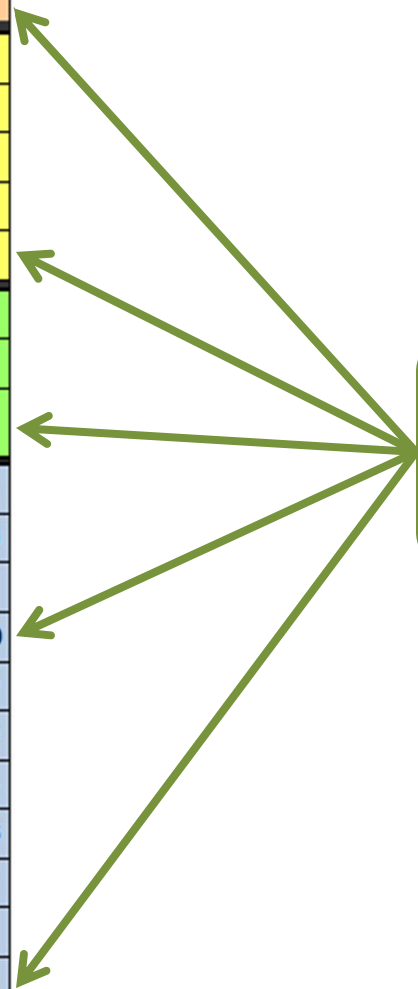
**Increase  
Demand 33%**



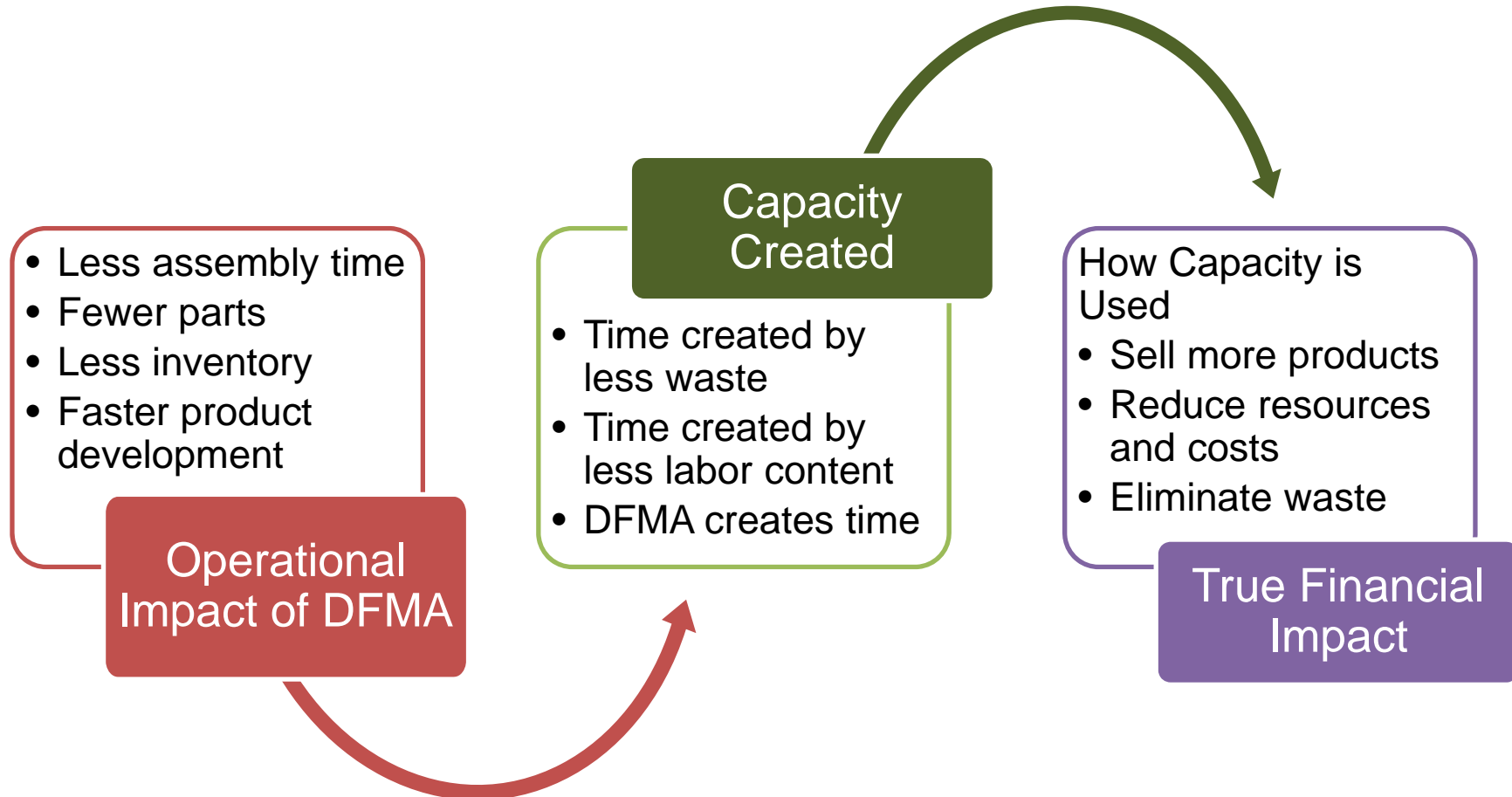
# 64% Increase in Profits

		Decrease Cycle Time	Increase demand	Redeploy people
Performance Measures	Productivity	54.55	70.91	125.81
	Flow	16.8	16.8	16.8
	On-time Delivery	95%	95%	95%
	Quality	90%	90%	90%
	Average Cost Per Unit	\$343.56	\$316.48	\$270.49
Capacity	Productive	29%	38%	57%
	Non-Productive	15%	16%	21%
	Available Capacity	56%	45%	23%
Income Statement	Revenue	\$1,875,000	\$2,493,750	\$2,437,500
	Material Costs	580,885	772,577	755,151
	Conversion Costs			
	Labor	307,130	307,130	173,110
	Machines	88,800	88,800	65,000
	Outside Processing	36,000	47,880	47,880
	Facilities	15,450	15,450	11,345
	Other	2,416	2,416	2,416
	Total Costs	\$1,030,681	\$1,234,253	\$1,054,902
	Value Stream Profit	\$844,319	\$1,259,497	\$1,382,599
	Return on Sales	45.03%	50.51%	56.72%

Re-Deploy  
People



# Wrap Up: The Box Score Advantage



# Questions & Information

Visit BMA website	<a href="http://www.maskell.com">www.maskell.com</a> Blogs, articles, books etc.
Contact Nick Katko	<a href="mailto:nkatko@maskell.com">nkatko@maskell.com</a>
To receive free Lean Accounting resources by download	Visit <a href="http://www.maskell.com">www.maskell.com</a> and click the “Download Free Resources” button
To read articles and case studies about Lean Accounting	Visit <a href="http://www.maskell.com">www.maskell.com</a> and choose the Lean Accounting Tab
Join the Lean Accounting SuperGroup (free)	Visit <a href="http://www.leanaccounting.ning.com">www.leanaccounting.ning.com</a> Blogs, forums, videos, and more. <b>Over 1700 members</b>
Join the BMA Lean Accounting Group on LinkedIn (free)	Visit <a href="http://www.linkedin.com">www.linkedin.com</a> and either join or sign in. Go to the Groups tab, search on “BMA Lean Accounting” and join in. Forums, blogs, networking and more. <b>Over 1100 members</b>