

Metrics, Benchmarking & Best Practices

Increasing DC Productivity & Efficiency

In this session...

- Why qualitative and quantitative benchmarking go hand-in-hand
- Critical warehouse metrics – WERC's DC Measure Study. Where does your company stand?
- A step-by-step description of an approach to benchmarking.
- WERC's Assessment Program

**“If you can’t measure it,
you can’t manage it.”**

~ Peter Drucker

Benchmarking is...

“The process of **improving performance** by **continuously** identifying, understanding, and adapting outstanding practices and processes found **inside and outside** the organization.

Benchmarking (seeks) to improve any given **business process** by exploiting "best practices" rather than merely measuring the best performance. **Best practices are the cause of best performance.** Studying best practices provides the greatest opportunity for gaining a strategic, operational, and financial advantage.”

The American Productivity and Quality Center (APQC)

What we know...

**Improve
Processes**

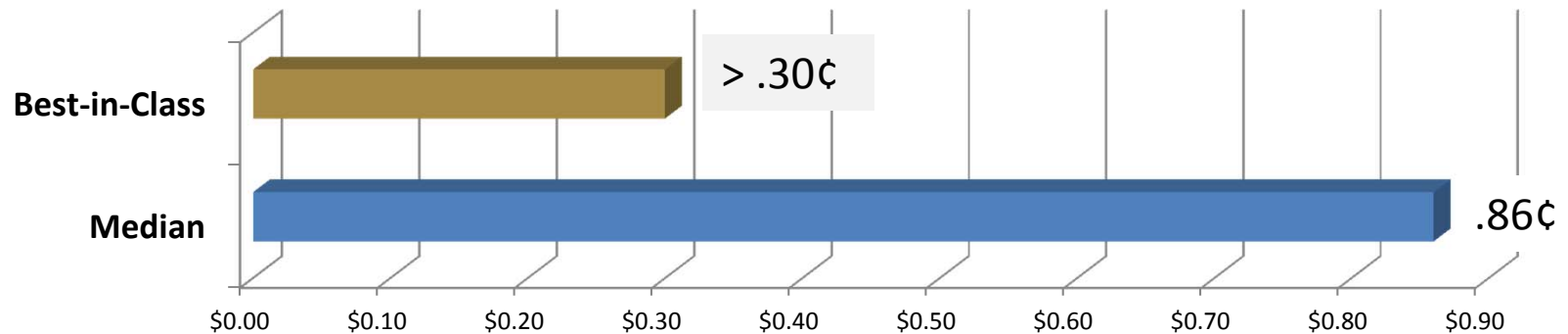
**Improve
Metrics**

**Improve
Bottom Line**

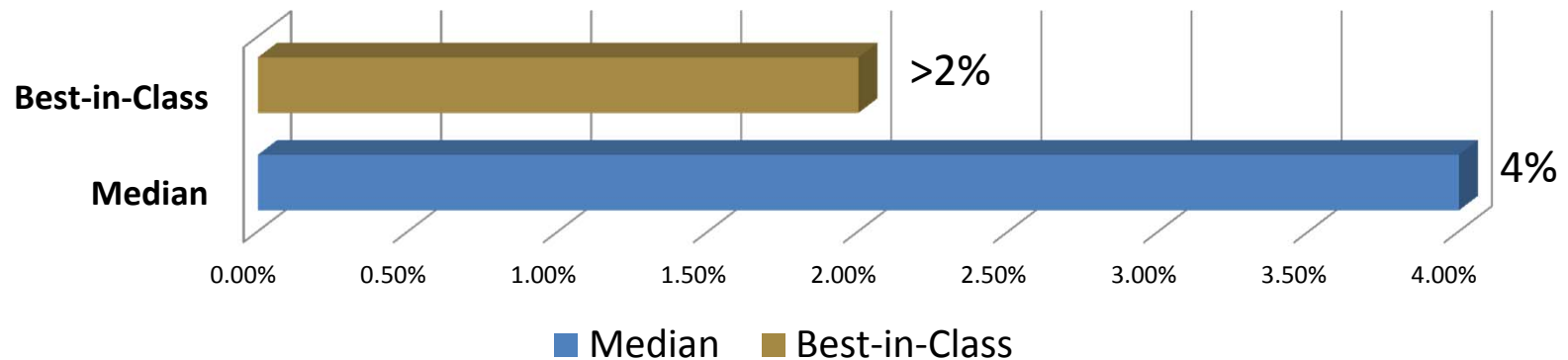
How do we know?

Financial Metrics

Distribution Cost per Unit Shipped

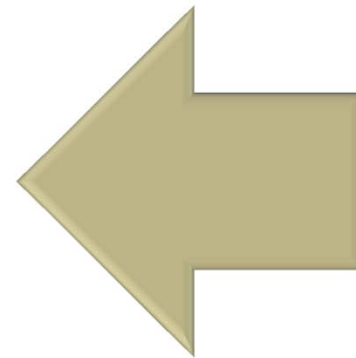
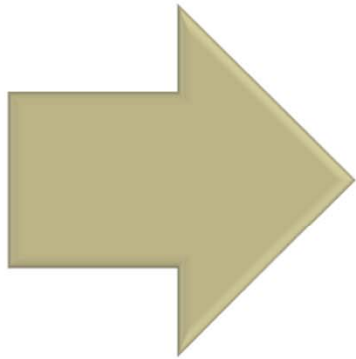


Distribution Costs as a Percent of Sales



Quantitative Benchmarking Data is Good... but it is not Good Enough

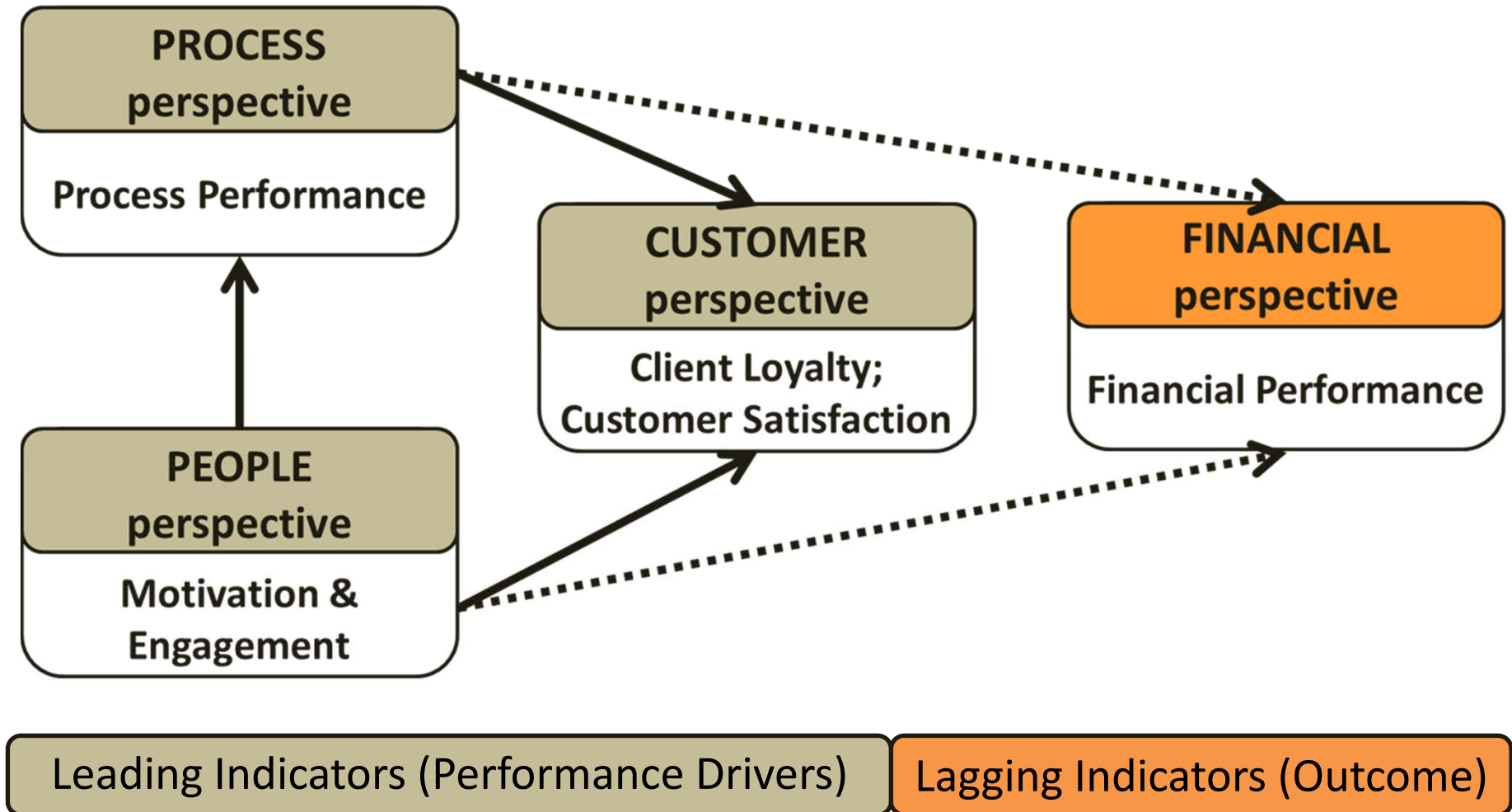
Quantitative



Qualitative

Limitations of Traditional Financial Measures

Financial measures tend to be lagging indicators.



Leading Indicators...

- On-time Shipments
- Lost Sales (Percent of SKUs Stocked Out)
- Dock-to-Stock Cycle Time, in Hours
- Order Fill Rate
- Pallets Picked & Shipped per Hour
- Distribution Costs per Unit Shipped
- Peak Warehouse Capacity Used
- Material Handling Damage
- Percent of Orders with On-time Delivery

There are hundreds of metrics referenced across industry associations

SPRING 2014

WAREHOUSING EDUCATION AND RESEARCH COUNCIL
WERC
THE ASSOCIATION FOR LOGISTICS PROFESSIONALS
WATCH™ A Periodic Assessment of Industry Trends
PROVIDED BY AND FOR THE WAREHOUSING PROFESSIONAL

Findings of a survey of benchmarking measures among WERC members and DC Velocity readers.

DC Measures 2014

by Joseph Tillman, CTL
Founder and Lead Instructor
TSGuard Logistics

Karl Maerrett, PhD
Professor
Georgia Southern University

Donna Williams, Jr.
Assistant Professor of Logistics
Georgia College and State University

We completed in-depth interviews with companies that have been identified as best-in-class practitioners on using performance data. In addition, we looked at those metrics that have had the most significant changes over the past year as well as any shifts in metrics that warehouses consider important. As in previous years, the study results and analysis are compiled and presented by our partners Karl Maerrett, PhD and Joseph Tillman. This year the team added Donna Williams, an Assistant Professor of Logistics at Georgia College and State University.

"This year we want to highlight how companies turn benchmarking data into actionable steps."

About the Study

2014 marks the eleventh year of the DC Measures study. In January, the survey is launched via an email invitation to WERC members and DC Velocity readers. Survey participants are asked to report their actual levels of performance for 2013. The study captures 47 key operational metrics that are close to the heart of most distribution center professionals. The measures have been grouped into 5 balanced sets – customer, operational, financial, capacity, quality and employment/safety – plus the additional sets related to perfect order and cash-to-cash cycle measurement.

WERC thanks the sponsoring companies who helped make this report possible:

KRONOS **KENCO**

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WERC

The WERC Research Team & Partners...

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Research Partner:



Research Sponsor:



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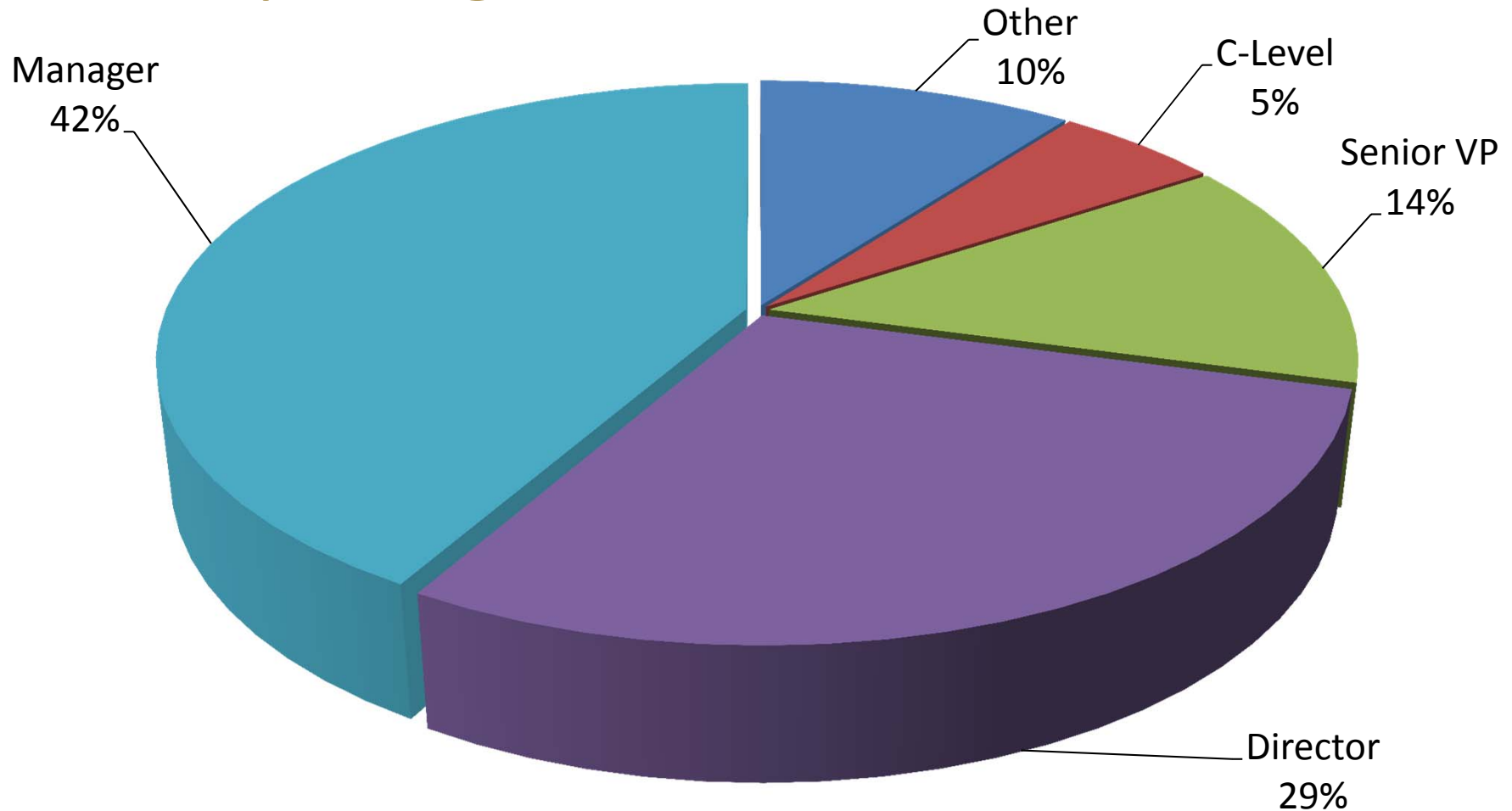


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Who is in WERC's Study...

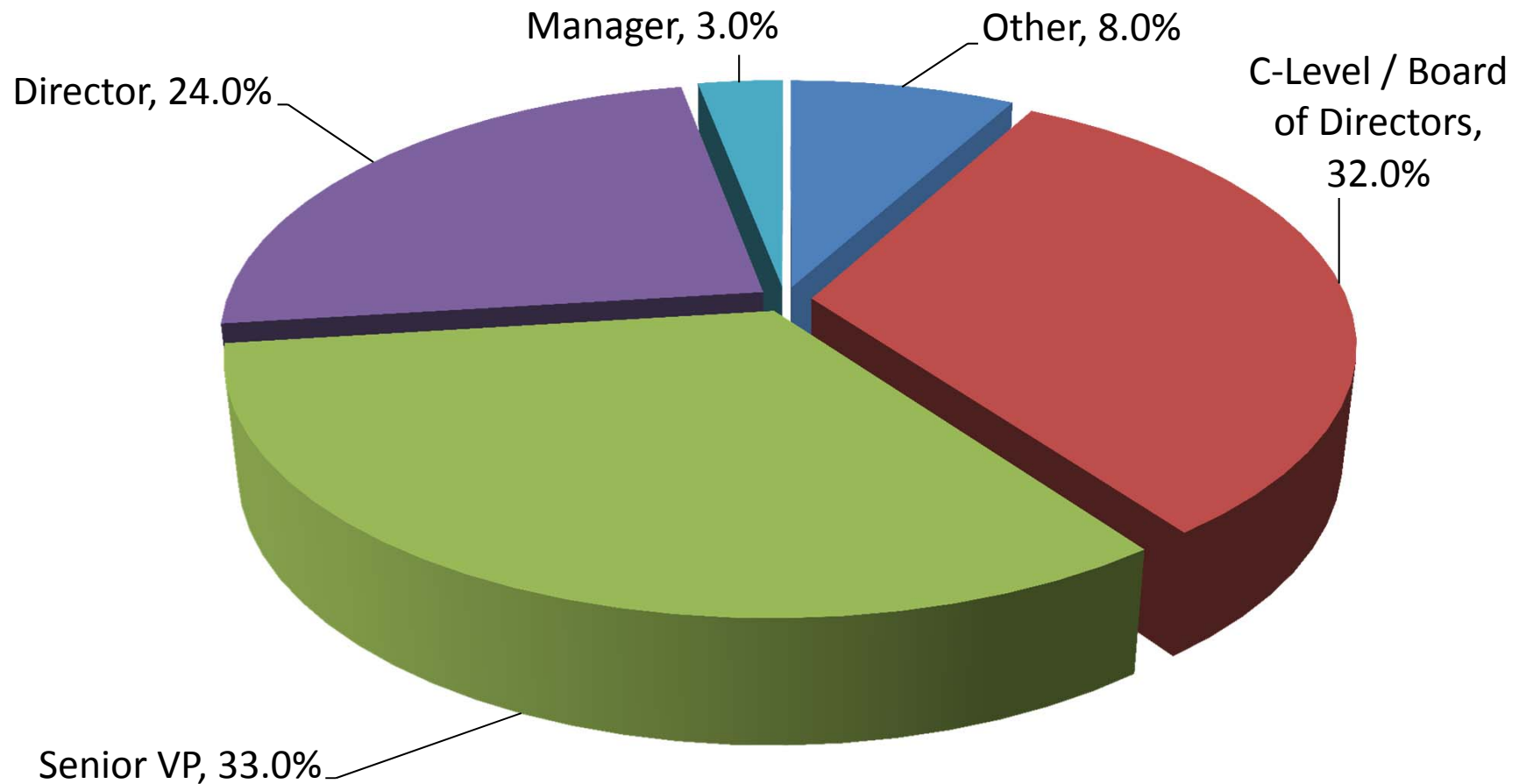
Who's reporting

This year's combined survey had over 600 participants of which 424 provided usable responses



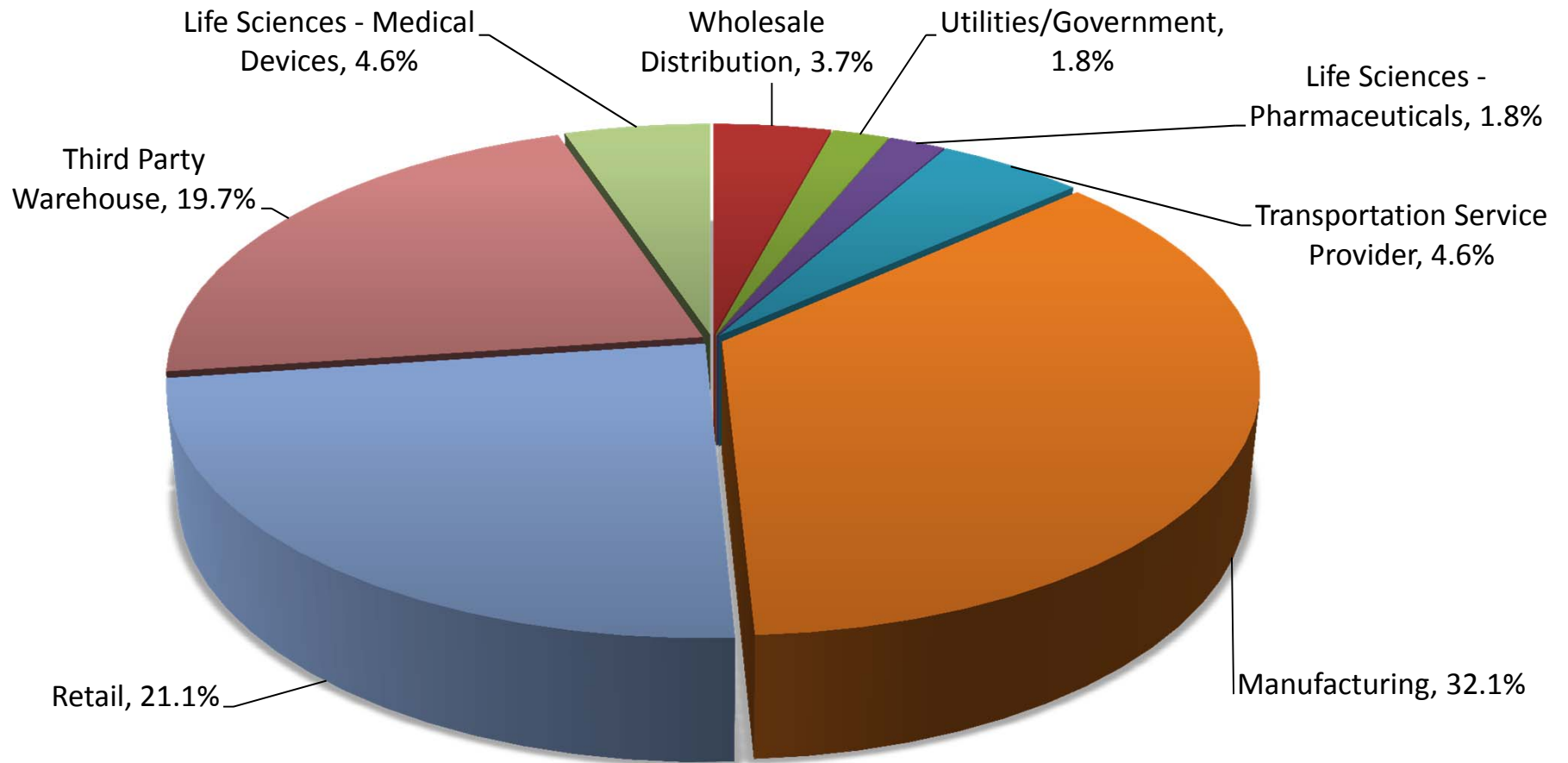
Who is in WERC's Study...

To whom they report



Who is in WERC's Study...

Breakdown by Industry



Who is in WERC's Study...

Nature of Work at the Facility

Majority (66.8%) focus on case picking vs. pallets

<i>Type of Operation</i>	<i>% of Total</i>	<i>% Case vs. Pallet</i>
Broken Case Picking	37%	66.8%
Full Case Picking	29.8%	
Full Pallet Picking	12.9%	33.2%
Partial Pallet Picking	20.1%	

Who is in WERC's Study...

Primary Customer Served

Respondents serve customers across the supply chain



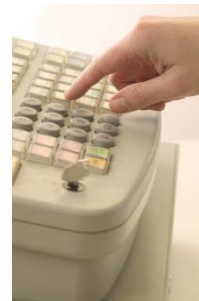
Manufacturer

18.6%



Wholesaler/Distributor

36.7%



Retailer

22.3%

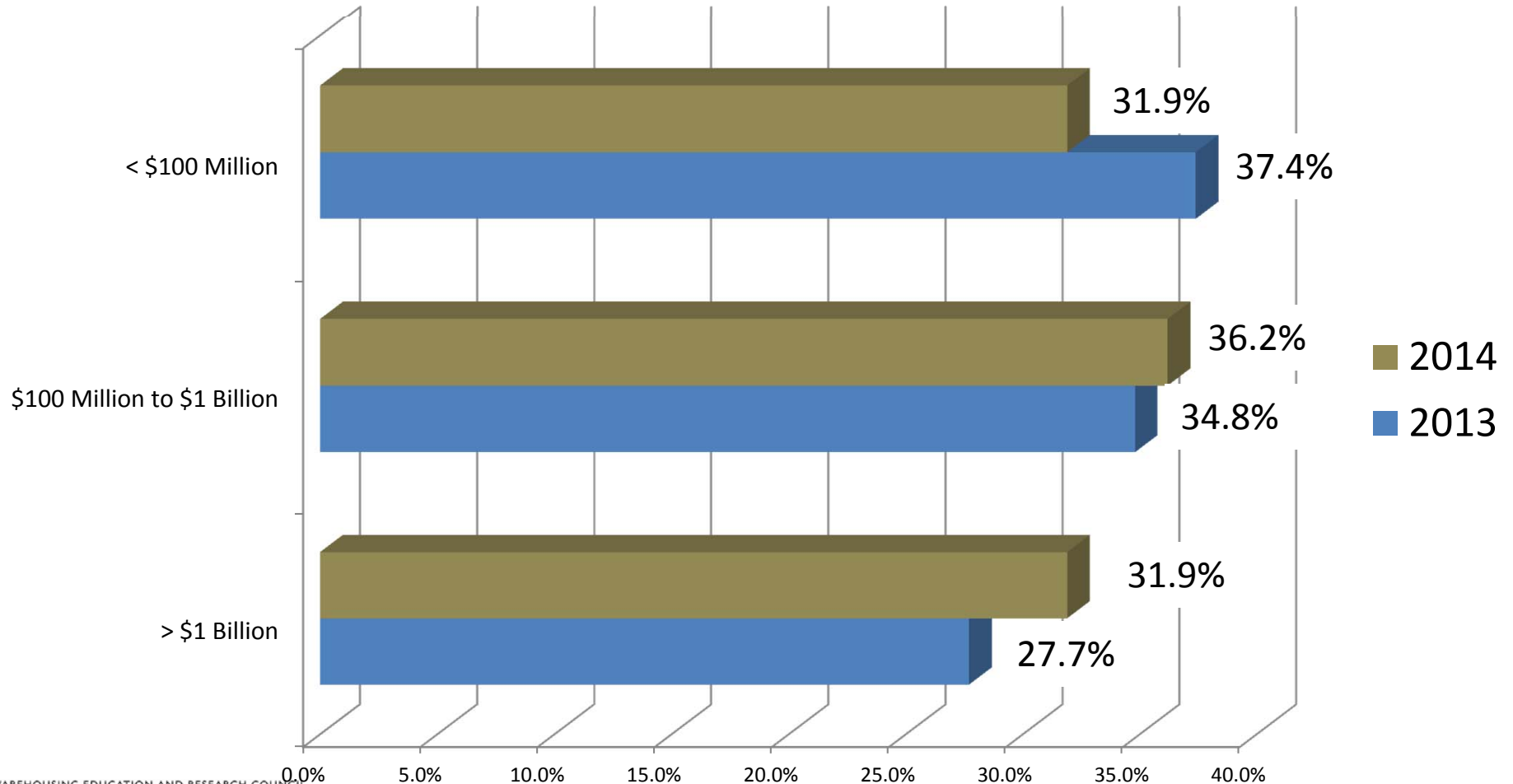


End User/Consumer

22.3%

Who is in WERC's Study...

Demographics by Company Size



The most popular metrics are...

Metric In Order of Popularity – 2014	2013 Rank	2012 Rank
1. On Time Shipments - Customer	1	1
2. Internal Order Cycle Time – Customer	2	5
3. Total Order Cycle Time – Customer	4	6
4. Dock to Stock Cycle Time, in Hours - Inbound Operations	3	4
5. Order Picking Accuracy – Quality	5	2
6. Lines Picked and Shipped per Hour – Outbound Operations	6	8
7. % of Supplier Orders Received Damage Free – Inbound Operations	8	12
8. Average Warehouse Capacity Used – Capacity	9	3
9. Peak Warehouse Capacity Used – Capacity	12	7
10. Lines Received and Put Away per Hour – Inbound Operations	7	11
11. Backorders as Percent of Total Orders – Customer	Not in Top 12	Not in Top 12
12. % of Supplier Orders Rec. w/ Correct Documentation – Inbound Ops.	11	Not in Top 12

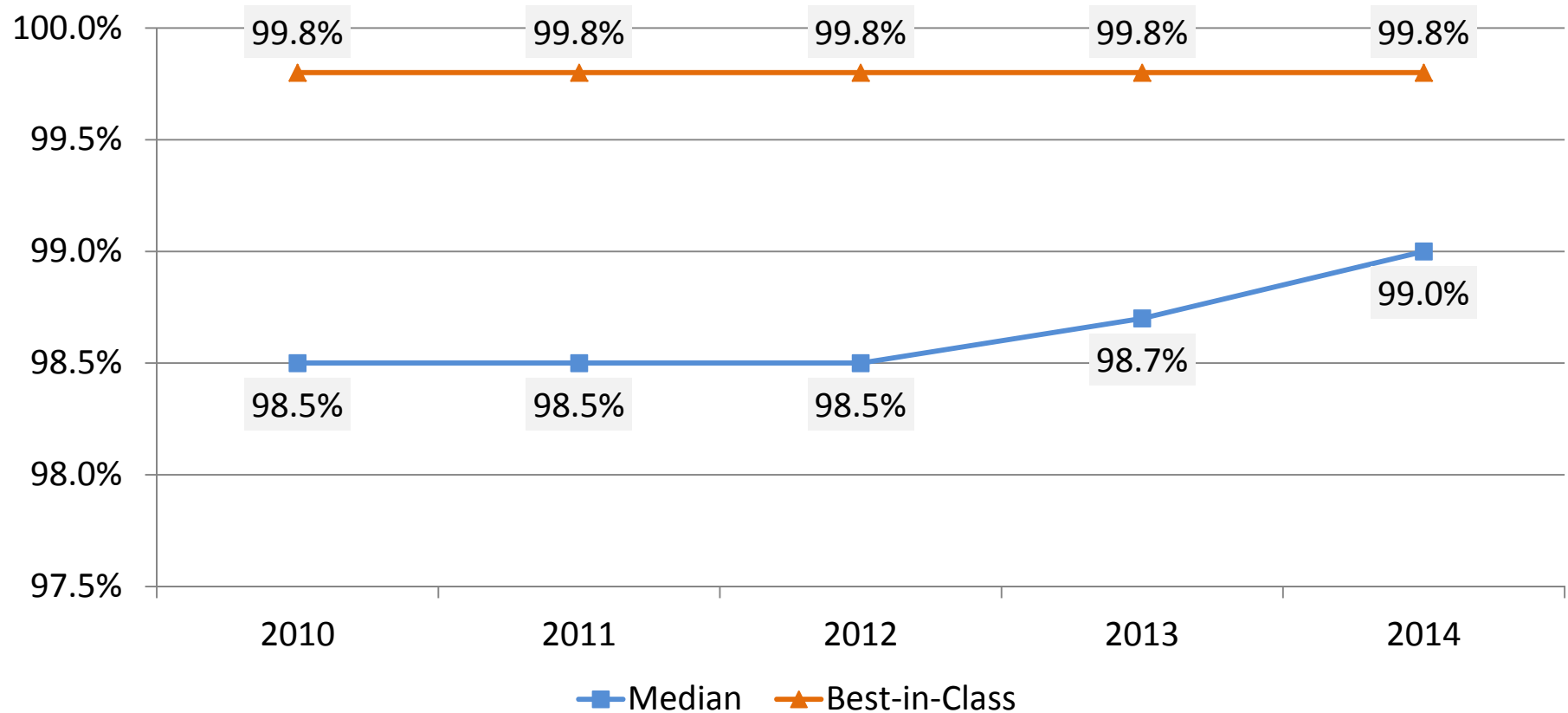
And the metrics are...

TABLE 5. QUINTILE PERFORMANCE CLASSIFICATIONS FOR METRICS

COLUMN 1	COLUMN 2	COLUMN 3	COLUMN 4	COLUMN 5	COLUMN 6	COLUMN 7
Customer Metrics*	Major Opportunity	Disadvantage	Typical	Advantage	Best-in-class	Median
On-time Shipments	Less than 96%	>= 96 and < 98.3%	>= 98.3 and < 99.5%	>= 99.5 and < 99.8%	>= 99.8%	99%
Total Order Cycle Time	Greater than 72 Hours	>= 28.9 and < 72 Hours	>= 24 and < 28.9 Hours	>= 8 and < 24 Hours	< 8 Hours	24 Hours
Internal Order Cycle Time	Greater than 27.4 Hours	>= 21.2 and < 27.4 Hours	>= 8 and < 21.2 Hours	>= 3.4 and < 8 Hours	< 3.4 Hours	12 Hours
Perfect Order Completion Index	Less than 85%	>= 85 and < 91.1%	>= 91.1 and < 98%	>= 98 and < 99.3%	>= 99.3%	96%
Lost Sales (Percent of SKUs Stocked Out)	Greater than 5.5%	>= 3.2 and < 5.5%	>= 2 and < 3.2%	>= 0.19 and < 2%	< 0.19%	2%
Backorders as a Percent of Total Orders	Greater than 8%	>= 4 and < 8%	>= 1.2 and < 4%	>= 0.14 and < 1.2%	< 0.14%	2%
Backorders as a Percent of Total Lines	Greater than 6%	>= 2 and < 6%	>= 1 and < 2%	>= 0.042 and < 1%	< 0.042%	2%
Backorders as a Percent of Total Dollars/Units	Greater than 8%	>= 2.5 and < 8%	>= 1 and < 2.5%	>= 0.012 and < 1%	< 0.012%	2%
Operations Metrics	Major Opportunity	Disadvantage	Typical	Advantage	Best-in-class	Median
INBOUND METRICS						
Dock-to-Stock Cycle Time, in Hours	Greater than 24 Hours	>= 9.1 and < 24 Hours	>= 5 and < 9.1 Hours	>= 2.4 and < 5 Hours	< 2.4 Hours	7.2 Hours
Suppliers Orders Received per Hour	Less than 1 per Hour	>= 1 and < 3 per Hour	>= 3 and < 6.6 per Hour	>= 6.6 and < 15 per Hour	>= 15 per Hour	5 per Hour
Lines Received and Put Away per Hour	Less than 8.3 per Hour	>= 8.3 and < 16 per Hour	>= 16 and < 25 per Hour	>= 25 and < 58.8 per Hour	>= 58.8 per Hour	22 per Hour
Percent of Supplier Orders Received with Correct Documents	Less than 90%	>= 90 and < 95%	>= 95 and < 98%	>= 98 and < 99%	>= 99%	97%
Percent of Supplier Orders Received Damage Free	Less than 95%	>= 95 and < 98%	>= 98 and < 99%	>= 99 and < 99.5%	>= 99.5%	98.9%
On-time Receipts from Supplier	Less than 87.4%	>= 87.4 and < 94.6%	>= 94.6 and < 96.5%	>= 96.5 and < 99%	>= 99%	95%

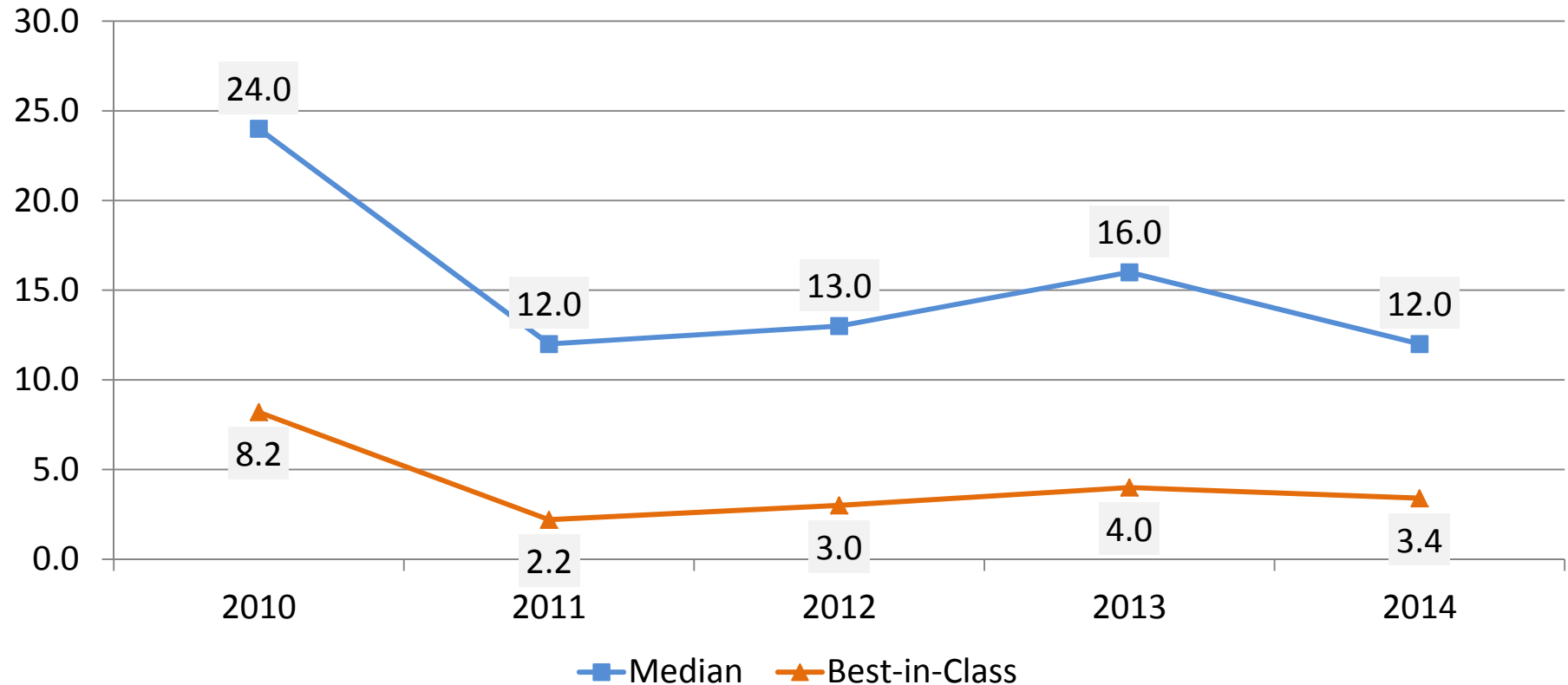
On Time Shipments (1)

Customer Metrics



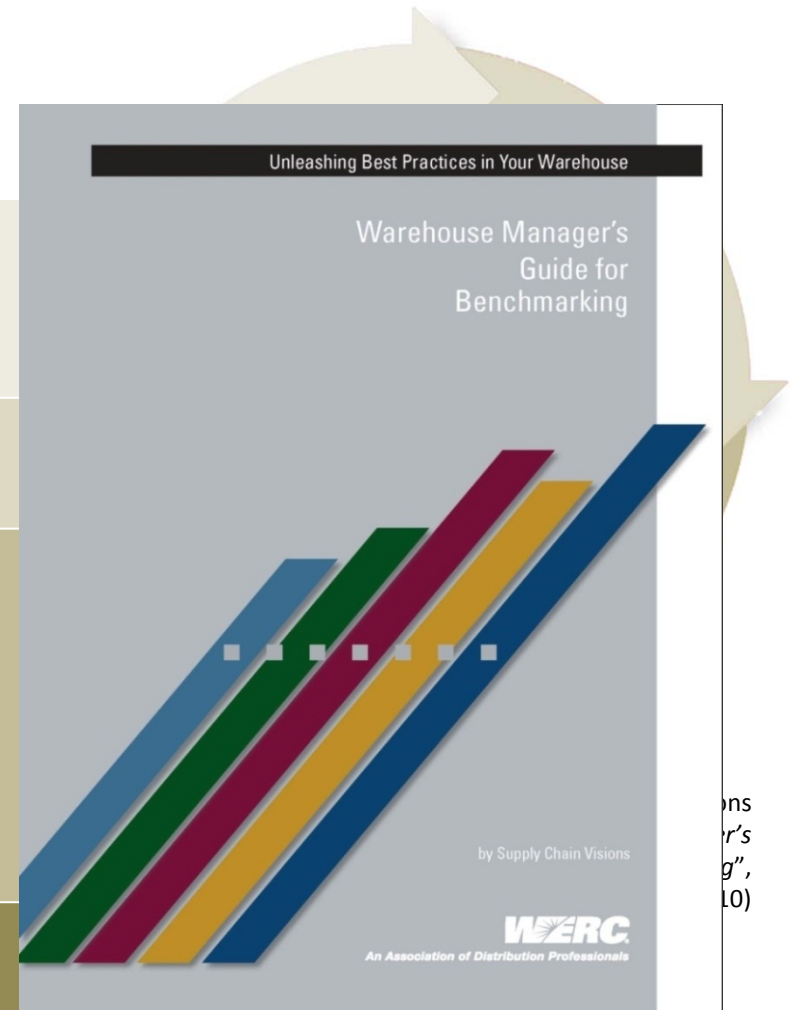
Internal Order Cycle Time (2)

Customer Metrics



Seven Steps to “Successful Benchmarking” ...

Plan	Step 1: Set benchmarking priorities
	Step 2: Identify the key processes to be assessed
Measure	Step 3: Collect data - operational and managerial
Compare	Step 4: Research and compare best-in-class performance to internal and external standards
	Step 5: Identify gaps and reasons for low performance
	Step 6: Develop an improvement roadmap and set priorities
Act	Step 7: Close gaps and improve/refine processes

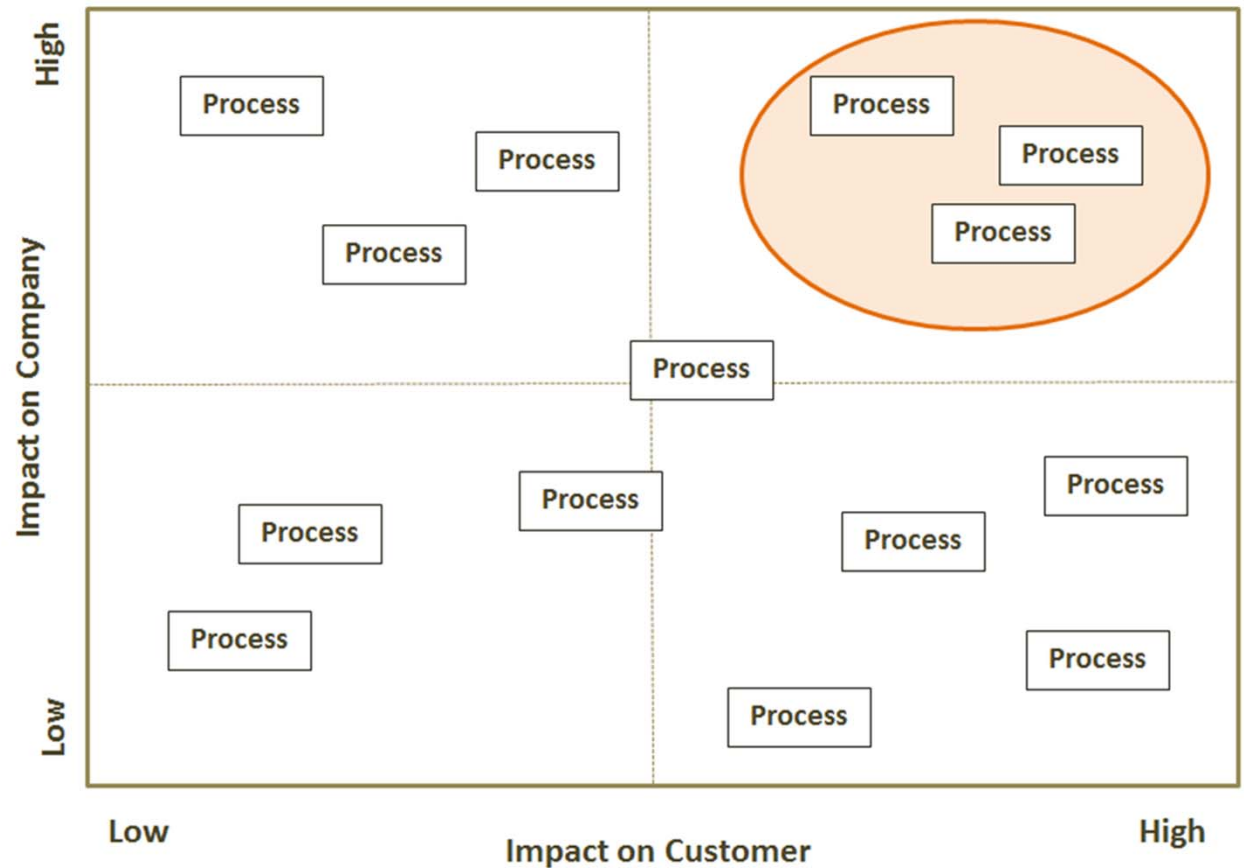


Plan – Step 1: Set Benchmarking Priorities

The best place to start is with a vision statement and values.

Plan – Step 2: Identify Key Processes

Consider narrowing down your list of what you would like to benchmark against



Measure –

Step 3: Collect Data – Operational & Managerial

- Yourself (other locations)
- Customers
- Formal benchmarking services
- Industry Associations

Measure

Trade Associations



Networks



Governments



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Compare Quantitative

Step 4: Research & Compare

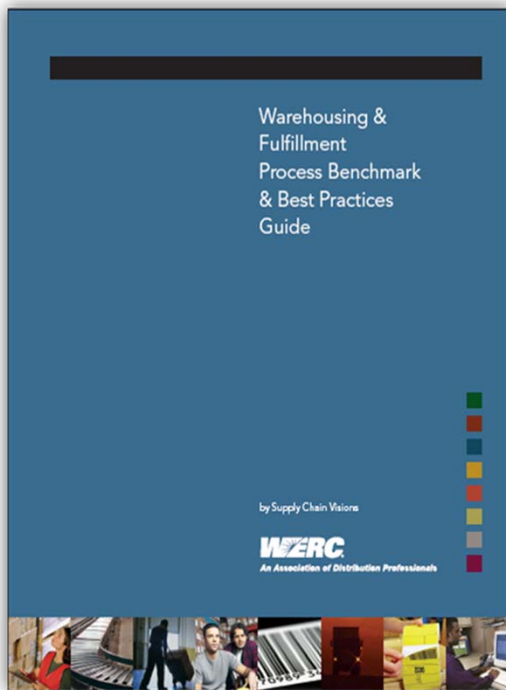
Best-in-Class Performance

2014 WERC DC Measure Report...



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Backorders as a Percent of Total Dollars/Units	Greater than 8%	≥ 2.5 and $< 8\%$	≥ 1 and $< 2.5\%$	≥ 0.012 and $< 1\%$	$< 0.012\%$	2%

Compare Qualitative



An example of this...

Receiving and Inspection – Process Benchmarks					
Process Group	Poor Practice	Inadequate Practice	Common Practice	Good Practice	Best Practice
Inspection	No inspection process at receipt	Insufficient inspection to identify non-conforming product, essentially checking for damage only.	Sufficient inspection to identify non-conforming product. Failing product is quarantined to prevent use	Sufficient inspection to identify non-conforming product which is then quarantined to prevent use or referred to suppliers within a prescribed timeframe	Inspection process results in quarantine, immediate notification to suppliers & carriers and initiates return process
Cross Docking	No process to identify or expedite products	No cross docking process Informal expediting of products	Informal process with manual lists are kept to support cross docking of products needed for current orders and replenishment,	Formal but manual process for cross-docking or immediate replenishment requirements for received product not in inventory but needed for current orders	System-enabled alerts for incoming product's immediate order requirements, creating a cross-docking or immediate replenishment task upon receipt

Compare – Step 5: Identify Gaps

With process standards you can rank selected processes against the standard and identify the process changes required to achieve the target

Receiving and Inspection – Process Benchmarks					
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Receiving and Inspection – Process Benchmarks					
Process Group	Poor Practice	Inadequate Practice	Common Practice	Good Practice	Best Practice
Rank	1	2	3	4	5
Dock Management			X		
Transactions		X			
Product Labeling	X				
Advance Ship Notice & Supplier Communication		X			
Process	X				
Inspection		X			
Cross Docking	X				
Metrics			X		
RFID	X				
Self Assessment Score Tool				16	

























- Scoring of the Receiving Inspection Process is Assessed as **Inadequate Practice**
- Review Process Attributes and Score Each Process Group

Source: WERC's "Warehouse Manager's Guide to Benchmarking", 2nd Edition (2010)

Compare

Step 5: Identify Improvement Roadmap

























Warehouse & Fulfillment: Gap Analysis

Process Rank	Gap	Poor Practice 1	Inadequate Practice 2	Common Practice 3	Good Practice 4	Best Practice 5
Receiving & Inspection						
Material Handling & Putaway						
Slotting						
Storage & Inventory Control						
Warehouse Management Systems						
Shipping & Documentation						
Picking & Packing						
Load Consolidation & Shipping						

Source: WERC's "Warehouse Manager's Guide to Benchmarking", 2nd Edition (2010)

Compare

Warehouse & Fulfillment: Road Map Rating Tool

Process	Strategic Impact	Cost/Performance Impact	Total Rating	Gap
Receiving & Inspection			6	
Material Handling & Putaway			6	
Slotting			4	
Storage & Inventory Control			5	
Warehouse Management Systems			5	
Shipping & Documentation			2	
Picking & Packing			6	
Load Consolidation & Shipping			4	



High Impact



Medium Impact



Low Impact



High Gap



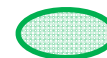
Medium Gap



Low Gap



Highest Priorities in Red



































Secondary Priorities in Green

Source: WERC's "Warehouse Manager's Guide to Benchmarking", 2nd Edition (2010)

Compare

Step 6: Identify Improvement Targets

Warehouse & Fulfillment: Gap Review

Process Rank	Gap	Poor Practice 1	Inadequate Practice 2	Common Practice 3	Good Practice 4	Best Practice 5
Receiving & Inspection						 
Material Handling & Putaway						 
Slotting						
Storage & Inventory Control						
Warehouse Management Systems						
Shipping & Documentation						
Picking & Packing						 
Load Consolidation & Shipping						

Source: WERC's "Warehouse Manager's Guide to Benchmarking", 2nd Edition (2010)
































Compare

Step 6: Identify Improvement Targets

	Twelve Key Metrics	Major Opportunity	Disadvantage	Typical	Advantage	Best in Class
Customer Metrics	On time shipments				★	
	Internal Order Cycle Time				★	
	Total Order Cycle Time				★	
Operations Metrics	Dock to Stock Cycle Time, in Hours			★		
	Fill Rate - Line					★
	Lines Received and Put Away per Hour				★	
	Percent of Supplier Orders Received Damage Free					★
	Lines Picked and Shipped Per Hour				★	
Capacity and Quality Metrics	Average warehouse capacity used				★	
	Order Picking Accuracy					
	Peak Warehouse Capacity Used				★	
Employee Metrics	Annual work force turnover			★		
	Productive hours to total hours				★	

Act – Step 7: Close Gaps

Warehouse & Fulfillment: Final Initiatives

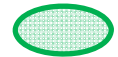
Process Rank	Gap	Poor Practice 1	Inadequate Practice 2	Common Practice 3	Good Practice 4	Best Practice 5
Receiving & Inspection						
Material Handling & Putaway						
Slotting						
Storage & Inventory Control						
Warehouse Management Systems						
Shipping & Documentation						
Picking & Packing						
Load Consolidation & Shipping						



Interim Target



Highest Priorities in Red



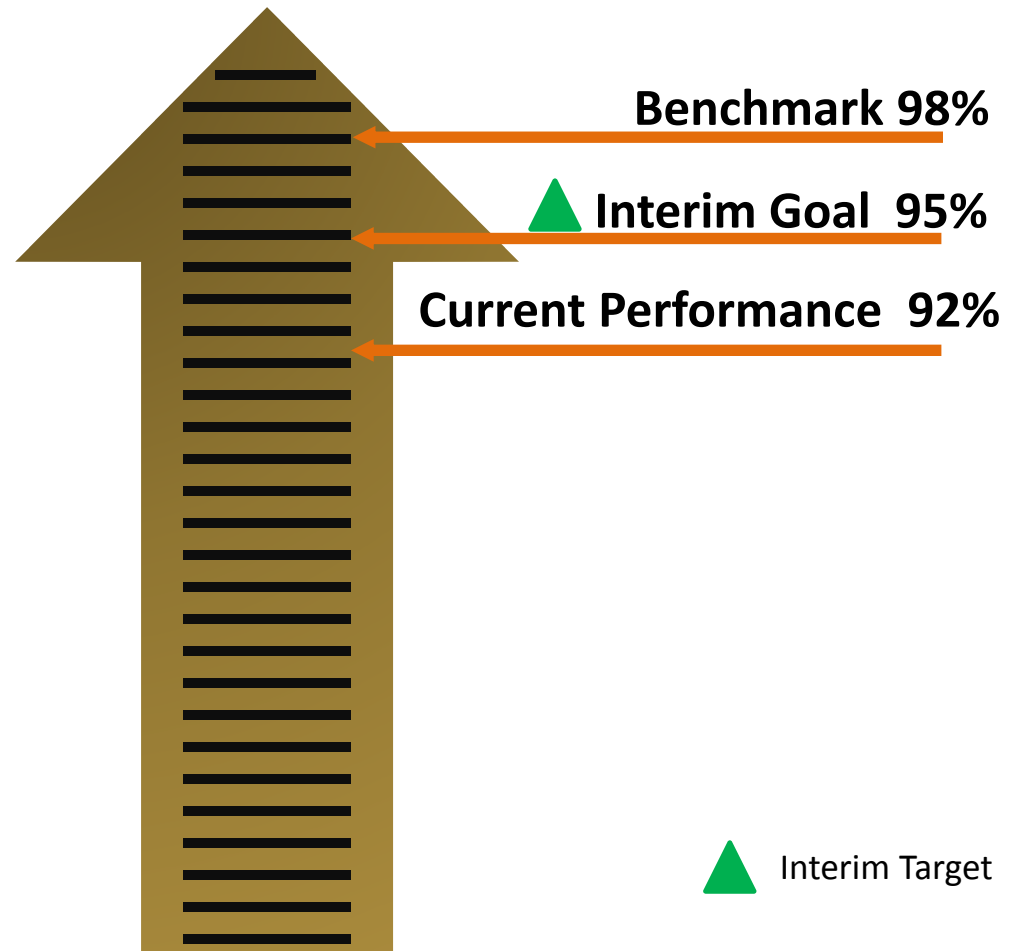
Secondary Priorities in Green

Act – Step 7: Close Gaps

Setting Targets

Half Life Theory

The half-life theory suggests that an interim goal should be selected when there is a large gap to close



Benchmarking Challenges

A study by Penn State found several key challenges among companies trying to benchmark

- ***Accurate/comparable data is the biggest barrier***
- Implementing results
- Comparable processes
- Available resources
- Standard definitions
- Clear Goals for benchmarking
- Willingness to share
- Finding the right partner
- Senior management support

WERC's Assessment & Certification Program



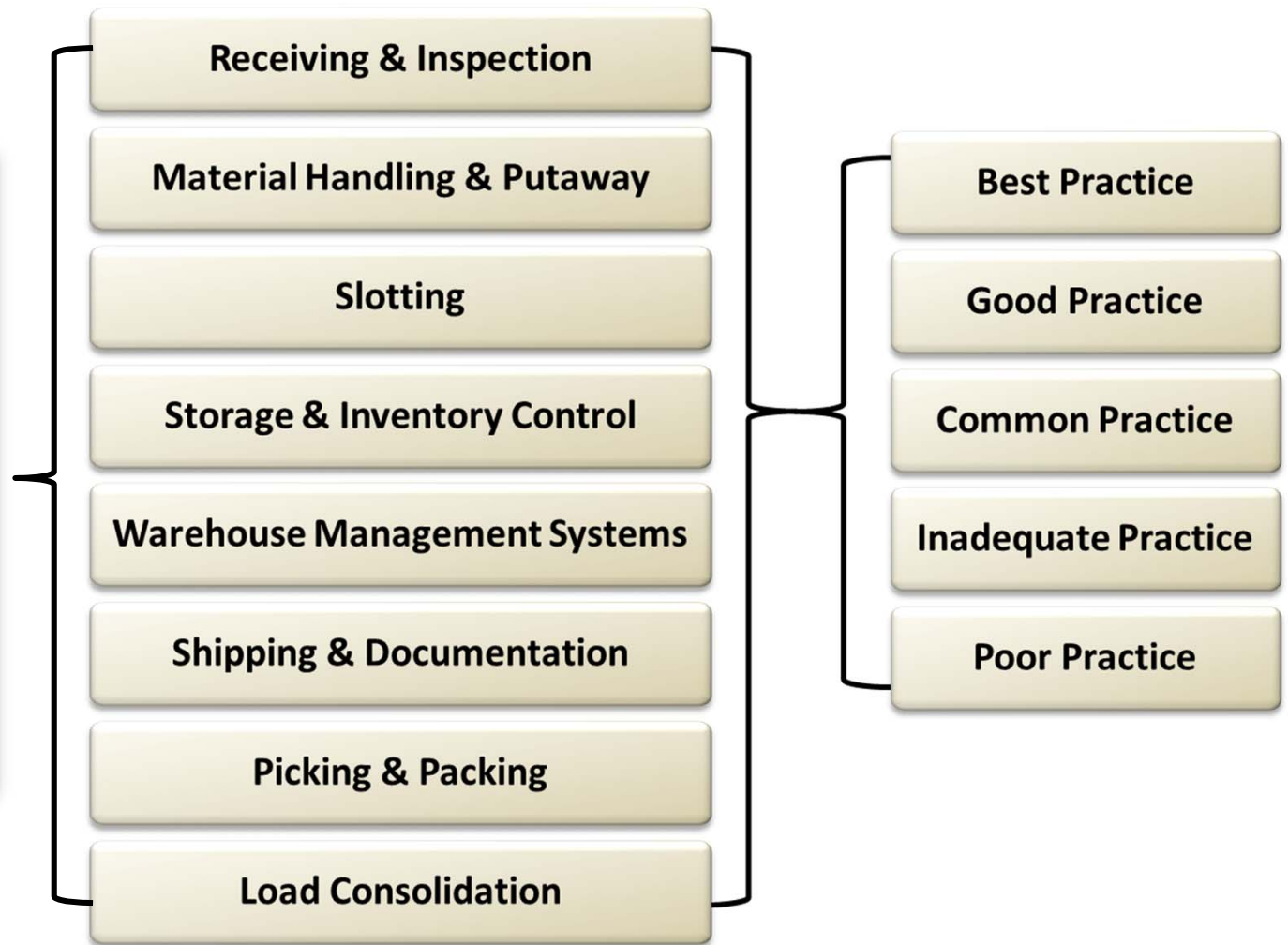
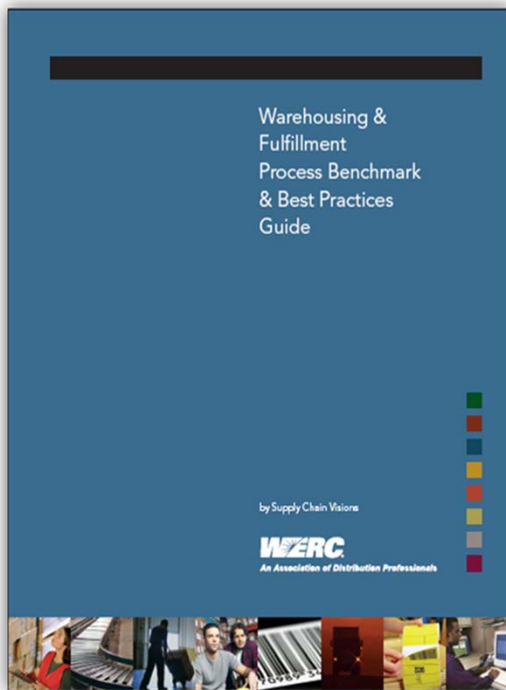
What are our challenges?



Doesn't the industry already have this?...



Compare Qualitative

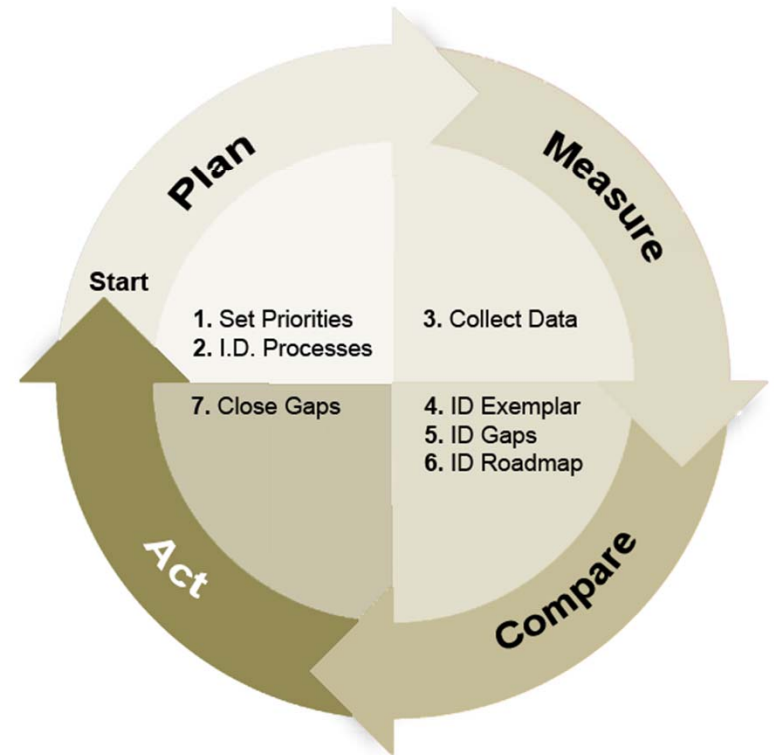


An example of this...

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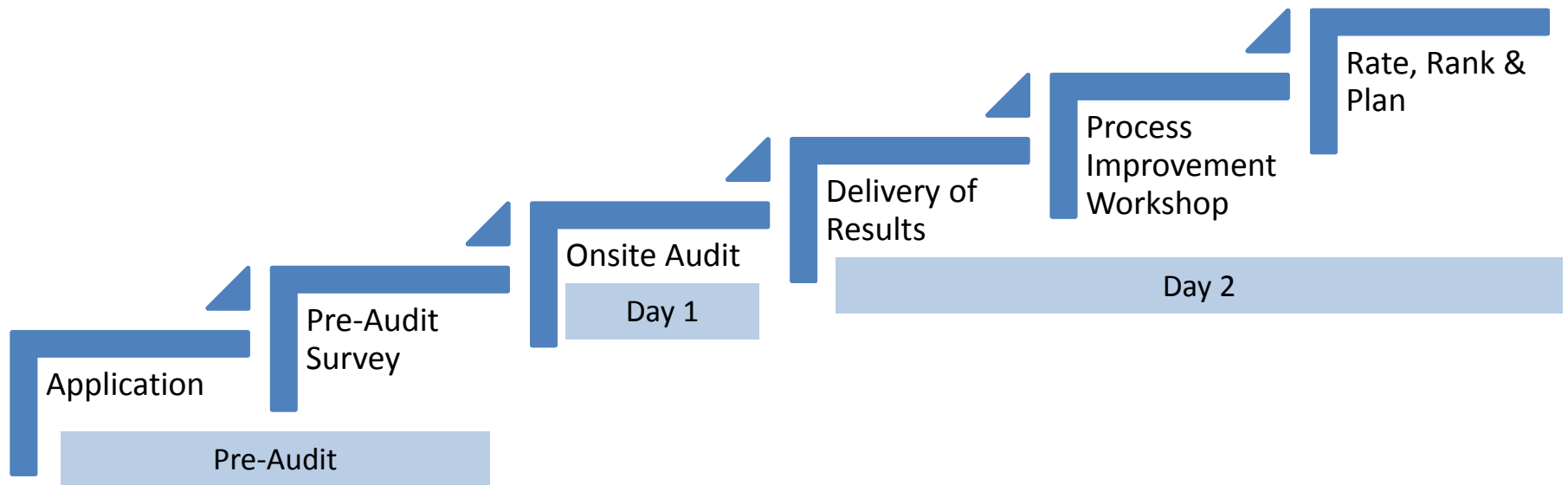
Seven Steps to “Successful Benchmarking” ...

Plan	Step 1: Set benchmarking priorities* Step 2: Identify the key processes to be assessed*
Measure	Step 3: Collect data - operational and managerial*
Compare	Step 4: Research and compare best-in-class performance to internal and external standards* Step 5: Identify gaps and reasons for low performance* Step 6: Develop an improvement roadmap and <u>set priorities</u> *
Act	Step 7: Close gaps and improve/refine processes



© Supply Chain Visions
 Source: WERC's "Warehouse Manager's
 Guide to Benchmarking",
 2nd Edition (2010)

Assessment & Certification Process...



Delivery of Results

- ✓ Process-by-Process review of the findings & observations.
- ✓ A review of the “3-Wishes.”

Process Attribute Assessment Material Handling & Putaway



Put-away				
Poor Practice	Bad Practice	Common Practice	Good Practice	Best Practice
• No defined putaway process	• Manually selected putaway locations	• WMS selects putaway locations based on system defined criteria	• WMS selected putaway locations to optimize open locations based on cube and weight	• System dynamically selects putaway locations, based on cube, wt., product velocity and minimizing travel time
WMS provides guidance for zone only, operators find and select open locations, place goods and record via scan. CONSIDER: Setup PKMS to track rack bay usage and dynamically assign put-away locations.			Audited Score	3
			Minimum Acceptable	3

Delivery of Results

	Comparable Base Scores Gap Analysis				
Process Group	Below Minimum	Needs Attention	Meets Standard	Good Practice	Best Practice
Receiving & Inspection	13.0	25.5	38.0	48.3	58.5
Material Handling & Putaway	14.0	28.0	42.0	52.5	63.0
Slotting	9.0	18.0	27.0	33.8	40.5
Storage & Inventory Control	16.0	31.5	47.0	59.5	72.0
Picking & Packing	16.0	32.5	49.0	60.5	72.0
Load Consolidation & Shipping	18.0	33.5	49.0	65.0	81.0
Shipping Documentation	10.0	20.0	30.0	37.5	45.0
Warehouse Management System	18.0	33.0	48.0	64.5	81.0

Process Improvement Workshop

- ✓ An overview of the 7 Step Benchmarking & Road Mapping Model

Act – Step 7: Close Gaps

Warehouse & Fulfillment: Final Initiatives

Process Rank	Gap	Poor Practice 1	Inadequate Practice 2	Common Practice 3	Good
Receiving & Inspection	Red		Orange		
Material Handling & Putaway	Red		Orange		
Slotting	Yellow			Orange	
Storage & Inventory Control	Red	Orange			
Warehouse Management Systems	Yellow			Orange	
Shipping & Documentation	Red		Orange		
Picking & Packing	Green				
Load Consolidation & Shipping	Red		Orange		

Interim Target Highest Priorities in Red Secondary Priorities in Green



Compare – Step 5: Identify Gaps

With process standards
Rank selected
against the
and identify the
changes required

Receiving and Inspection – Process Benchmarks					
Process Group	Poor Practice	Inadequate Practice	Common Practice	Good Practice	Best Practice
Inspection	No inspection process at	Insufficient inspection to identify non-conforming product	Sufficient inspection to identify non-conforming product. Failing	Sufficient inspection to identify non-conforming product which is then quarantined to	Inspection process results in quarantine, immediate notification to

Compare

Warehouse & Fulfillment: Road Map Rating Tool

Process	Strategic Impact	Cost/Performance Impact	Total Rating	Gap
Receiving & Inspection	High Impact	High Impact	6	High Gap
Material Handling & Putaway	High Impact	High Impact	6	High Gap
Slotting	Medium Impact	Medium Impact	4	Medium Gap
Storage & Inventory Control	Medium Impact	High Impact	5	High Gap
Warehouse Management Systems	Medium Impact	High Impact	5	Medium Gap
Shipping & Documentation	Low Impact	Low Impact	2	High Gap
Picking & Packing	High Impact	High Impact	6	Low Gap
Load Consolidation & Shipping	Medium Impact	Medium Impact	4	High Gap

High Impact Medium Impact Low Impact High Gap Medium Gap Low Gap Highest Priorities in Red Secondary Priorities in Green

Source: WERC's "Warehouse Manager's Guide to Benchmarking", 2nd Edition (2010)

Rate, Rank & Plan

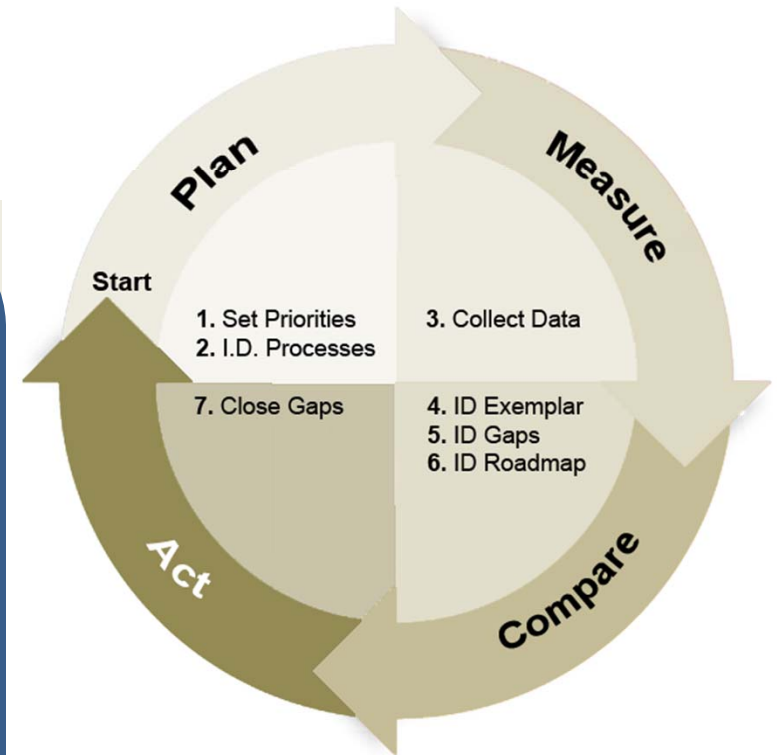
- ✓ An exercise to rate and rank the potential improvements based on strategic importance, value and cost.
- ✓ The creation of an action item list with assigned responsibilities for further research, development and implementation of improvements.

Opportunities Resulting from Warehouse Audit Meetings	
Item Number	
Rank or Priority	
Opportunity Name	
Detailed Description of Opportunity	
Describe Benefit of Taking Action	
Describe Potential Risks	
Potential Value:	
Direct Savings	
Other Factors	
Estimated Cost to Implement	
Time Required to Implement	
Strategic Value (1-3)	
Cost Impact (!-3)	
Perceived GAP (1-5)	
Owners:	
Enablers	
Individuals	
Processes	
Technology	

Opportunities Resulting from Warehouse Audit Meetings																
Item	Rank	Opportunity Name	Detailed Description of Opportunity	Benefit Description	Risk Description	Potential Value		Estimated Cost	Time to Implement	Value Level (1-3)		GAP (1-5)	Owners	Enablers		
						Direct Savings	Other Factors			Strategic	Cost			Individuals	Processes	Tech
1		Reduce time required to verify items delivered														
2		Production should have product ready for shipment at time of picking														
3		Improved equipment used in receiving (forklifts, scanners, etc.)														
4		Provide additional space to work on receiving products														
5		Capability to use serialized "License Plates" for each pallet														
6		Improve process of assigning products to locations during receiving & putaway														

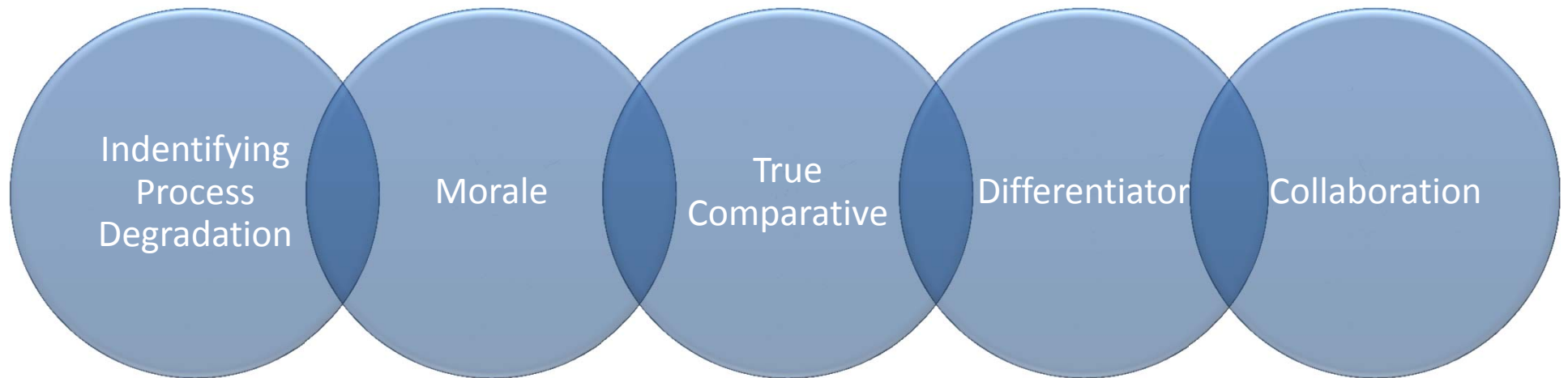
Seven Steps to “Successful Benchmarking” ...

Plan	Step 1: Set benchmarking priorities
	Step 2: Identify the key processes to be assessed
Measure	Step 3: Collect data - operational and managerial
Compare	Step 4: Research and compare best-in-class performance to internal and external standards
	Step 5: Identify gaps and reasons for low performance
	Step 6: Develop an improvement roadmap and set priorities
Act	Step 7: Close gaps and improve/refine processes



© Supply Chain Visions
 Source: WERC's "Warehouse Manager's
 Guide to Benchmarking",
 2nd Edition (2010)

Benefits beyond what you can see...



Who has it...



- APL Logistics (Colgate-Palmolive Co.)*
- Aquarius – Grupo SID (CP)*
- Colgate-Palmolive Co.(13)*
- DHL (Unilever & CP)*
- FCC Logistic – Spain (CP)*
- FM Logistic – Poland (CP)*
- Frode Laursen – Denmark (CP)*
- GE Industrial*
- Hunter Fan Company
- Ingersoll Rand/Trane (2)
- Kenco (Whirlpool)*
- LEGACY Supply Chain Services (GE Industrial)*
- Nexus Distribution CDC
- OHL (Starbucks Coffee Company*) (3)
- Scholastic National Service Organization
- Starbucks Coffee Company (5)*
- Swagelok OFC Component Warehouse
- Trojan Battery Company
- Unilever*
- Whirlpool (2)*
- Zimag Logistics (CP)*

**Facility Certification pursued jointly by customer and logistics service provider*

Resources...

www.werc.org/metrics

- The 2014 Conference Presentation
- Link to the 2014 DC Measure Study

The screenshot shows the WERC website with a navigation bar including links for Membership, Learning Center, Resource Center, Events, WERCouncils, About, and Store. The main content area features the title '2014 - Metrics in the DC - Annual Study' and a sub-header 'Metrics in the DC - Annual Metric Study'. Below this, a paragraph explains that each year, WERC members and DC Velocity readers identify the most critical metrics used in their DCs. A list of sponsors includes Joseph Tillman, Karl B. Manrodt, and Donnie F. Williams, Jr. A section titled 'Metrics That Matter' shows a Newton's cradle and the text 'Results of the Annual Metrics Study'. At the bottom, there is a link to download a whitepaper titled 'Visual Metrics - The Executive Insight into the Competitive Landscape'.

www.werc.org/facility_cert

- Resources

The screenshot shows the WERC website with a navigation bar including links for Membership, Learning Center, Resource Center, Events, WERCouncils, About, and Store. The main content area features the title 'WAREC Resources for Assessment and Certification Program'. Below this, there are two sections. The first section is titled 'Warehousing and Fulfillment Process Benchmark & Best Practices' and includes a description of the program, member and non-member prices, and a note about a complimentary copy. The second section is titled 'Warehouse Manager's Guide For Benchmarking' and includes a description of the guide, member and non-member prices, and a note about a complimentary copy.

WAREHOUSING EDUCATION AND RESEARCH COUNCIL



THE ASSOCIATION FOR LOGISTICS PROFESSIONALS

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