

**THE  
WORK  
TRUCK  
SHOW**

**NTEA**  
THE ASSOCIATION FOR THE WORK TRUCK INDUSTRY

# Fleet Management 101

An Introduction to Key Principles,  
Concepts, Strategies, and  
Techniques – **Part 1**

Indianapolis, IN  
March 14, 2017

**MERCURY**

# On the Agenda



## Introductions

9:00 – 9:10

Fleet Management: An Overview

9:10 – 9:20

The Science of Fleet Management

9:20 – 9:30

Key Concepts in Fleet Management

9:30 – 9:45

Fleet Management Policies &  
Procedures

9:45 – 10:00

Driving Accountability

10:00 – 10:30

## Break

10:30 – 10:45

# On the Agenda



## Break

10:30 – 10:45

Organizational and Process  
Improvement

10:45 – 11:00

Preventive Maintenance

11:00 – 11:30

PM Training

11:30 – 12:00

## Lunch

12:00 – 1:00

Maintenance and Repair

1:00 – 1:40

Performance Measurement

1:40 – 2:45

## Break

2:45 – 3:00

# On the Agenda



## Break

2:45 – 3:00

Managing Fleet Replacement

3:00 – 3:30

Fleet Data Sources and Processing  
Tools

3:40 – 3:50

Strategies for Reducing Fleet Costs

3:50 – 4:00

Key Trends in Fleet Management

TBD

## Adjournment

4:00



# About the Instructors

## Tony Yankovich



- More than 28 years' experience in the fleet industry
  - 12 years as asset manager for 1,200 unit fleet
  - 17 years as fleet management consultant
- Directed, managed or participated in over 225 fleet studies across North America

## Steve Saltzgiver



- More than 40 years' experience as a fleet maintenance technician, local and state government (Utah and Georgia), and corporate (Coca-Cola and Republic Services) fleet manager and fleet management consultant
- Successfully transitioned from wrench tuner to manager of a \$1.5 billion (annual capital and operating budget), 50,000-unit fleet

# About Mercury Associates, Inc.

- Largest dedicated fleet management consulting company in North America
- More than 600 clients served, with fleets of <100 to >200,000 vehicles and pieces of equipment
- Company's mission is to help organizations improve fleet management practices, improve fleet performance, and reduce fleet costs



# Key Mercury Associates Services

- Fleet Management Best Practices Studies
- Fleet Management Program Consolidation and Organizational Restructuring Studies
- Fleet Cost Analysis, Reduction, and Containment Studies
- Fleet Utilization, Optimization, and Rightsizing Studies
- Fleet Management Information System Requirements Definition, Acquisition, Implementation, Hosting
- Outsourcing Feasibility Studies

# Key Mercury Associates Services

- Development of Requirements, Specifications, and Tenders – Vehicles, Services, Information Systems
- Supplier Selection, Contract Negotiation, and Performance Reviews
- Determination of Optimal Vehicle Replacement Cycles
- Evaluation of Lease versus Buy and other Capital Financing Strategies
- Financial Audits of Fleet Leasing Company and other Supplier Invoices
- Management Training



# Sample Mercury Associates, Inc. Clients

## Corporate

- 3M
- Air Products
- Aramark
- BP
- Bell Canada
- BNSF Railway
- Danella
- GlaxoSmithKline
- Honeywell
- Intel
- Johnson Controls
- Pacific Gas & Electric
- Pfizer
- Quanta Services
- Rockwell-Collins
- Schindler Elevator
- Toyota

## Commercial

- Alyeska Pipeline Service Company
- British Columbia Hydro
- Carolinas HealthCare System
- Coinmach Services
- Flint Hills Resources
- Georgia Power Company
- Goodwill Industries
- Gulf Stream Marine
- Hoosier Energy
- Horizon Utilities
- Hunt Brothers Pizza
- Laidlaw
- Lancaster Foods
- Lighting Maintenance, Inc.
- Terra Renewal
- Whiting Oil & Gas

## Government/Other

- US Army, Navy, Air Force, Marine Corps
- US departments of Agriculture, Defense, Energy, Homeland Security, Interior, Labor, State, Veterans Affairs
- US Postal Service
- Smithsonian Institution; NASA
- Canada Post
- United Nations
- LDS Church
- RAND Corporation
- Transportation Research Board
- 33 of 50 largest cities in the US, including 10 largest;
- 3 of 5 largest cities in Canada
- 35+ state and provincial governments
- 40+ colleges and universities

# Workshop Objectives

- Learn about key fleet management principles, trends, and best practices – not all of which are equally applicable to every fleet owner
- Learn to think about fleet management as a complex, multidisciplinary, and interdependent set of activities
- Learn to think about fleet management in a structured, proactive, and scientific fashion
- Learn about the importance of using objective, quantitative data to perform fleet management activities efficiently and effectively

# Keys to the Success of this Workshop for You

- Think about the relevance of the concepts, strategies, and techniques presented here to the industry and the particular part of the organization in which you work
- Think about who in your organization needs to understand and support the elements of an effective fleet management program

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# Fleet Management: An Overview



# Evolution of Vehicles



1880's  
Karl Benz

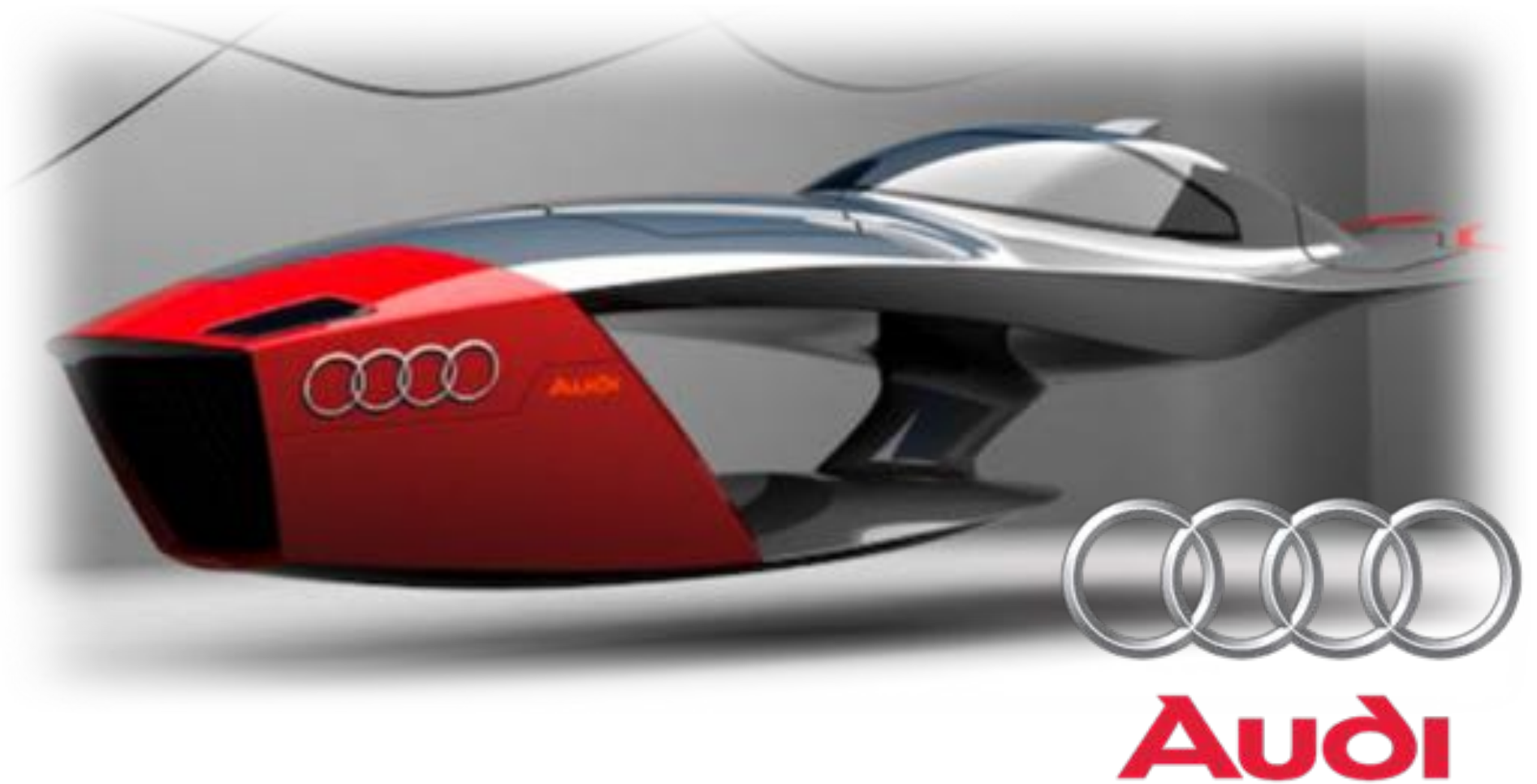


# Evolution of Vehicles



Ford GT

# Evolution of Vehicles



# Evolution of Fleet Management

File It



Analysis



Big Data



Then

and

Now



Wrench & Return




FMIS



Telematics



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# The Science of Fleet Management

# What is a “scientific” approach to the management of anything?

## *Scientific* (definition)

- Something that is done in an **organized** way that agrees with the methods and principles of science

## *Science* (definition)

- The state of knowing; **knowledge** as distinguished from ignorance or misunderstanding
- A department of **systematized** knowledge as an object of study
- Knowledge or a **system** of knowledge covering general truths or the operation of general laws, especially as obtained and tested through scientific method

## *Scientific Method* (definition)

- Principles and procedures for the **systematic** pursuit of knowledge involving the recognition and formulation of a problem, the collection of data through observation and experiment, and the formulation and testing of hypotheses



# More Definitions

## Strategy

- Defines your long-term goals and how you are planning to achieve them

## Tactics

- Identifies the specific steps required to attain your strategy

### Strategy

Future  
Planning  
Large Scale  
Why  
Long Duration

### Tactic

Immediate  
Doing  
Smaller Scale  
How  
Short Duration

*“Strategy without tactics is the slowest route to victory. Tactics without strategy is the noise before defeat.”*

*Sun Tzu in “The Art of War”  
5<sup>th</sup> century BC*

Many organizations do not approach fleet management in a scientific fashion because...

...the **goals** of fleet management activities are not clear or well understood.

The goals of any fleet management program are to furnish assets that are:

1. Suitable
2. Available
3. Reliable
4. Safe
5. Economical
6. Sustainable

Different stakeholders may view the importance of these goals very differently from one another

Many organizations do not approach fleet management in a scientific fashion because...

... there is insufficient appreciation of the **complexity** of fleet management activities



# Fleet management is complicated because...

- Managing a fleet involves the performance of two distinct, but interdependent, types of activities:
  - Asset management activities
  - Enterprise management activities
- Performing these activities requires different types of knowledge and skills and many individuals who are skilled in one area are not skilled in the other
- Responsibility for performing these activities usually is fragmented, with different employees and/or organizational units responsible for different “pieces of the puzzle”
- Many enterprise management activities are designed and conducted to manage an entire enterprise, not just a fleet; enterprise-wide goals and associated management policies and procedures are not always aligned with the demands of effective fleet management

# Asset Management Activities





# Enterprise Management Activities



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# Key Concepts in Fleet Management

# Vehicle Statistical Referencing System





# Workload



# Workforce





# Workplace



# VSRS



## 1.0 VEU

- 100 sedans
- 100 VEUs
- 1,200 hours
- 0.9 technicians



## 4.0 VEUs

- 100 dumps
- 400 VEUs
- 4,800 hours
- 3.6 technicians



## 5.5 VEUs

- 100 sewer trks
- 550 VEUs
- 6,600 hours
- 4.9 technicians

# Sample

- Fleet = 500 assets
- VEU = 1,100
- Hours per VEU = 12 direct labor hours per year
- Direct labor hours required = 13,200/yr
- Technician productivity target = 1,450 hours/yr
- Technicians required = 9.1
- Maintenance bays required = 14
- Shop supervisors required = 1
- Parts clerks required = 1
- Fleet manager = 1
- Support analyst = 1



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# Fleet Management Policies and Procedures

# Documented policies and procedures are important for...

- Ensuring that all the elements required to perform a particular fleet management activity effectively and efficiently are identified and understood
- Uncovering deficiencies in current practices
- “Institutionalizing” knowledge and maintaining sound practices despite employee turnover
- Demonstrating professionalism and commitment to high-quality performance to management and customers



# Potential Depth and Breadth of Fleet Management Policies and Procedures

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# Lifecycle of a Policy & Procedure





# Summary: Key Attributes of a Scientific Approach to Fleet Management

- Clear understanding of goals and objectives
- Recognition of fleet management as a complex set of principles, policies, and processes that need to be applied/practiced in a systematic fashion
- Structured, data-driven goal and policy setting, forecasting, planning, and decision making methodologies
- Formally defined (documented) policies and procedures for performing all key asset management activities and for leveraging/influencing pertinent enterprise management practices

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# Driving Accountability (RACI)

# RACI Discussion

Responsibility, Accountability, Consult and Inform

- There was an important job to be done and *EVERYBODY* was asked to do it .....
- *EVERYBODY* was sure that *SOMEBODY* would do it .....

# RACI Discussion

Responsibility, Accountability, Consult and Inform

- ANYBODY could have done it, but NOBODY did it!
- SOMEBODY got angry about that, because it was EVERYBODY's job!



# RACI Discussion

Responsibility, Accountability, Consult and Inform

EVERYBODY thought

ANYBODY could do it, but

NOBODY realized that

EVERYBODY wouldn't do it

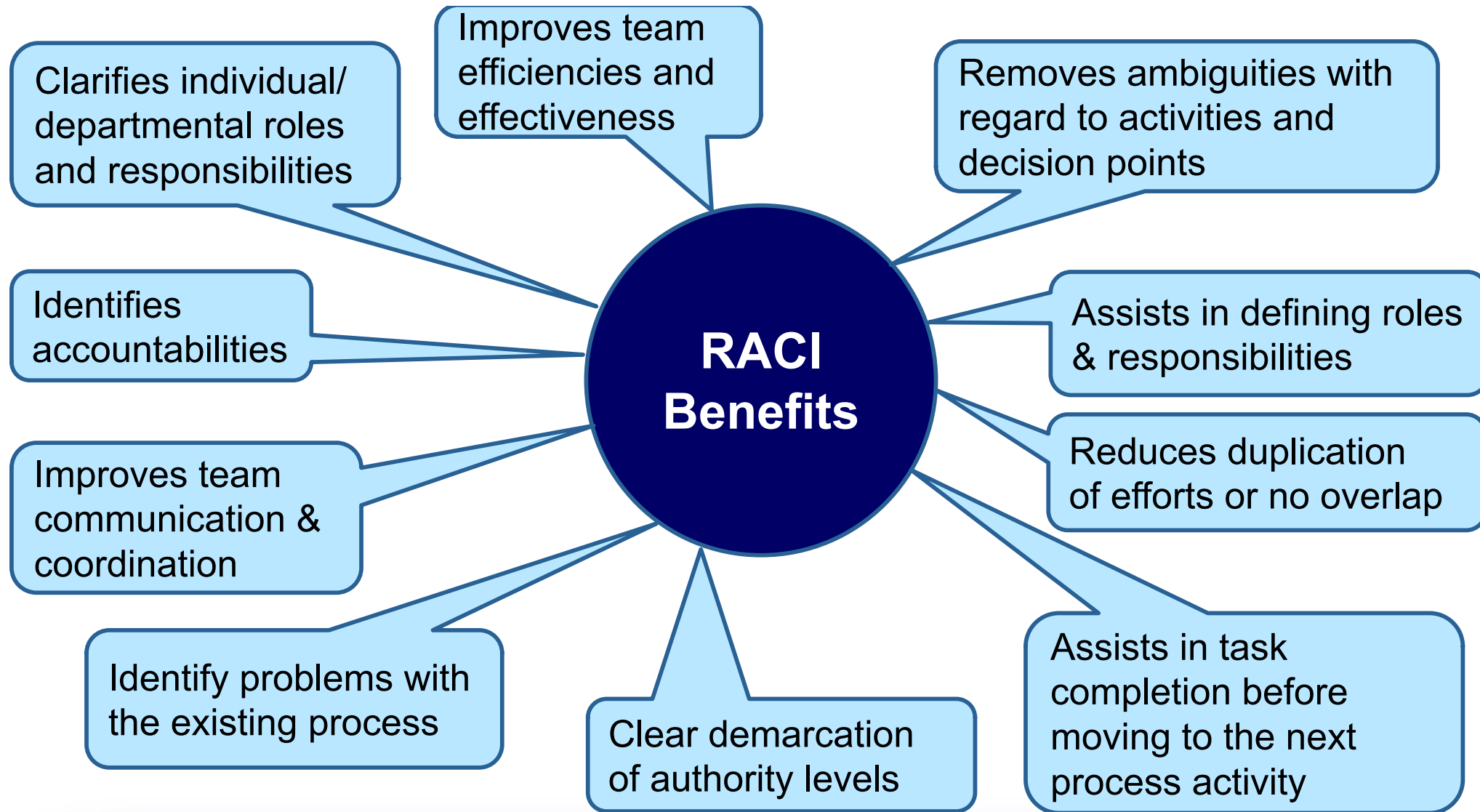
# RACI Discussion

Responsibility, Accountability, Consult and Inform

- It ended up that EVERYBODY Blamed SOMEBODY when
- ANYBODY could of done what NOBODY did .....

# RACI Discussion

Responsibility, Accountability, Consult and Inform



# RACI Discussion

Responsibility, Accountability, Consult and Inform

## Responsible

- These are the individuals who actually complete the task or activity and are responsible for action and / or implementation.
- Responsibility is often shared, with each individual's degree of responsibility determined by the individual with the "A"



# RACI Discussion

Responsibility, Accountability, Consult and Inform

## Accountable

- This is the individual who carries the “yes” or “no” authority and has full veto power for an activity.
- ***Only one “A” can be assigned to a task or activity*** and authority must accompany accountability.

# RACI Discussion

Responsibility, Accountability, Consult and Inform

## Consult

- These are the individuals who must be consulted prior to a final decision or action. “Consult” implies two way communication.

# RACI Discussion

Responsibility, Accountability, Consult and Inform

## Inform

- These are the individuals who need to be informed after a decision or action is taken because they, in turn, may take action or make a decision based on the output.
- “***Inform***” is FYI and implies only one-way communication.

# RACI Discussion

Responsibility, Accountability, Consult and Inform

## RACI Asset Management

Activities	Asset Manager	Asset Analyst	Fleet Manager	Fleet Supervisor	Compliance Manager	Director Fleet Operations	Fixed Assets	Asset Supervisor	Director Procurement	Fleet Capital PMO	Operations Leadership
New Assets - "How"/"Who"	A	R	C				I		C	C	C
New Asset- "Implementation"	A	I	R								C
Identify New Assets Types - "What"	R								I	A	C
Replace Assets - "How"/"Who"	A	R	C				I			C I	C I
Replace Assets - "What"	A	R	C				I		I	C	C
Replacement Asset - "Implementation"	A	I	R								C
Transfer Assets - "What"	A	R	C				I		I	C	I
Transfer Assets - "How"/"Who"	A	R	C				I				C
Transfer Assets - "Implementation"	A		R								C
Dispose Assets - "What"	A	R	C				I				I
Dispose Assets - "How"/"Who"	A	R	C	C			I				I



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# Organizational and Process Improvement

*Operational Excellence Lean management, and  
Six Sigma concepts*

# Operational Excellence

The 8 Wastes – “SPELL DOWNTIME”

*DOWN TIME* are the two worst 4 letter words  
in Fleet

# Objectives

- To establish a common language for continuous improvement in YOUR Organization
- To establish a general understanding of 'waste', from an Operational Excellence perspective
- To provide an opportunity to identify wastes from a personal perspective



# Definitions

- **Waste**

- Those elements of our system for which the customer is not willing to pay
- System inconsistency, variation, stress, & strain

- **Customer**

- Companies which purchase our products or services for sale (including consignment)
- Our valued consumer base
- Each downstream process within our system



- **There are 8 kinds of waste...**

Common  
Language



# The 8 Wastes



# DOWNTIME: The 8 Wastes, explained...

Waste	Organization	Support Environments
Defects	Waste related to poor quality, including creating, finding, recording, and fixing defects	Waste related to mistakes and missed expectations
Overproduction	Producing more product than needed for immediate consumption or customer requirements	Performing tasks earlier than needed, pulling resources from higher priorities
Waiting	Product, people, or machines delayed due to earlier processes	System elements which cannot perform tasks, due to upstream considerations
Not Tapping Potential	Waste due to not fully utilizing resources available, including human intellect	Waste related to resisting new ways of thinking or performing functions
Transportation	Waste related to physical movement of product to different locations	Waste related to moving physical or virtual elements across locations
Inventory	Waste related to storing product without specific, current requirements	Collecting physical or virtual elements, without actual/immediate need
Motion	Waste related to movement of people or equipment within a task	Waste related to poor ergonomics, or movement within the 'envelope' of the body
Excess Processing	Waste related to not understanding actual customer requirements	Performing tasks & functions with greater depth than actually required for the purpose at hand

# Waste #1: Defects

This is waste related to poor quality and missed expectations, such as:

- Input errors
- Creating defects
- Routing defects
- Finding defects
- Correcting defects
- Recording defects
- Reporting defects

## Examples in SUPPORT SYSTEMS :

- Errors in master data
- Wrong information submitted
- Misunderstood communications
- System crashes



# Waste #2: Overproduction

This is waste related to producing too much or too early, such as:

- Over-ordering
- Early scheduling
- Producing more product/services than is required for immediate consumption

## Examples in SUPPORT SYSTEMS :

- Preparing reports too early  
(information changes!)
- Purchasing travel too far in advance  
(plans change!)
- Ordering & storing years worth of Parts inventory





# Waste #3: Waiting

This is waste due to unbalanced processes, such as:

- People waiting for processes to finish
- Processes waiting for the previous process to complete
- Product waiting for the rest of the batch to be completed
- Anything which should be 'flowing' but is standing still

## Examples:

- Waiting for work assignments
- Waiting for meetings to start
- Waiting for Parts to install
- Waiting for signatures



# Waste #4: Not Tapping Potential

Waste due to misuse of human potential & resistance to change, such as:

- Not utilizing human potential
- Not soliciting and using the ideas of others
- Not engaging people in the change process
- General resistance to change

## Examples in, SHOPS environments:

- Not using outside resources
- Squashing the ideas of new teammates
- Performing tasks ‘your way’  
(not utilizing the approved Standardized Work)
- Not developing your people  
(or yourself!) for future opportunities



# Waste #5: Transportation

This is waste due to movement between processes, such as:

- People and product moving between workstations
- People and product moving within work areas
- Movement of product between functional areas

## Examples in SUPPORT SYSTEMS :

- Traveling to remote meetings
- Moving paper around the system
- Moving electronic information around the system



# Waste #6: Inventory

This is waste related to materials and product in excess of immediate requirements, such as:

- Raw materials
- WIP (work-in-process)
- Finished goods

## Examples in SUPPORT SYSTEMS :

- Office supplies
- Historical report copies
- Email
- Computer/desktop files



# Waste #7: Motion

This is waste related to ergonomics and movement within tasks, such as:

- Hand and arm motion
- Machine stroke/cycle
- Control movement on equipment

## Examples in SUPPORT SYSTEMS :

- Repetitive motion can result in 'carpal tunnel' syndrome
- Activities which promote poor posture can increase stress, risk of injury
- Repetitive motion adds time to tasks





# Waste #8: Excess Processing

This is waste related to misunderstanding customer requirements, such as:

- Cleaning in excess of requirements (and re-cleaning)
- Inspections
- Moving product, then moving again
- Generating trash
- Other non-value-added steps

## Examples in SUPPORT SYSTEMS :

- Signature requirements for minor purchases
- Inspections
- Auto-generated reports



# Which is the 'Worst' Waste?



Depending on where you are in the process, some wastes affect you more than others.

In the **value chain**, OVERPRODUCTION is generally seen as the 'worst' waste, because it can be the root cause all of the other wastes.

In **support functions**, EXCESS PROCESSING is generally seen as the 'worst' waste.

REMEMBER, all 8 wastes exist in every process, to one degree or another!

# How to Use the Concept of 8 Wastes

- As a Leader:
  - Challenge your teams to continually identify waste
  - Empower project and workshop teams to redesign processes to eliminate wastes from systems
- As a Team Member:
  - Question everything!
  - Point out waste at every opportunity!



# Summary

- *Customers* define value as those elements for which they are willing to pay
- If you question whether or not something adds value, ask, “Would our customer want *more* of it?”
- Waste includes all those system elements for which the customer would rather not pay
- There are 8 kinds of waste:
- Eliminating waste is everyone's responsibility



Defects  
Over-production  
Waiting  
Not tapping potential  
Transportation  
Inventory  
Motion  
Excess processing



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# Preventive Maintenance

*The single most important key to  
successful fleet management and  
performance*



# Review Current PM Program

- Plans and procedures:
  - Review written procedures for vehicles and equipment; and
  - Review OEM technical manuals and literature
  - Review training records and technician training strategy
  - Review shop layout and parts inventory operations

# Review Current PM Program

- Gap Analysis of Current PM Program:
  - Meet with management team and key stakeholders (including technicians and supervisors) to determine program goals and expectations; and
  - Identify current program strengths and weaknesses and review opportunities using Mercury's vast industry knowledge of what should be included in a "Best in Class" PM program

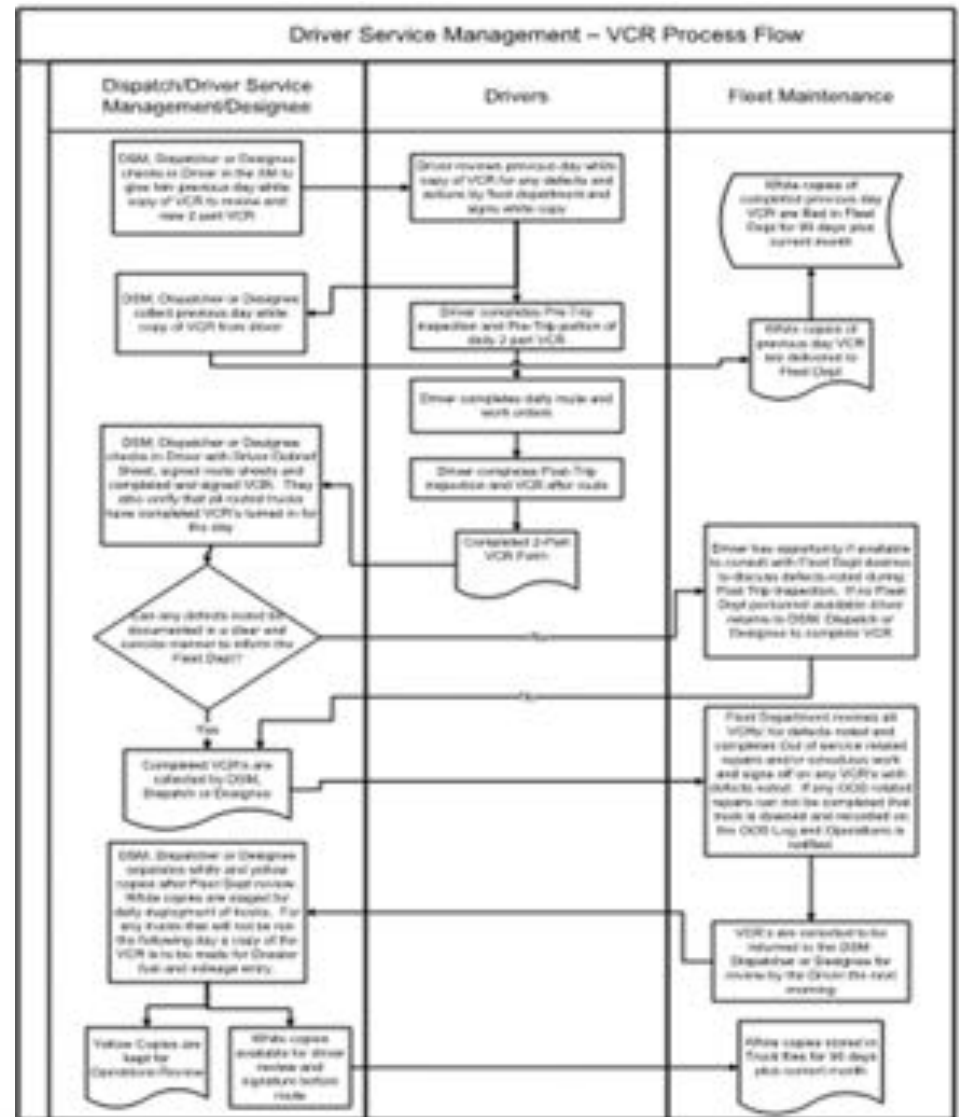
# Establishing PM Policies and Procedures

- Regulatory compliant
- Sets comprehensive standards
- Team trained to standards
- Dynamic
- Acknowledged by personnel

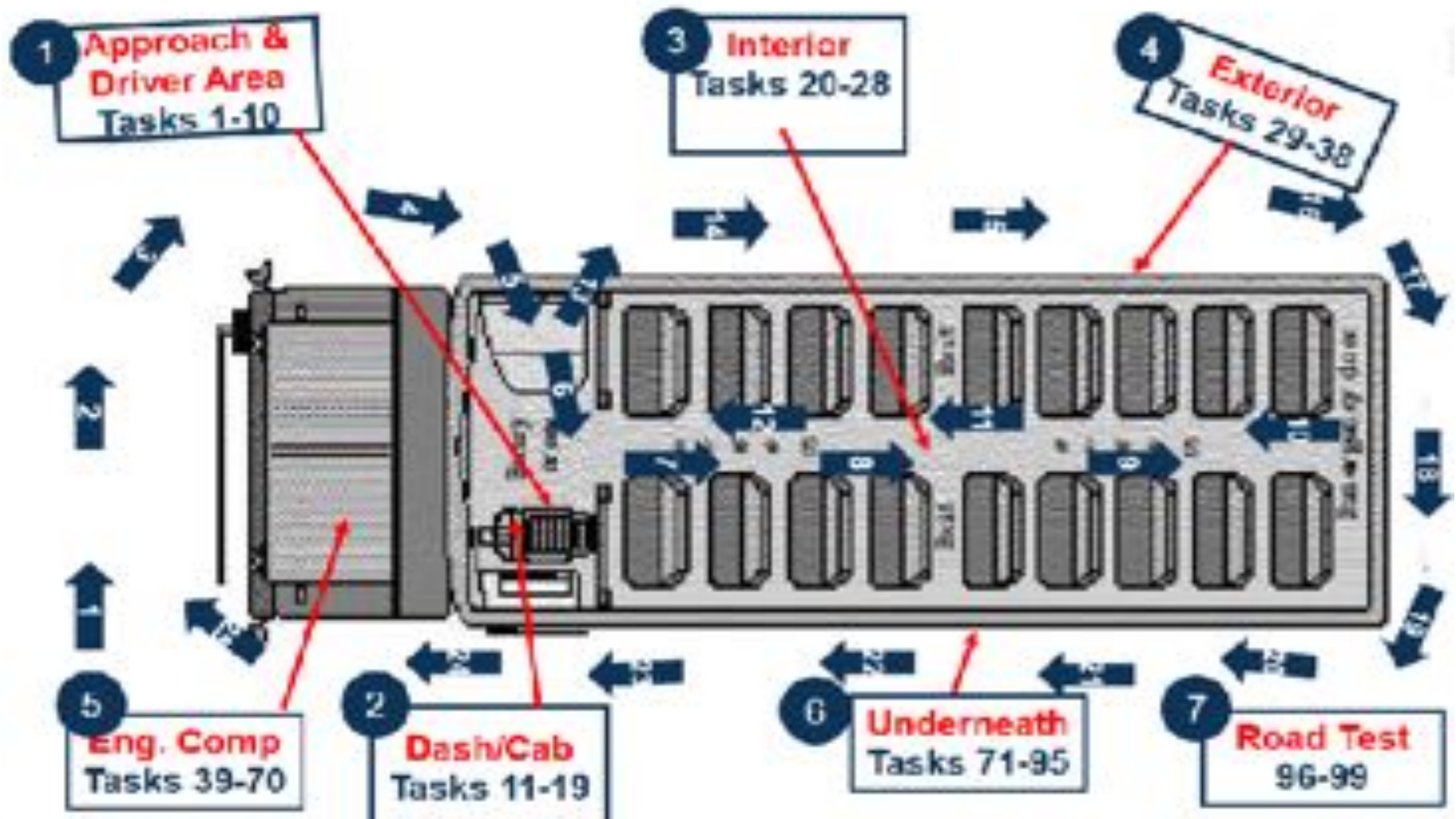
<b>Department of Administrative Services Division of Fleet &amp; Surplus Services (DFSS) Policies and Procedures Memorandum</b>	PPHF 02/02 Effective Date: 11/18/2002 Expiration Date: N/A
<b>Subject: Preventative Maintenance (PM)</b>	
<b>1- Purpose:</b> To establish guidelines, policy and procedures in accordance with Administrative rule R27-1-2 (24A-14)(38) and R27-8-1 governing the agency use, responsibility and requirement to perform PM maintenance services and PM repairs on state vehicles.	
<b>2- Policy &amp; Procedures:</b> <ol style="list-style-type: none"><li>1. PM services shall be performed on state vehicles in a timely manner as prescribed in the Service Level Agreement (SLA). Regular-duty vehicles are required to have a PM inspection every 5,000 miles. Extreme-duty vehicles are required to have a PM inspection performed every 3,000 miles. Agencies shall work with DFO to set up PM inspection programs for specialized equipment.</li><li>2. The cost for PM services and repairs shall be covered by DFO for all full-service lease vehicles. Full-service leases shall be responsible to coordinate all PM services and repairs using the approved DFO maintenance network of vendors.</li><li>3. Fleet Operations shall set all statewide PM standards for agencies to follow. Fleet Operations will work closely with each agency fleet contact to conform to the original equipment manufacturer (OEM) vehicle PM specifications.</li><li>4. Capital lease agencies shall be responsible for the cost and accurate tracking of their PM repairs and services.</li><li>5. Agencies shall create internal policies to insure vehicle operators perform proper PM maintenance on their state vehicles to conform to state PM policies, guidelines and procedures.</li><li>6. Agencies shall be responsible for premature or catastrophic vehicle repair costs caused by PM neglect, abuse and/or failure to comply with PM procedures.</li><li>7. Fleet agencies shall assist the division of Fleet Operations with maintaining the accurate PM data in the fleet information system. Agencies are required to use all statewide purchase contracts approved by DFO and/or the division of Purchasing and General Services. DFO shall be responsible to work with the division of Purchasing to provide the necessary infrastructure and vendor contracts to perform PM maintenance statewide.</li><li>8. Agencies shall use the fleet information system to accurately track all PM repairs and services. All work order information shall be documented clearly to provide the exact date, time, mileage, parts, labor and type of PM service performed on state vehicles. In the event an agency chooses to use vendors with an automated interface to the fleet information system, these systems should provide at a minimum the information described in this section.</li><li>9. Agencies with Capital lease authorization shall be responsible to provide their vehicle operators with a PM coupon booklet with the proper PM inspection intervals recommended by the Original Equipment Manufacturer (OEM).</li></ol>	

# Work-flow Standardization

- Visual flow
- Reduces people, processes and technology waste (i.e., Lean, Six Sigma)
- Promotes continuous improvement



# Orderly Approach to PM Inspection Increases Technician Efficiency and Productivity

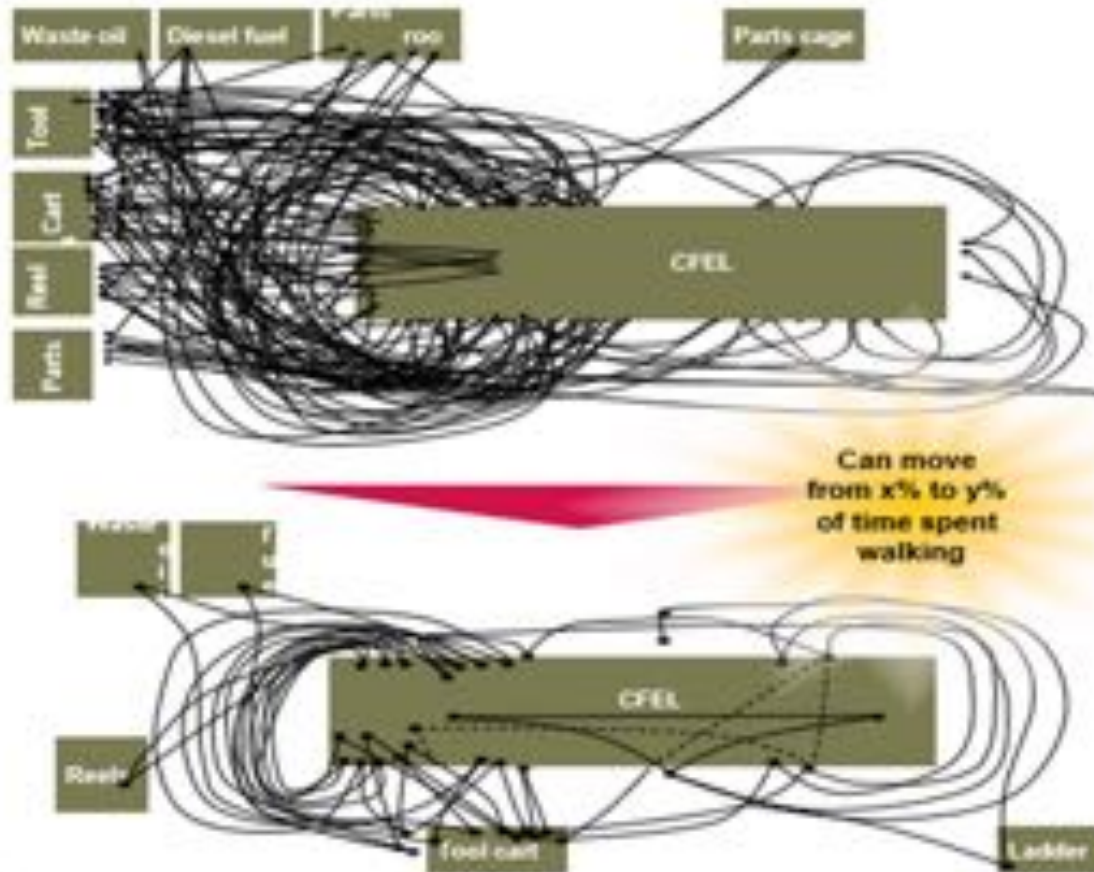




# PM Design: Maximizing Productivity, Quality, and Minimizing Waste

## Properly sequenced PM steps for efficiency: Reduction of excess motion

Illustrative wrench time analysis to demonstrate excessive movement from poor sequencing



What it is

Training program and reference material to ensure proper sequence of PM steps to drive greatest technician efficiency

Getting to best practice

- Refresh sequence of PM steps
- Update materials including training video and module to current standards
- Conduct analysis of technician wrench time and efficiency

## How?

- 
- Top diagram: Observation of PM 2.5**
- Compressible flow value: 100 (Red lines)
  - Incompressible flow value: 100 (Green lines)
  - Callouts:
    - Single observation of PM 2.5
    - Multiple observation nodes to monitor indoor PM 2.5
    - 20-year walk into parking lot (indicated by a red line)
- Bottom diagram: Observation of PM 2.5 (continued)**
- PM 2.5 (Red lines)
  - Non-PM 2.5 (Green lines)
  - Callouts:
    - Single observation node of PM 2.5
    - Multiple observation nodes to monitor indoor PM 2.5
    - 20-year walk into parking lot (indicated by a red line)

# What Tasks are in a PM Program?

- Inspect
- Change
- Clean
- Lubricate
- Adjust
- Prevent/Predict
- Communicate
- Report

74" Safety Inspection  
60-Day Interval  
60-Day Interval

Item	Make	Model	Year	Location
1. Check engine oil level and condition				
2. Check engine oil pressure				
3. Check engine oil filter				
4. Check engine oil pan				
5. Check engine oil pump				
6. Check engine oil pump drive				
7. Check engine oil pump drive shaft				
8. Check engine oil pump drive gear				
9. Check engine oil pump drive gear oil				
10. Check engine oil pump drive gear oil level				
11. Check engine oil pump drive gear oil pressure				
12. Check engine oil pump drive gear oil filter				
13. Check engine oil pump drive gear oil pan				
14. Check engine oil pump drive gear oil pump				
15. Check engine oil pump drive gear oil pump drive				
16. Check engine oil pump drive gear oil pump drive shaft				
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60. Check engine oil pump drive gear oil pump drive gear oil pump drive gear oil pump drive gear oil pump drive gear oil pump drive gear oil pump drive				

I, the undersigned, have completed the PM inspection.

Technician \_\_\_\_\_





# Formal PM Checklists Should be Used to Ensure Standard Processes are Followed

- OEM/GOV based task list – All EQ types have own list
- Step-by-step process
- Tasks should be numbered for easy reference
- Ensure regulatory compliance
- Include driver communication (DVIR)

- Create audit trail
- Increase productivity
- Mitigate liability
- Reduce breakdowns and lower costs

# Daily PM Reporting is Critical to Proactive Scheduling, Leveling, and Compliance

## Objective

- Schedule PMs in advance
- Review compliance and non compliance
- Document historical trends
- Promote shop's value

## Benefits

- Identifies gaps and opportunities
- Inform stakeholders
- Promotes continuous improvement

Rank	Detail	Straight Trucks-Compliant	Single Axle-Compliant	Multi Axle-Compliant	Trailer-Compliant	Light Duty-Compliant	Other-Compliant	Total-Compliant
Company	Total	89.28%	91.60%	89.70%	92.50%	64.60%	94.40%	87.40%
Rank	Detail	Straight Trucks-Compliant	Single Axle-Compliant	Multi Axle-Compliant	Trailer-Compliant	Light Duty-Compliant	Other-Compliant	Total-Compliant
1	Northwest Region	97.00%	95.70%	92.40%	99.20%	78.40%	97.10%	93.60%
2	West Region	100.00%	96.60%	96.00%	97.00%	72.60%	98.10%	92.40%
3	South Region	97.10%	93.50%	86.90%	94.50%	65.80%	97.20%	92.50%
4	Southeast Region	83.60%	92.70%	90.20%	90.90%	65.60%	95.20%	88.70%
5	Great Lakes Region	94.70%	90.20%	83.00%	89.70%	62.70%	92.90%	84.50%
6	Canada Region	76.90%	86.10%					
7	Northeast Region	88.60%	90.80%					
8	Midwest Region	89.70%	85.90%					

PM Due List						Dec-12	
Department	Vehicle	Year	Make	ModelName		Miles Due	
CED	3277	2012	CHEVY	MAILBU		14063	
CEU	3576	2012	GMC	SIERRA		15995	
CRC	2767	2012	CHEVY	MAILBU		12492	
CRC	2877	1994	DODGE	SPIRIT		125432	
CRC	3260	2015	BUICK	LACROSS		9660	
CRC	3730	2012	CHEVY	CRUZE		19430	
CRC	4016	2012	DODGE	RAM		10853	
CUMH	3247	2012	DODGE	B350		8172	
CUMH	3294	2012	DODGE	B350		11794	
CUMH	3308	2012	DODGE	B350		10654	
CUMH	3905	2012	CHEVY	CORSICA		10140	
CUMH	3945	2012	FORD	CLUB WAGON		6869	
DAG	1407	2010	GMC	SIERRA		9093	
DAG	2367	2007	CHEVY	S10		11621	
DAG	2863	2012	DODGE	RAM		16513	
DAG	2994	2012	FORD	F150		26790	
DAG	2995	2012	FORD	F150		5526	
DAG	3007	2012	DODGE	RAM		19447	
DAG	3273	1994	CHEVY	CORSICA		18083	
DAG	3333	1994	CHEVY	CORSICA		121718	
DAG	3556	1999	FORD	F-150		124051	



# PM Manuals and Multi-Echelon Task Lists Strengthen Quality and Equipment Reliability

- PM tasks included in each subsequent PM
- PM A tasks included in PM B tasks
- PM B tasks included in PM C tasks

The image displays three overlapping PM task lists, labeled A, B, and C, illustrating a multi-echelon task list structure. Each list is a detailed form with multiple columns and rows of tasks. The tasks are organized into sections, with some tasks being repeated across different levels. The labels A, B, and C are placed in blue circles over the top of each respective form, indicating the sequence and inclusion of tasks.

# Formal PM Reporting

## Objective:

- Schedule PMs in advance
- Review compliance and non compliance
- Document historical trends
- Promote shop's value

## Benefits:

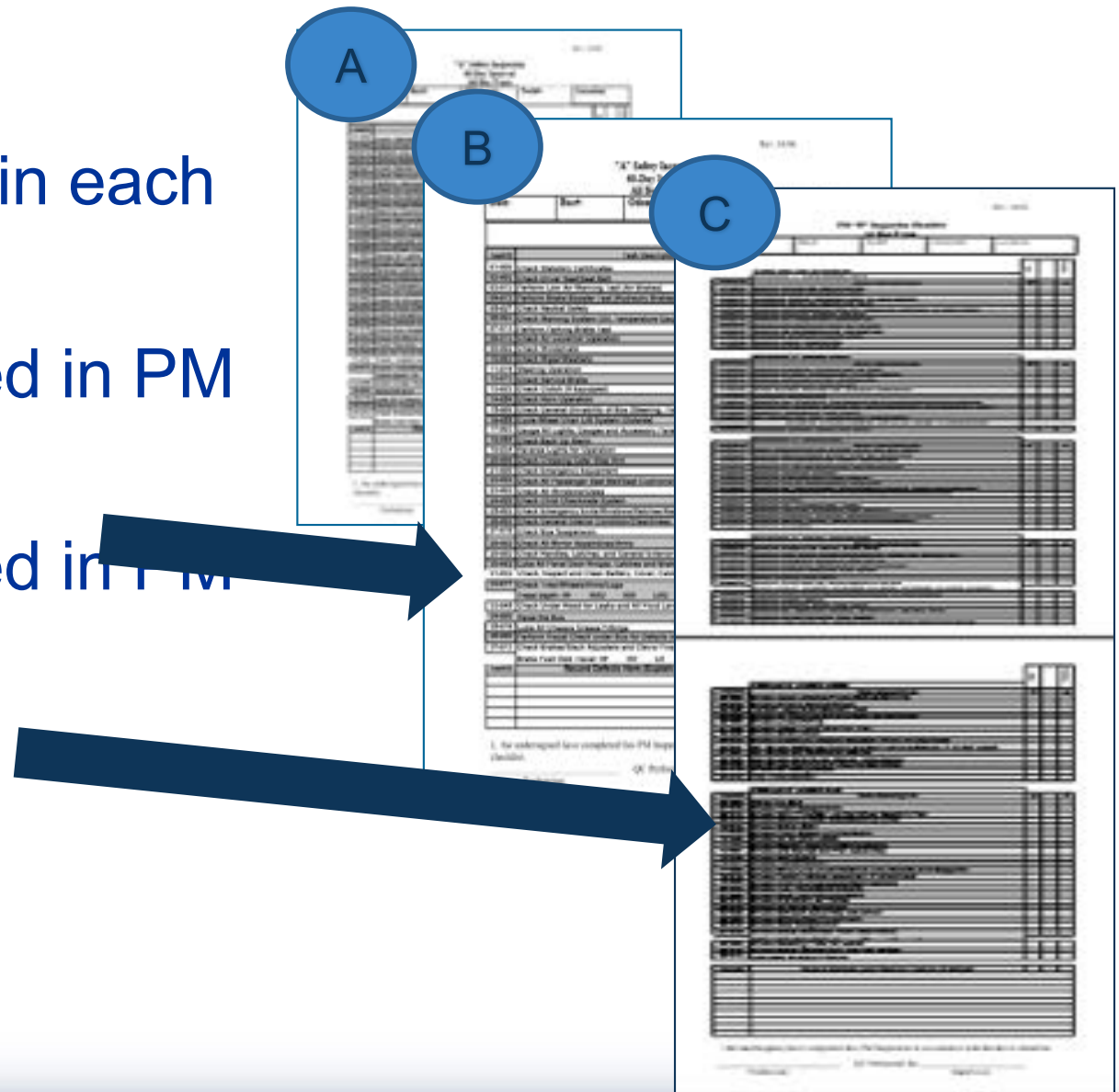
- Identifies gaps and opportunities
- Inform stakeholders
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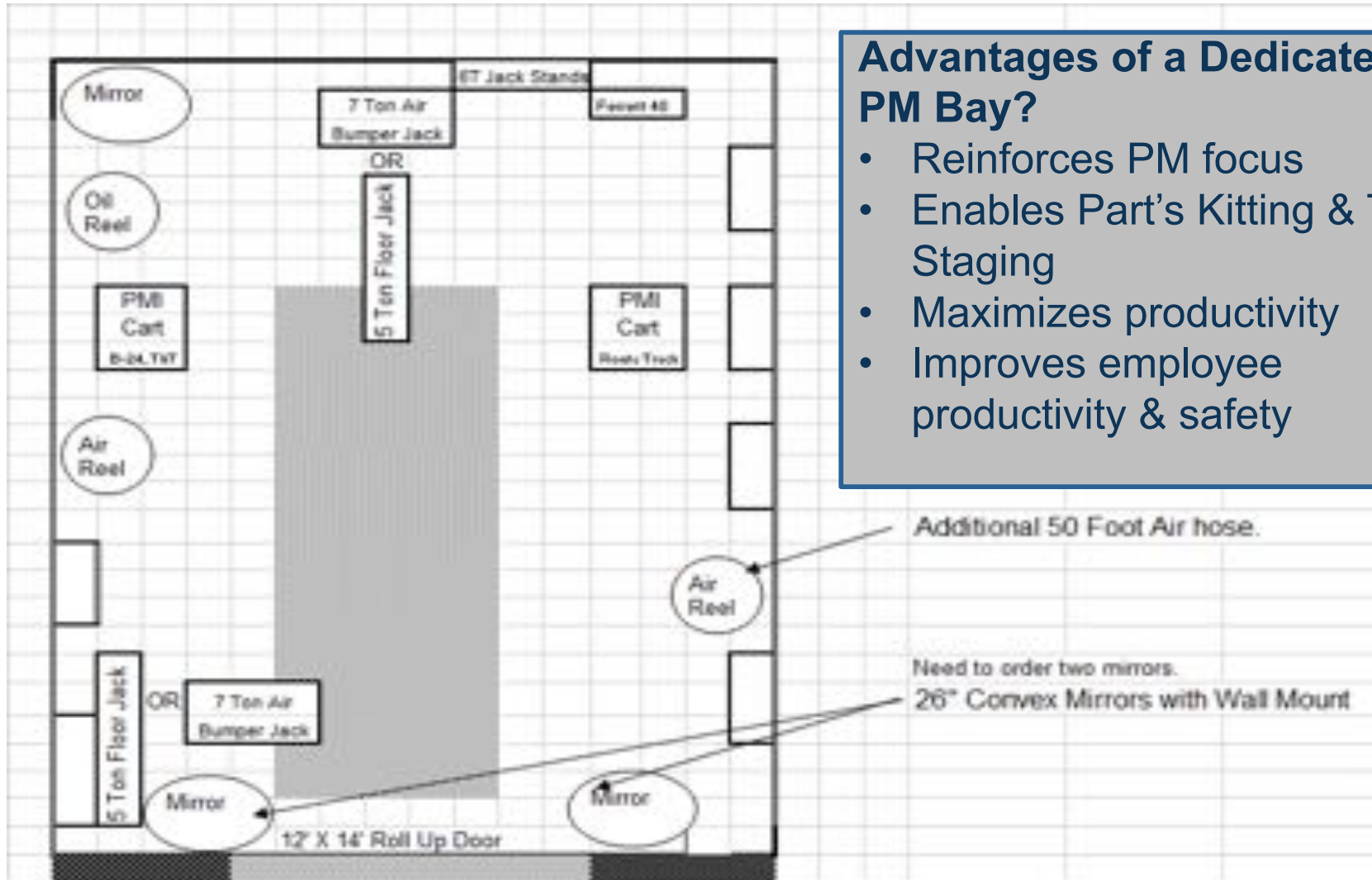
PM Due List						Dec-12
Department	Vehicle	Year	Make	ModelName	Miles Due	
CED	3277	2012	CHEVY	MAILBU	14063	
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DAG	3333	1994	CHEVY	CORSICA	121718	
DAG	3556	1999	FORD	F-150	124051	

# Multiple Echelon Task Lists

- PM tasks included in each subsequent PM
- PM A tasks included in PM B tasks
- PM B tasks included in PM C tasks
- Etc...



# Dedicated PM Bay Setup



## Advantages of a Dedicated PM Bay?

- Reinforces PM focus
- Enables Part's Kitting & Tool Staging
- Maximizes productivity
- Improves employee productivity & safety



# Oil Analysis Benefits

## ❑ Enhances Equipment Life & Reliability

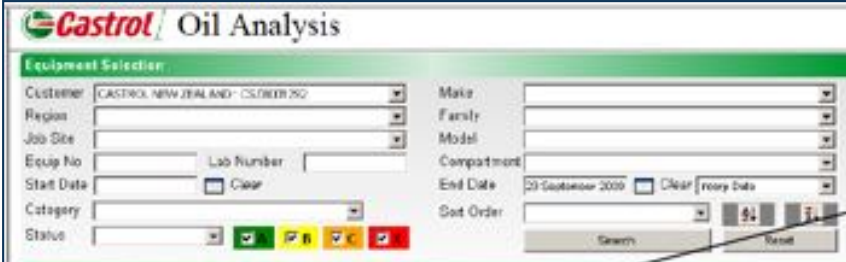
1. Ensures proper lubrication
2. Detects excessive wear
3. Spots contamination

## ❑ Extends Oil Life

1. Monitors oil condition
2. When needed, treats and cleans
3. Allows longer change intervals

## ❑ Reduces Downtime

1. Spots lubrication problems
2. Corrects problems before serious issues occur
3. Saves components



Severity	Sampled Date	Unit	Component
D	Sep 11 2014	2420685	HYDRAULIC
D	Sep 08 2014	1226	ENGINE
A	Sep 11 2014	TC040429	COOLING SYSTEM
D	Sep 10 2014	2309	ENGINE
C	Sep 11 2014	TC08071	ENGINE

**Can double  
change intervals  
450 – 900 hours**



# Summary of PM Best Practices

- Organization focus is clearly on PM services
- Based on OEM recommended interval requirements
- Meets customer convenience (e.g., Swing/Graveyard shift, weekend focus)
- Customers receive advance notice of PMs scheduled
- Ensure safety practices in place (e.g., LOTO, etc.)
- Has a dedicated bay with part kits staged in advance to minimize steps and lost time
- Uses detailed “Checklist” with symbols (e.g., √, X, O) and form for follow-on repairs
- Sequential flow for greater productivity/fewer errors

# Summary of PM Best Practices

- Program incorporates multiple echelons of progressive tasks
- Reports missed and overdue PMs to users
- Work orders used to record PM and follow on maintenance activities
- PM inspection is separated from defects discovered for follow on repairs for greater benchmarking
- Uses DVIRs, history, recalls and campaign data
- Procedures identify vehicles scheduled for replacement, check for overdue PMs, and check for warranties

The background is a dark blue grid. A wavy line with a blue and purple gradient flows from the bottom left towards the center. An arrow with a similar gradient points diagonally upwards from the bottom left towards the top right. On the right side, there is a vertical axis with numerical labels: 19, 18, 17, 16, 15, 14, 13, 12, 11, 10, 9, 8, 7, 6, 5, 4, 3, 2, 1, 0.

# PM Training

*Classroom and Practical Training  
Examples to Drive Standard PM  
Performance*

# Good Training Programs are Highly Dependent on Durable Process

- Existence of robust policies and procedures in a PM Manual
- Set standards with detailed step by step work instructions
- Commit to ongoing technician training (e.g., Classroom and Practical)
- Leader enforcing commitment to Quality Control
- Team accountability for work performed

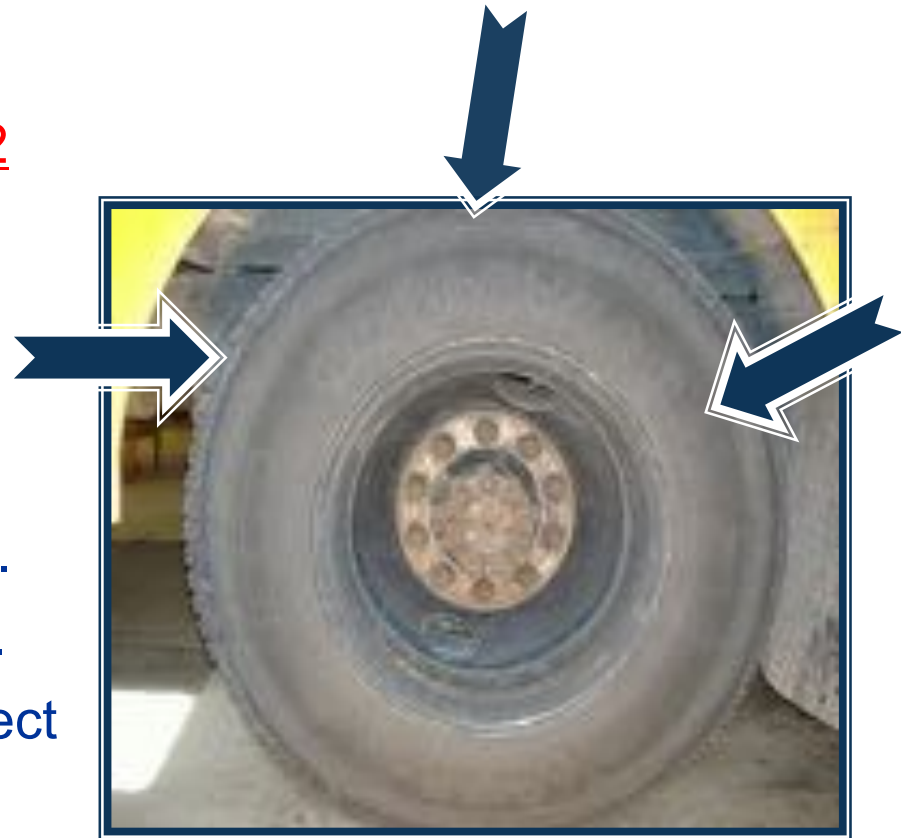
Part	Work Instruction	Approved
<b>Preventive Maintenance (PM) Work Instruction</b> <b>King Pin Inspection Process</b>		
<b>PURPOSE</b> The purpose of this Policy is to ensure compliance with the FMCSA Requirement § 396.17 that axles and components receive a periodic inspection per DOT regulations.		
<b>SCOPE</b> All City vehicles MUST be physically inspected in accordance with the Company's prescribed PM intervals to ensure safe operating condition, inspection of safety and prevent premature breakdowns.		
<b>RESPONSIBILITIES</b>		
<b>Fleet Manager</b> - Responsible for training, implementation, and sustainability of Fleet Optimization standards and processes in assigned location.		
<b>Fleet Supervisor</b> - Responsible for training, implementation, execution, work quality control, and sustainability of these standards both internally and externally.		
<b>Technician</b> - Responsible to perform the inspection in accordance to the standards of both in this step-by-step work instruction.		
<b>APPROVED PROCEDURES</b> Each operating shop facility shall inspect all <b>King Pins</b> in accordance with these policies contained below.		
<b>Safety Inspection</b>		
<b>Step 1:</b> Apply service brake to stimulate wheel bearing movement.		
<b>Step 2:</b> With floor and wheel and jacks installed, grip tire at top and bottom and attempt to move in and out.		
<b>Step 3:</b> Repeat the vehicle if measurement at the top and bottom of the tire at the outer circumference is greater than listed below: 14" or less wheel - 14", 17" to 18" wheel - 20" and over 18" - 5/2".		
 <b>Checking Wheel/Spindle Movement</b>		
<b>Routine Inspection</b>		
<b>Step 1:</b> Install a dial indicator so that the base is on the hub and the tip is against the side of the top of the knuckle.		
<b>Step 2:</b> Set the indicator to zero and move the top of the tire side-to-side after raising the vehicle and installing jack stands.		
<b>Step 3:</b> Repeat for lower bushing. If dial indicator moves a total of 0-2/32" for either, replace the king pins.		
 <b>Measuring Lateral Movement</b>		
Revised By: [Signature]	First Printed Date: [Date]	Revised Date: [Date]
Revised By: [Signature]		Page 1 of 1



# Technician PM Training Standards: What to look for during the inspection process?

## Check Tires/Valve Caps Wheels/Rims:

- a. Tread minimums are 5/32 front and 3/32 rear unless otherwise directed.
- b. Check tires for excessive curbing, cuts, general sidewall condition.
- c. Check wheels around lug nuts for cracking, corrosion and rust.
- d. Check tires for an irregular wear pattern.
- e. Check wheel alignment to air inner dual.
- f. Check and record tire air pressure, correct as needed.
- g. Check valve stem condition and assure steel valves are used.
- h. Check that tires are properly matched, size and tread design.



**Measure Tread in  
three (3) places**



# Tech Training Standards – Testing is Critical to Reinforce Set Standards

- Question 1 (PM)
  - What is the minimum tire tread depth permitted by DOT on all steer axle tires on trucks, tractors, or buses?
    - A. 1/32 in.
    - B. 4/32 in.
    - C. 2/32 in.
    - D. 5/32 in.

# Certifying PM Technicians

- Safety focused
- Qualified
- Experienced
- Accountable
- Productive
- Standardized



# PM – Keeping Score

- Capture accurate data
- Define metrics
- Set goals
- Review progress
- Improve performance

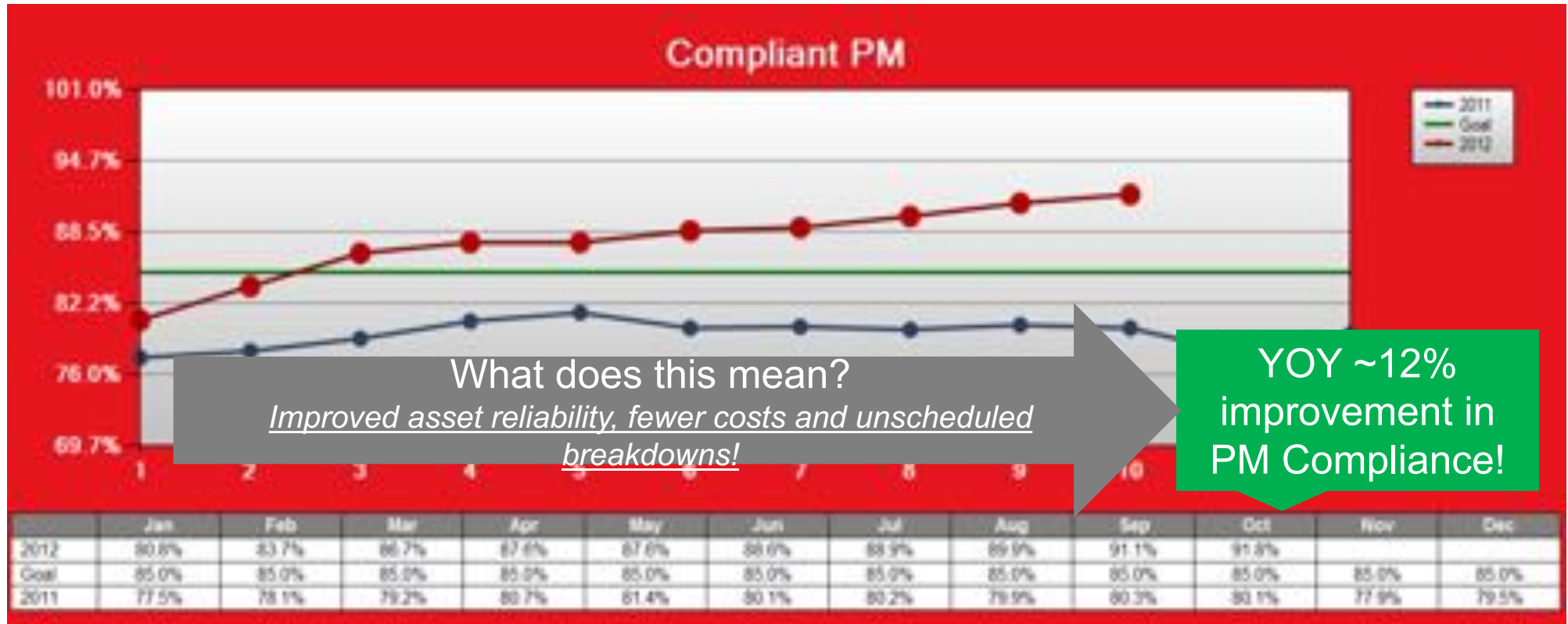
## PM Related Metrics:

- On-time compliance %
- Early completion %
- Late (Past due) %
- Asset reliability %
- Asset availability %
- Shop Scheduling %
- Downtime %
- # Door traffic
- # Road calls
- QCI given/pass %
- # Backlog repairs

Preventative Maintenance			
KBI	Act		Goal
Early	3.3%	■	15.0%
Late	9.9%	■	0.0%
Compliant	86.9%	■	85.0%

# PM Compliance

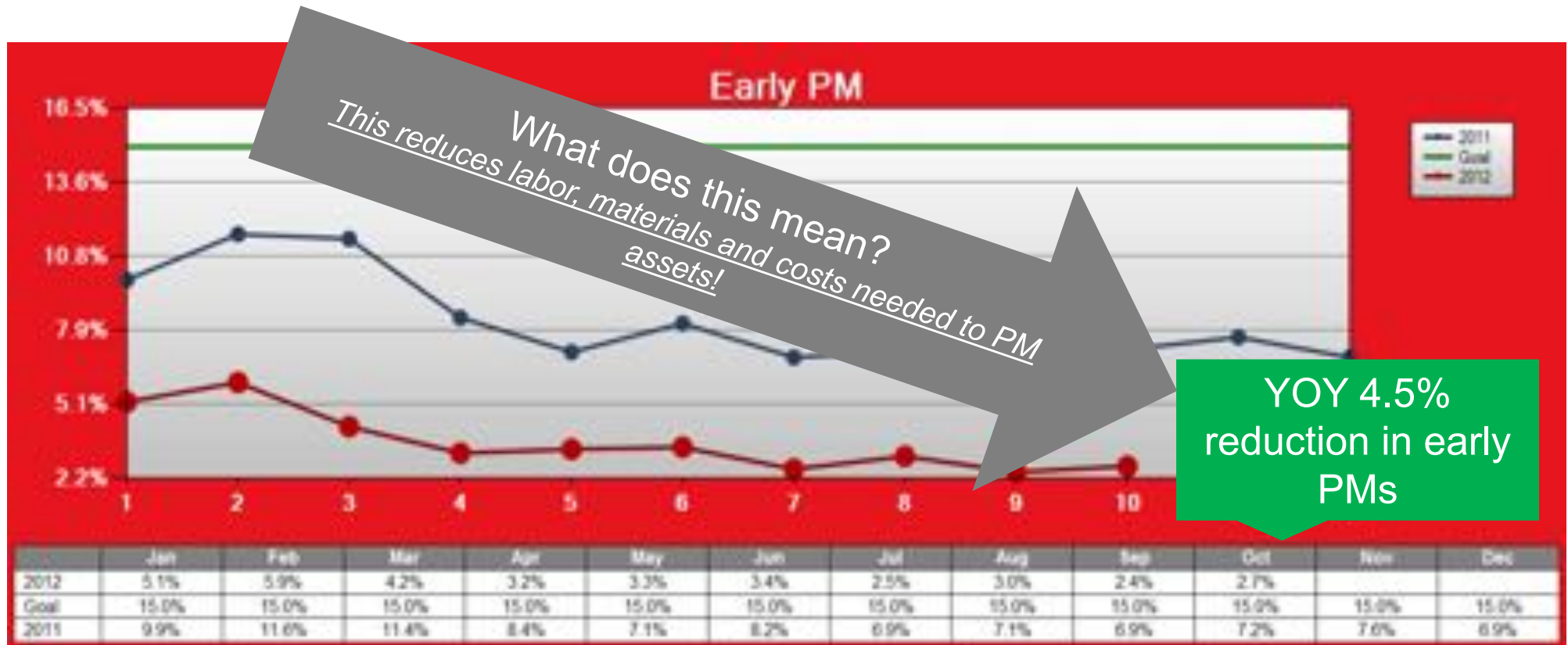
On-time PMs reduce unnecessary costs and downtime



Goal = > 95%

# Early PM Avoidance

Early PMs create unnecessary costs and technician labor

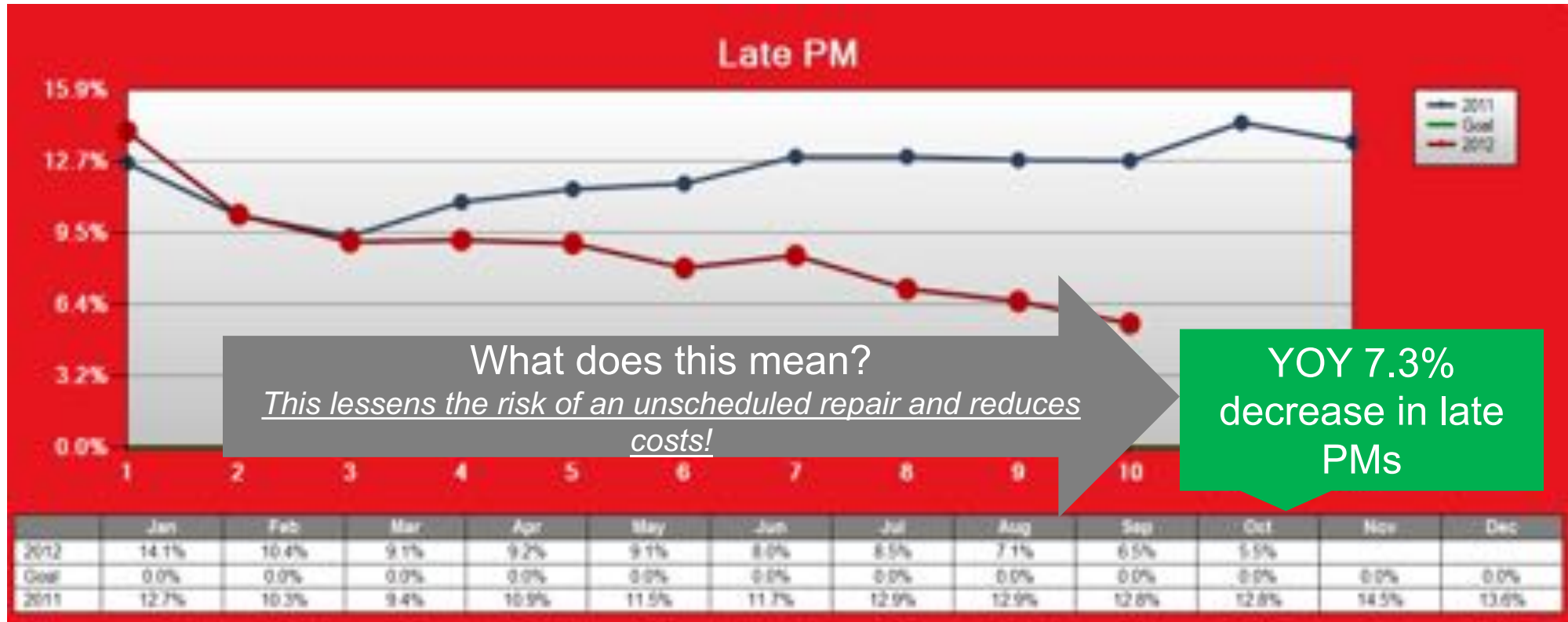


Goal = < 5%



# Late PM Avoidance

Late PMs cost money and > risk unscheduled repairs



Goal = 0% (No late PMs)