



# Rolling Stock Asset Health

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MARTS  
Minneapolis, MN - October 5, 2015

## Asset Health Strategy Committee

Preventing Mechanical Service Interruptions

Inspection Quality Initiatives



Rolling Stock Asset Health

# ASSET HEALTH STRATEGY COMMITTEE

# *Asset Health Strategy Committee*

- ▶ Official Committee status April 2015 – combination of:
  - ▶ Asset Health Task Force (AHTF)
  - ▶ Advance Safety and Efficiency Committee (ASEC)
  
- ▶ Objectives:
  - ▶ Interface with FRA in promoting regulatory change.
  
  - ▶ Coordinate work of a number of technical committees and move forward on initiatives that improve industry safety, reduce variability, streamline mechanical operations, and reduce or eliminate non-value added activities.
  
  - ▶ Continue to provide leadership to the work of the Asset Health Strategic Initiative (AHSI).

# *Asset Health Strategy Committee*

- Safety and Operations Management Committee (SOMC)
  - *Technical Services Working Committee (TSWC)*
    - ***Asset Health Strategy Committee (AHSC)***
      - All 7 Class 1 Railroads
      - *4 Associate Members*
      - Amtrak
      - AAR, TTCI & Railinc
- Additional Committees Engaged
  - CRB, EHMC, AEI, GIS, ARB, etc.

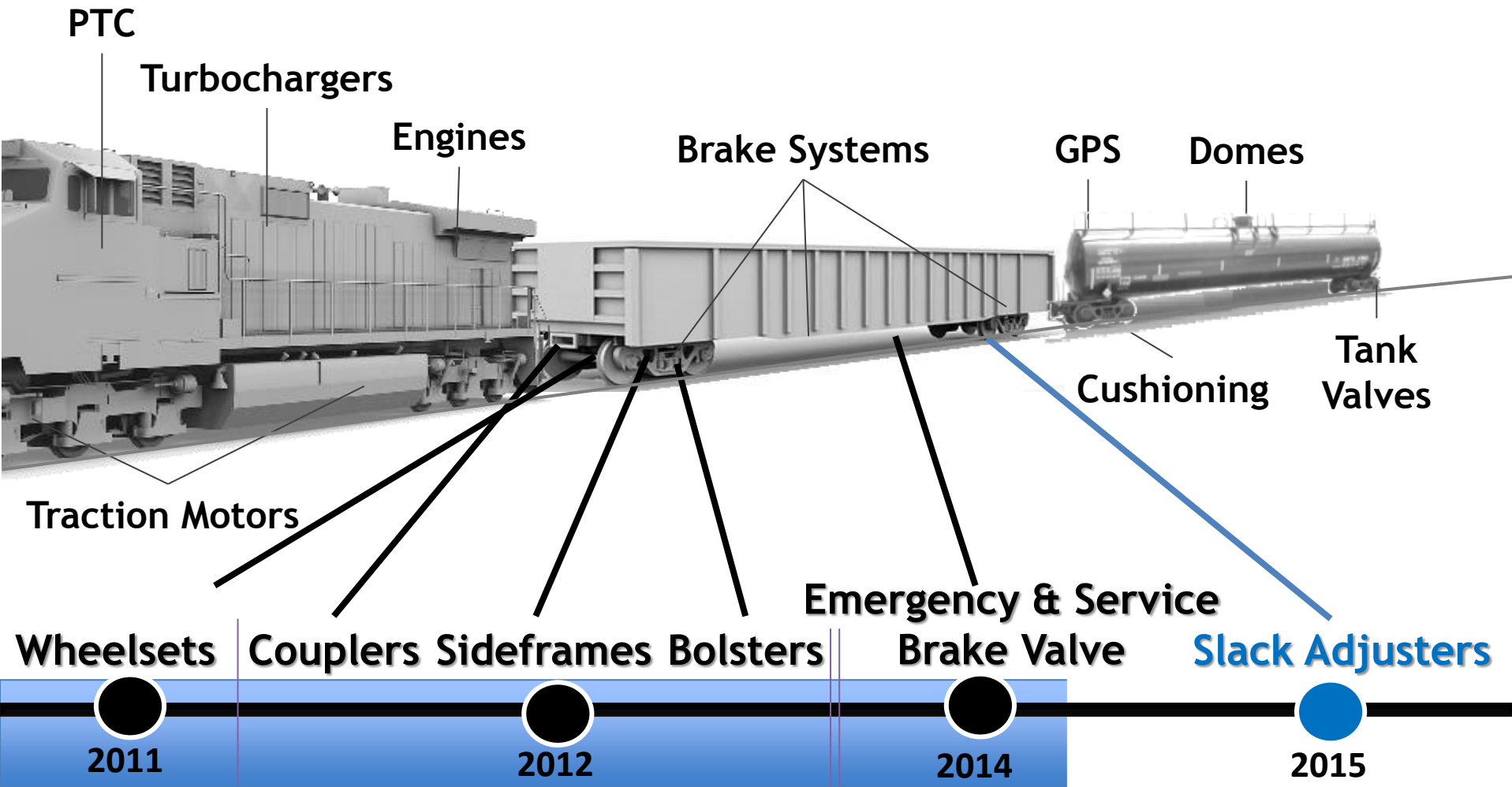
# Asset Health Strategy Committee Members

Member	Representing
Paul Steets	AMTK
Hark Braren	BNSF
Darrell Iler	CN
Rod Campbell	CP
John Murphy	CSX
Rudy Bernard	KCS
Jamie Williams	NS
Rex Beck (Chair)	UP
Rick Grossman	FURX
Tom Mordock	GATX
Amy Herbal	Trinity
Rick Koenig	UTLX
Jim Grady, Nichole Fimple	AAR
Steve Josey (Manager)	Railinc
Kari Gonzales	TTCI

# *Slack Adjusters*

- ▶ FRA discovered a problem with slack adjusters on crude oil trains, where slack adjusters had ingested water that froze
- ▶ Working with the manufacturers, BSC developed a new style of slack adjuster (Group R) that doesn't appear to have this problem
- ▶ FRA advised that they wanted all tanks cars to have group R slack adjusters, by the winter of 2015
- ▶ AAR Issued MA-0158
  - ▶ Total Number of Car Originally Assigned: 47,731
  - ▶ Total Number of Cars Currently Assigned: 29,458
- ▶ Next Steps:
  - ▶ Escalate Cars in Storage to EW
  - ▶ Beyond crude and ethanol

# Slack Adjusters Added to Component Tracking

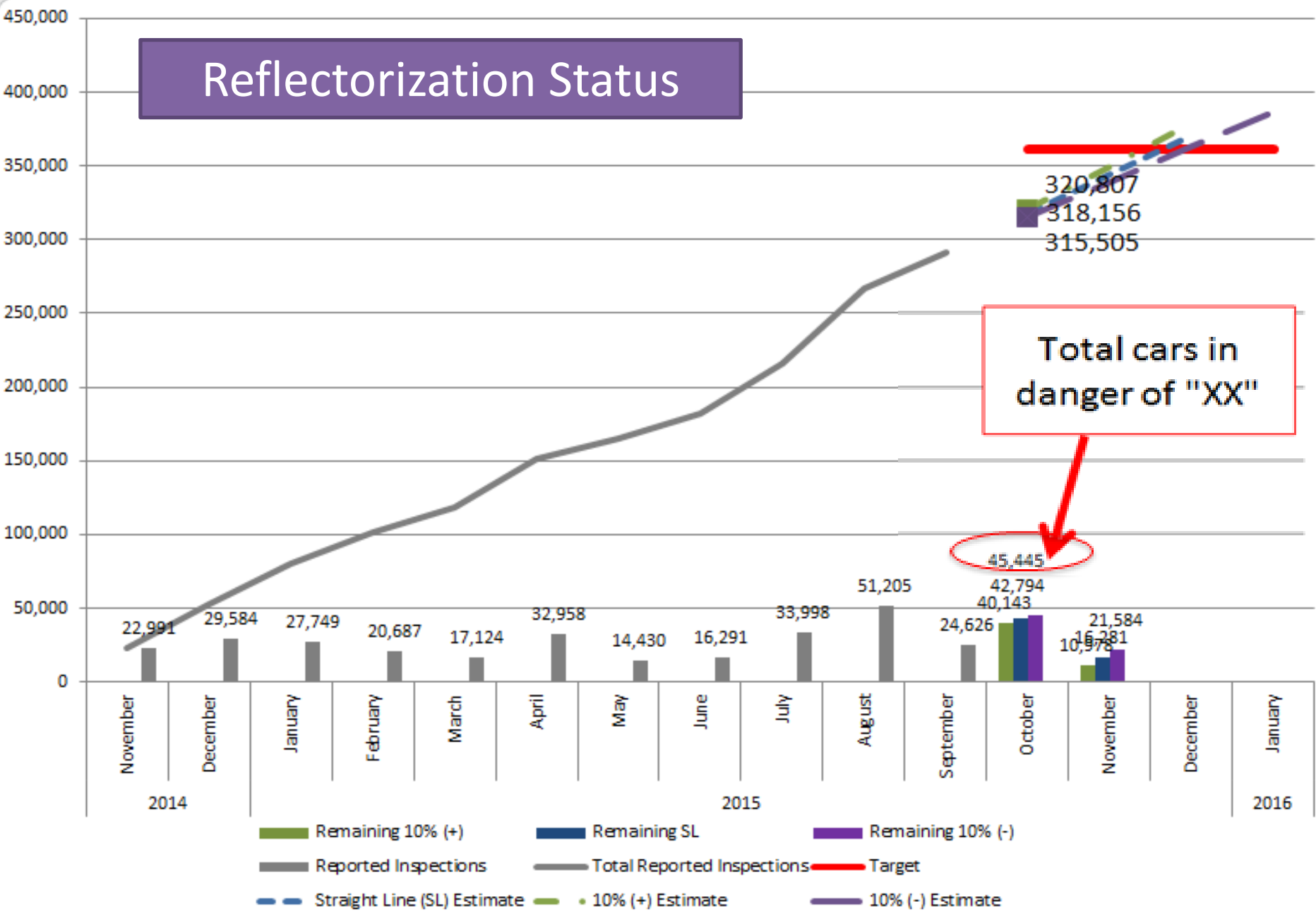


# *Reflectorization*

- ▶ EW-5299 – Cars with No Record of Reflectorization in Umler
  - ▶ October 28, 2015 move to XX status
  - ▶ November 28, 2015 FRA deadline
  
- ▶ 10 Year Replacement Requirement
  - ▶ A waiver petition regarding the 10 year replacement requirement (49 CFR Part 224.111) was filed with FRA on Tuesday, September 22
  - ▶ In this petition, AAR has asked for a waiver from this requirement for a three year period, during which time AAR members will develop a performance-based protocol to replace the automatic 10-year replacement mandate



# Reflectorization Status



# *Single Car Air Brake Test*

- ▶ Waiver in place for 24 months between tests
- ▶ Current Process: Not fully supporting waiver efforts
- ▶ Proposed Changes: Rule 3 Chart A. 1)

# Single Car Air Brake Test

CHART A

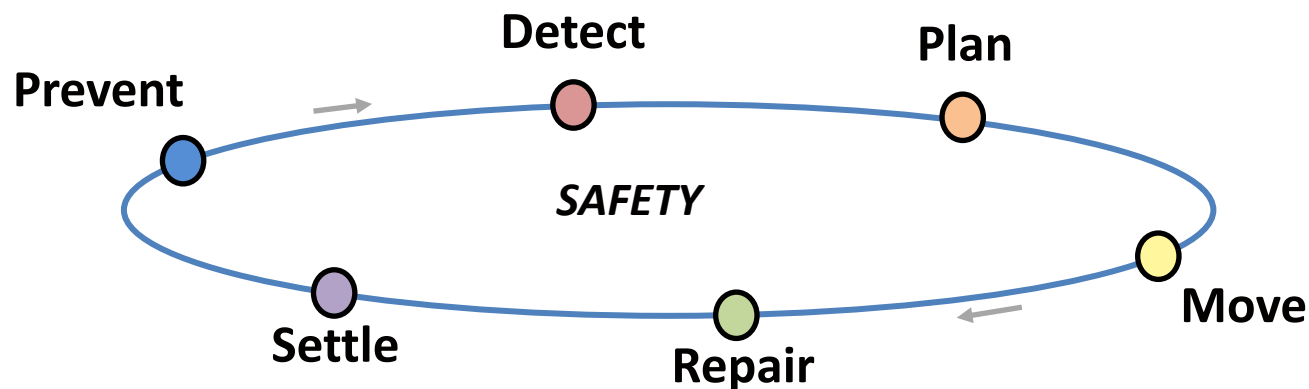
TESTS AND ATTENTION REQUIRED PER A

All cars set out of trains requiring tests for defects listed below in Chart A, must receive attention per Chart A while on the	Single Car Air Brake Test	Brake Pipe Leakage Test (Sect. 3.3)	Slack Adjuster Test (Sect. 4.1)	Em Loac (emp or (Sec
1) Car is overdue for a single car air brake test, based on due date in Umler.	X			
set out or on shop or repair track	X			

# *Asset Health Strategic Initiative (AHSI)*

## *Description*

- Multi-year strategy for improvement of asset health driven by yearly industry targets and measures for improvement,
- Solves problems with rolling stock that need a network view of asset information and industry coordination,
- Applies information technology solutions and processes



## *2015 AHSI Anticipated benefits are on track*

Capability Developed	Year Build	Benefit	Value Begins	Status September 2015
Identification of "Bad Actor" equipment through network level analysis	2014	Reduction of Line of Road Failures in the 'UDE No Cause Found' category	2015	259 potential bad actors cars currently assigned to MA-0146. Initial positive results.
Improved and enhanced health information available to Class I Railroads and car owners	2014	More detailed equipment level analysis based on available health indicators	2014	Line of Road Data Failure data summaries established for no-cause-found and air hose separation events.
Sharing of Class I, IA, and Extended Haul inspection data	2015	Reduction in duplicate or non-required inspections between railroads	2015	1 railroad is sending the mechanical conducted Class I Air Slips; Work is underway for railroads to submit inspections this year.
Determination of Brake Effectiveness for a Consist (via wheel temperature detector data)	2014	Higher quality inspection data and future reduction of manual Class IA inspections	2015	Brake Health Data Summary in production for industry. Rule-making process underway with Brake Systems Committee to support further use of the data.

# Asset Health Strategy Committee

## Preventing Mechanical Service Interruptions

### Inspection Quality Initiatives

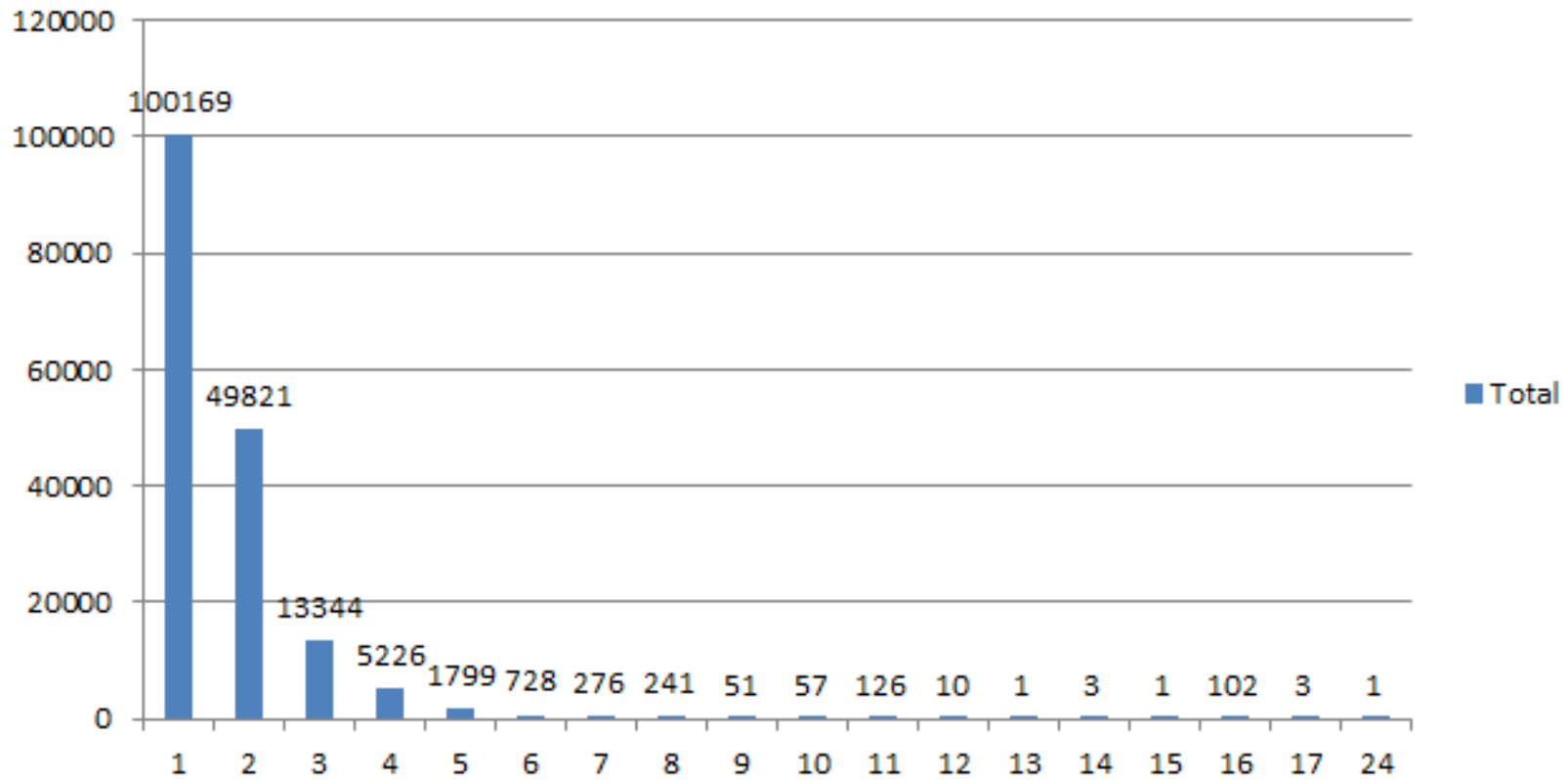


Rolling Stock Asset Health

# **PREVENTING MECHANICAL SERVICE INTERRUPTIONS**

# LORF-NCF DS Raw Event Count

## Total



*Positive initial results continue with identifying suspect bad actor equipment (multiple UDEs with no cause found)*

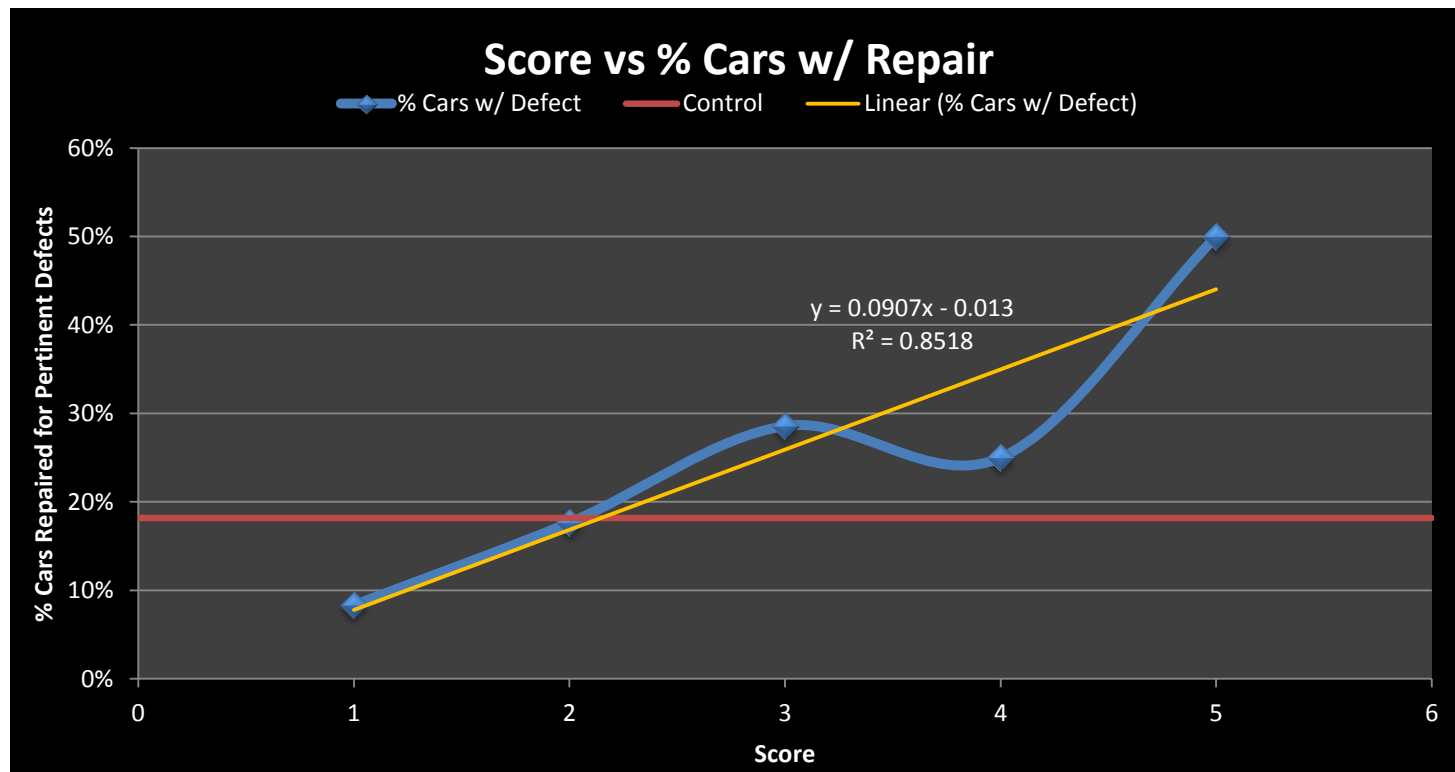
- ▶ AIR/E-Train project TAG is analyzing submitted Line of Road failure data
- ▶ Scorecard process established to identify suspect bad actors with multiple UDEs
- ▶ Candidate bad actors selected and added to MA 146
  
- ▶ 2014 Final Results:

Round	Cars Tested	Failed SCABT with Ext Svc Stability	Other Brake Related Issues Found
March	47	36%	77%
July	42	26%	74%
December	63	36%	54%



# Evaluating the Results

- ▶ Results showed a good correlation of score to repairable components



# Evaluating the Results (Current Status)

- ▶ Cars currently on MA-146 were selected based on real data feeds and a scoring threshold
- ▶ Initial results have not shown the same results as found in testing

Test	Yes	No	N/A	Total	% Fail
Other Brake Related Issue?	192	254		446	43%
Failed SCABT?	79	336		429	18%
Any Brake Related Issue?	273	173		446	61%

44% of the 266 worksheets coming in had some issue other than failing the SCABT. Compared to 50 - 70% we have captured in previous rounds.

Only 18% of the worksheets failed the SCABT. Compared to the 30 - 40% captured in previous rounds

- Several flaws were identified in the selection criteria for cars on the MA. These have been corrected, and going forward we expect to see results in line with prior tests

# LORF-NCF Bad Actor Identification

## *Data Summary Next Steps*

### 3 Phase Process

- ▶ EHMS Data Summary deployed on April 23rd
  - ▶ Not cause-for-action
  - ▶ Informational in nature (not an alert)
  - ▶ Auto-reset defined
- ▶ Use of MA-0146 to collect findings
  - ▶ Collect worksheets (attached to MA)
  - ▶ Ongoing analysis by mini-TAG
- ▶ Establish industry alert
  - ▶ Rule changes needed
  - ▶ No timeline identified

# Line-of-Road Failure – No Cause Found (LORF-NCF) Data Summary

## EHMS

### Equipment Status

Search Criteria

\*\*Equipment ID::

AXYZ1111

Date Range::





Search

Reset

Clear

Data Summaries

	Equipment ID:	Data Summary Type	Owner	Location:	Earliest Open Date	Latest Event Date	Report Repair/Inspection	Opened in Error
	AXYZ - 0000001111	LORF_NCF	2	BASE	09-10-2015	09-18-2015		
	AXYZ - 0000001111	LORF_AHS	2	BASE	09-11-2015	09-14-2015		

Export

Print

# LORF-NCF Data Summary Example

## Data Summary Details

Equipment ID: XYZ0000001111 Location: BASE Data Summary: LORF  
NCF Data Summary

[Hide Criteria](#)

Opening Criteria:

Autoclose Criteria:

Date of last bad detector read:

Note: all times are Eastern Standard Time (EST)

[Show Aggregate Method](#)

Name	Aggregation
Open Date	09-10-2015 23:40
Last Event Date	09-18-2015 23:40
Count of DS Creators	2
Score	2.0
Raw Count	2
Train Count	2
Road Count	2
Automated Group Count	2
Manual Group Count	0
Loaded Count	0
Empty Count	2
Manual Count	0
Automated Count	2
Max Lifetime Score	2.0
Max Lifetime Score Date	09-18-2015 23:40
Last LORF-NCF Inspection Date	09-14-2015 00:00
Last LORF-NCF Inspection Reason	LORF NCF Inspected and Released
Last LORF-NCF Inspection Reason Code	LI
Last Event Timestamp	09-18-2015 23:40
Last Event Load Empty Indicator	E
Last Event Manual/Download Indicator	AUTOMATED

This section repeats to capture the most recent 10 events.



# MA-0146 Worksheet

Reviewed  
by BSC

Process Step & Instructions		Conditions		Comments	Corrective Action Taken
		A-END	B-END		
<b>MA-0146 UDE Car Inspection &amp; Repair Worksheet</b> The purpose of the following checklist is to ensure we are capturing the data required to possibly uncover the reasons behind an Unintended Emergency event (UDE). The Class 1 Railroads, and some private car owners, have agreed to flag and inspect equipment that could potentially be the root cause of UDE events. In order to unearth the root cause the Technical Advisory Group (TAG) must filter the data to reveal any correlation of inspection data that could lead to a possible solution to the problem. The person completing this form is helping uncover a failure mode that is elusive. Your participation and attention to detail by completing this form correctly could potentially help lead to a commonly.					
				Inspected Car Mark:	
				Repair Date:	
				Location:	
				Company:	
<b>Pre-Repair Inspection</b>					
<b>Important Note: The following components must be inspected prior to performing any tests or repairs to identify any conditions prior to the tests.</b>					
<b>1) Draft System Type</b>					
Reference Type Draft System Configuration According to AAR Field Manual. Circle the type of cushioning device the car is equipped with:		<input type="checkbox"/> Draft Gear <input type="checkbox"/> EOC <input type="checkbox"/> COC	<input type="checkbox"/> Draft Gear <input type="checkbox"/> EOC <input type="checkbox"/> COC		
<b>2) Coupler</b>					
Measure Coupler height from Top of rail.					
<b>3) Coupler</b>					
Inspect draft pocket for non compliance.		<input type="checkbox"/> Yes <input type="checkbox"/> Requires Repair (Enter comments)	<input type="checkbox"/> Yes <input type="checkbox"/> Requires Repair (Enter comments)		
<b>4) Uncoupling Lever</b>					
Inspect for excessive wear and slack. Uncoupling lever should be inspected to uncover any wear that warrants changing of the unit. This could be a bent beyond repair or excessive slack in a telescoping unit.		<input type="checkbox"/> 00 = Good Condition <input type="checkbox"/> 01 = Worn-out (Enter Comments) <input type="checkbox"/> 02 = Broken <input type="checkbox"/> 03 = Missing <input type="checkbox"/> 04 = Defective (Comments required) <input type="checkbox"/> 05 = Bent <input type="checkbox"/> 06 = Bent beyond repair <input type="checkbox"/> 08 = Wrong - Not standard to car (Enter Comments)	<input type="checkbox"/> 00 = Good Condition <input type="checkbox"/> 01 = Worn-out (Enter Comments) <input type="checkbox"/> 02 = Broken <input type="checkbox"/> 03 = Missing <input type="checkbox"/> 04 = Defective (Comments required) <input type="checkbox"/> 05 = Bent <input type="checkbox"/> 06 = Bent beyond repair <input type="checkbox"/> 08 = Wrong - Not standard to car (Enter Comments)		
<b>5) Uncoupling Lever</b>					
Is toggle clearance correct? This is a mandatory comment field. Toggle clearance must be checked when the out lever and lockpin interact. Please indicate if the clearance is acceptable or if it required adjustment. If adjustment was necessary, explain what was needed.		<input type="checkbox"/> Yes <input type="checkbox"/> No (Enter Comments)	<input type="checkbox"/> Yes <input type="checkbox"/> No (Enter Comments)		
<b>6) End Arrangement Type</b>					
Reference Type End Arrangement Applied to Car According To AAR Field Manual. Please use the end arrangement booklet to determine what type of end arrangement is on each car. This will further help to identify a certain type of arrangement that may be contributing to a higher number of UDE's.		<input type="checkbox"/> Arrangement Type 424 <input type="checkbox"/> Arrangement Type 425 <input type="checkbox"/> Arrangement Type 426 <input type="checkbox"/> Arrangement Type 427 <input type="checkbox"/> Floating End Sill w/ Schaeffer Arrangement <input type="checkbox"/> STRATO Coupler Mounted Bracket <input type="checkbox"/> Arrangement Type 4003 <input type="checkbox"/> Arrangement Type 4003X <input type="checkbox"/> Arrangement Type 4003-05 <input type="checkbox"/> Arrangement Type 4021E <input type="checkbox"/> Arrangement Type 4021F <input type="checkbox"/> Arrangement Type 4028 <input type="checkbox"/> Arrangement 4030	<input type="checkbox"/> Arrangement Type 424 <input type="checkbox"/> Arrangement Type 425 <input type="checkbox"/> Arrangement Type 426 <input type="checkbox"/> Arrangement Type 427 <input type="checkbox"/> Floating End Sill w/ Schaeffer Arrangement <input type="checkbox"/> STRATO Coupler Mounted Bracket <input type="checkbox"/> Arrangement Type 4003 <input type="checkbox"/> Arrangement Type 4003X <input type="checkbox"/> Arrangement Type 4003-05 <input type="checkbox"/> Arrangement Type 4021E <input type="checkbox"/> Arrangement Type 4021F <input type="checkbox"/> Arrangement Type 4028 <input type="checkbox"/> Arrangement 4030		
<b>7) End Arrangement</b>					
Inspect for 1) Bent, broken, defective arrangements, 2) Non-standard arrangements, 3) Rewelded or fabricated arrangements. Pay attention to trakey arrangements for proper travel and conditions. Note conditions in comment column. Indicate damages present to end arrangement or if found in good condition. Some arrangements have been "field modified" to facilitate continued movement of the equipment. Indicate if the modified apparatus is attached to the car. The "not standard" component should be removed and replaced with the correct arrangement. In some cases a Coupler Mounted Bracket may have been installed per acceptable repairs outlined in the AAR field manual. This modification is ok.		<input type="checkbox"/> 00 = Good Condition <input type="checkbox"/> 01 = Worn-out (Enter Comments) <input type="checkbox"/> 02 = Broken <input type="checkbox"/> 03 = Missing <input type="checkbox"/> 04 = Defective (Comments Required) <input type="checkbox"/> 05 = Bent <input type="checkbox"/> 08 = Wrong(not standard to car) - Enter Comments	<input type="checkbox"/> 00 = Good Condition <input type="checkbox"/> 01 = Worn-out (Enter Comments) <input type="checkbox"/> 02 = Broken <input type="checkbox"/> 03 = Missing <input type="checkbox"/> 04 = Defective (Comments Required) <input type="checkbox"/> 05 = Bent <input type="checkbox"/> 08 = Wrong(not standard to car) - Enter Comments		
Return completed forms by scan/email to <a href="mailto:adejia@railinc.com-ar">adejia@railinc.com-ar</a> fax it to (918) 651-5455					

# Reusable process for “Bad Actor Identification”

## Initiate

Identify and Gather Data

Identify and Prioritize Problems to Address

Standardize and Stabilize Data  
(quality and quantity)



## Pilot / Validate

Execute Pilot Process to Address Identified Problems

Analyze Results, Adjust, Repeat

Review with Appropriate Subject Matter Experts / Committees



## Identify Method for Industry Implementation

Determine Methods to Share Information  
(e.g., Data Summaries)  
AAR Circular Published

As applicable: Propose Rule Changes, Provide CBA, Communicate Timelines, Update Training, Establish Alerts, etc.

Monitor Results

2012/2013

2014/2015

2015

2016+

# LORF-AHS Bad Actor Identification

## *Data Summary Next Steps*

### 2 Phase Process

- ▶ EHMS DS deployed on **September 29**
  - ▶ Not cause-for-action
  - ▶ Informational in nature (not an alert)
  - ▶ Auto-reset defined
- ▶ Establish industry alert (TBD)
  - ▶ Rule changes needed
  - ▶ No timeline identified



# Line-of-Road Failure – Air Hose Separation (LORF-AHS) Data Summary

## EHMS

### Equipment Status

**Search Criteria**

**\*\*Equipment ID::**  **Date Range::**

**Data Summaries**

	Equipment ID:	Data Summary Type	Owner	Location:	Earliest Open Date	Latest Event Date	Report Repair/Inspection	Opened in Error
	XYZ - 0000001111	LORF NCF	2	BASE	09-10-2015	09-18-2015		
	XYZ - 0000001111	LORF_AHS	2	BASE	09-11-2015	09-14-2015		

Equipment ID: XYZ0000001111 Location: BASE Data  
 Summary: LORF AHS Data Summary

[Hide Criteria](#)

# LORF-AHS Data Summary Example

Opening Criteria:

Autoclose Criteria:

Date of last bad detector read:

Note: all times are Eastern Standard Time (EST) [Show Aggregate Method](#)

Name	Aggregation
Open Date	09-11-2015 23:40
Last Event Date	09-14-2015 23:40
Count of DS Creators	2
12mo Raw Count	2
36mo Raw Count	2
12mo Distinct Pair Count	2
36mo Distinct Pair Count	2
Last LORF-AHS Inspection Date	09-10-2015 00:00
Last LORF-AHS Inspection Reason	LORF AHS Repaired and Released
Last LORF-AHS Inspection Reason Code	AR
2nd to Last LORF-AHS Inspection Date	
2nd to Last LORF-AHS Inspection Reason	
2nd to Last LORF-AHS Inspection Reason Code	
3rd to Last LORF-AHS Inspection Date	
3rd to Last LORF-AHS Inspection Reason	
3rd to Last LORF-AHS Inspection Reason Code	
Last Event Timestamp	09-14-2015 23:40
Last Event Load/Empty Indicator	E
Last Event Partnering Equipment	AZYE0000167777
Last Event End of Equipment 'A'	Y
Last Event End of Equipment 'B'	

This section repeats to capture the most recent 5 events.



# Sharing of Electronic Air Slips

## Air Slips

- ▶ Class I
- ▶ Class IA
- ▶ Extended Haul

## Mileage

- ▶ Ability to calculate miles per car for current air slip



To be used if train is to be moved in excess of 500 miles.

**To Engineer:**

The following test(s) and inspection have been properly performed: (Mark the proper box or boxes)

Class I - Initial Terminal Air Brake Test and Inspection  
 ETD Tested

Train No. 21ACNCT15L

No. of Cars Inspected 4

Person performing test J. Kerber  
 (Signature not required)

Time and Date 17 October 2013 1:00 PM est

Location LA

Initials and Number of car or unit on which rear-of-train device is applied:  
 \_\_\_\_\_

ETD Number \_\_\_\_\_

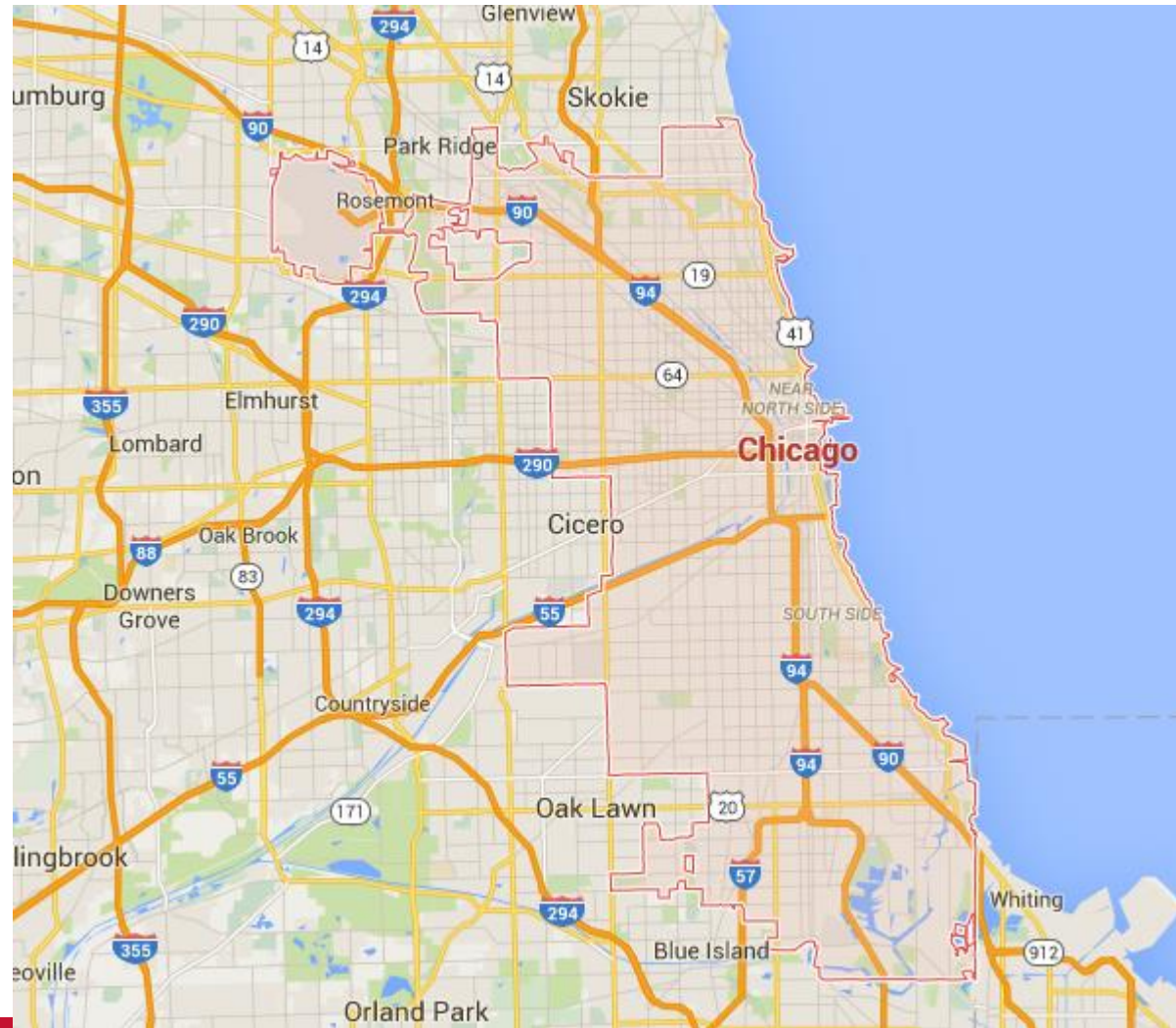
PLACE ON CONTROL STAND OF LEAD LOCOMOTIVE IN PLAIN VIEW OF ENGINEER

FORM 15287 Printed in U.S.A.

# Sharing of Electronic Consist

## Scenarios:

- ▶ AskRail
  - ▶ First Responders
  - ▶ Live April 2015
- ▶ Chicago
  - ▶ Chicago Gateway
  - ▶ POC fall 2015



# Asset Health Strategy Committee Preventing Mechanical Service Interruptions **Inspection Quality Initiatives**



Rolling Stock Asset Health

# **INSPECTION QUALITY INITIATIVES**

# High Level Inspection Quality Platform Benefits

Scenario Developed	Year	Benefit
<b>Cold Wheel Scenario</b> - Analysis - Brake Health Indicator - Air Brake Test/Umler/ Mileage Integration	2013-2015	Higher quality brake inspection data; future brake test regulatory relief; indicator for establishing brake condemning limits
<b>AEI Bad Tag Scenario</b> - Analysis - Bad Tag Identification - AEI Merging Capabilities	2015-2016	Reduce improperly identified components; identify AEI tag issues; increase AEI merging capabilities

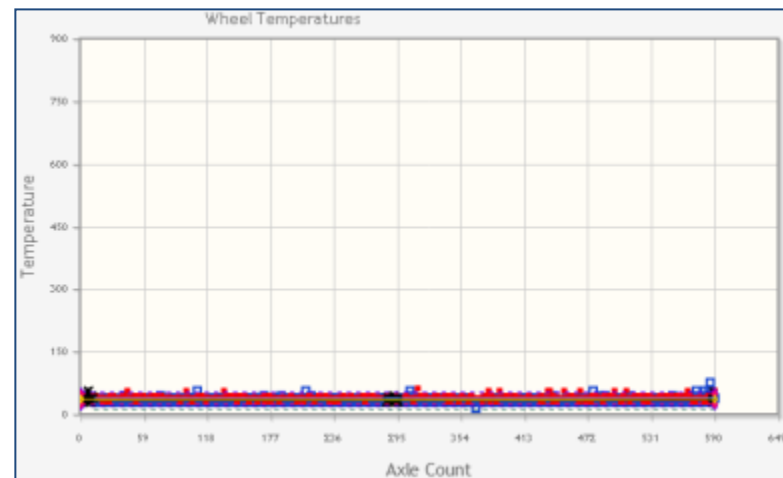
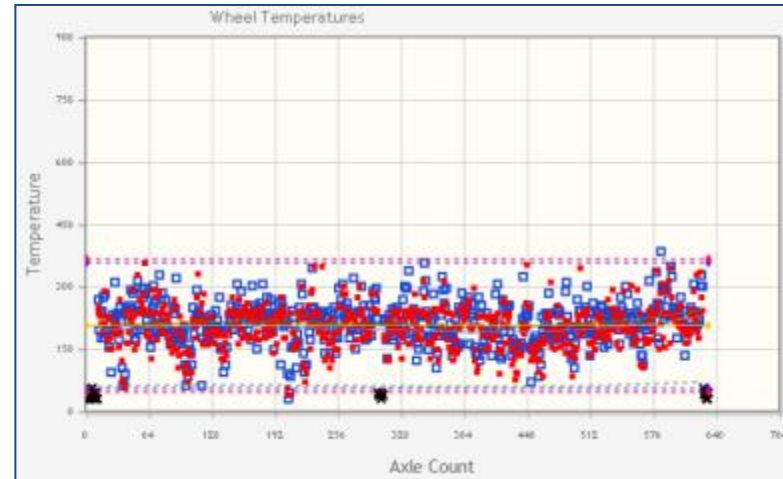
# Cold Wheel Scenario Approach

## ▶ Graph Train Passings by Wheel Temperature Detectors (WTD)

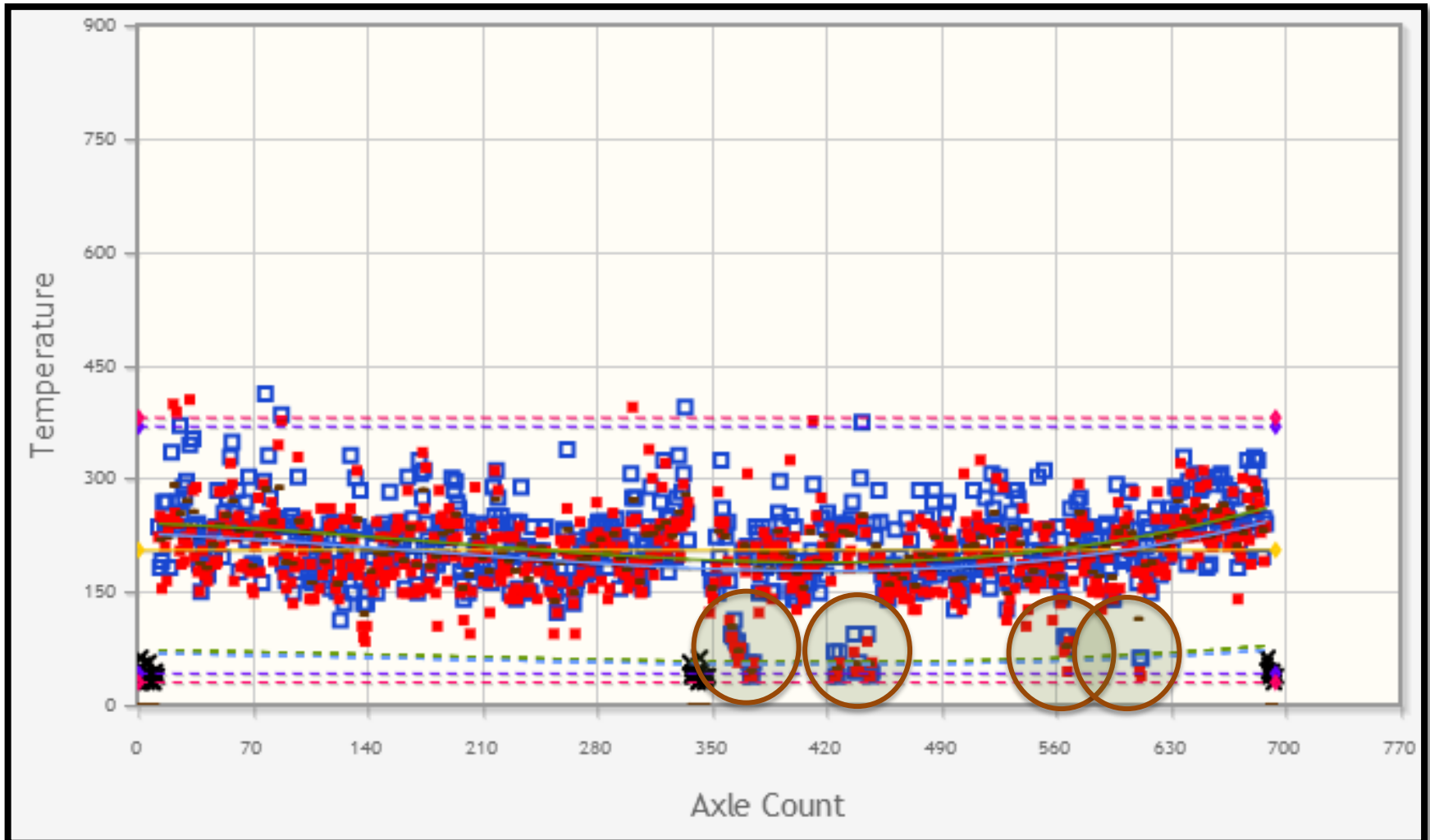
- ▶ Review actual WTD train report data supplied by various Railroads
- ▶ Represent algorithms/thresholds currently used by different Railroads today

## ▶ Ultimately, identify and evaluate the important characteristics

- ▶ Data Quality: good, bad, temperature profile
- ▶ Detector Health: e.g., are there calibration issues?
- ▶ Train Dynamics: braking, non-braking, partially braking
- ▶ Outliers: cold, hot, both




# Identifying Outliers Graphically





# Brake Health Data Summary (Truck Level)

## Data Summary Details

Equipment ID:  Location: TRUCK B Data Summary: BrakeHealth\_TRK

[Hide Crit](#)

**Opening Criteria:** Any wheel temperature detector passing when train is in a braking condition.

**Autoclose Criteria:** Data summary is always open.

**Date of last bad detector read:**

**Note:** all times are Eastern Standard Time (EST)

[Show Aggregate Me](#)

Name	Aggregation
Open Date	08-09-2014 22:54
Last Event Date	04-24-2015 13:04
Count of DS Creators	2
Timestamp of the last Brake Performance Test when the train was in a braking condition	04-24-2015 13:04
Latest ABT Date	08-02-2014 00:00
Last timestamp of when the Brake Performance Test indicate truck passed the cold wheel evaluation	04-24-2015 13:04
Second to last timestamp of when the Brake Performance Test indicate truck passed the cold wheel evaluation	03-14-2015 09:32
Third to last timestamp of when the Brake Performance Test indicate truck passed the cold wheel evaluation	03-13-2015 13:13
Fourth to last timestamp of when the Brake Performance Test indicate truck passed the cold wheel evaluation	10-14-2014 23:07
Fifth to last timestamp of when the Brake Performance Test indicate truck passed the cold wheel evaluation	10-14-2014 14:13
Last timestamp of when the Brake Performance Test indicate truck failed the cold wheel evaluation	
Second to last timestamp of when the Brake Performance Test indicate truck failed the cold wheel evaluation	
Third to last timestamp of when the Brake Performance Test indicate truck failed the cold wheel evaluation	
Fourth to last timestamp of when the Brake Performance Test indicate truck failed the cold wheel evaluation	
Fifth to last timestamp of when the Brake Performance Test indicate truck failed the cold wheel evaluation	
Sixth to last timestamp of when the Brake Performance Test indicate truck failed the cold wheel evaluation	

Truck level Brake Health Indicator

1

# Brake Health Data Summary (Car Level)

## Data Summary Details

Equipment ID: ██████████ Location: BASE Data Summary: BrakeHealth\_CAR

[Hide Criteria](#)

**Opening Criteria:** Any new Brake Health Truck data summary is created

**Autoclose Criteria:** A Brake Health Car data summary will always remain open

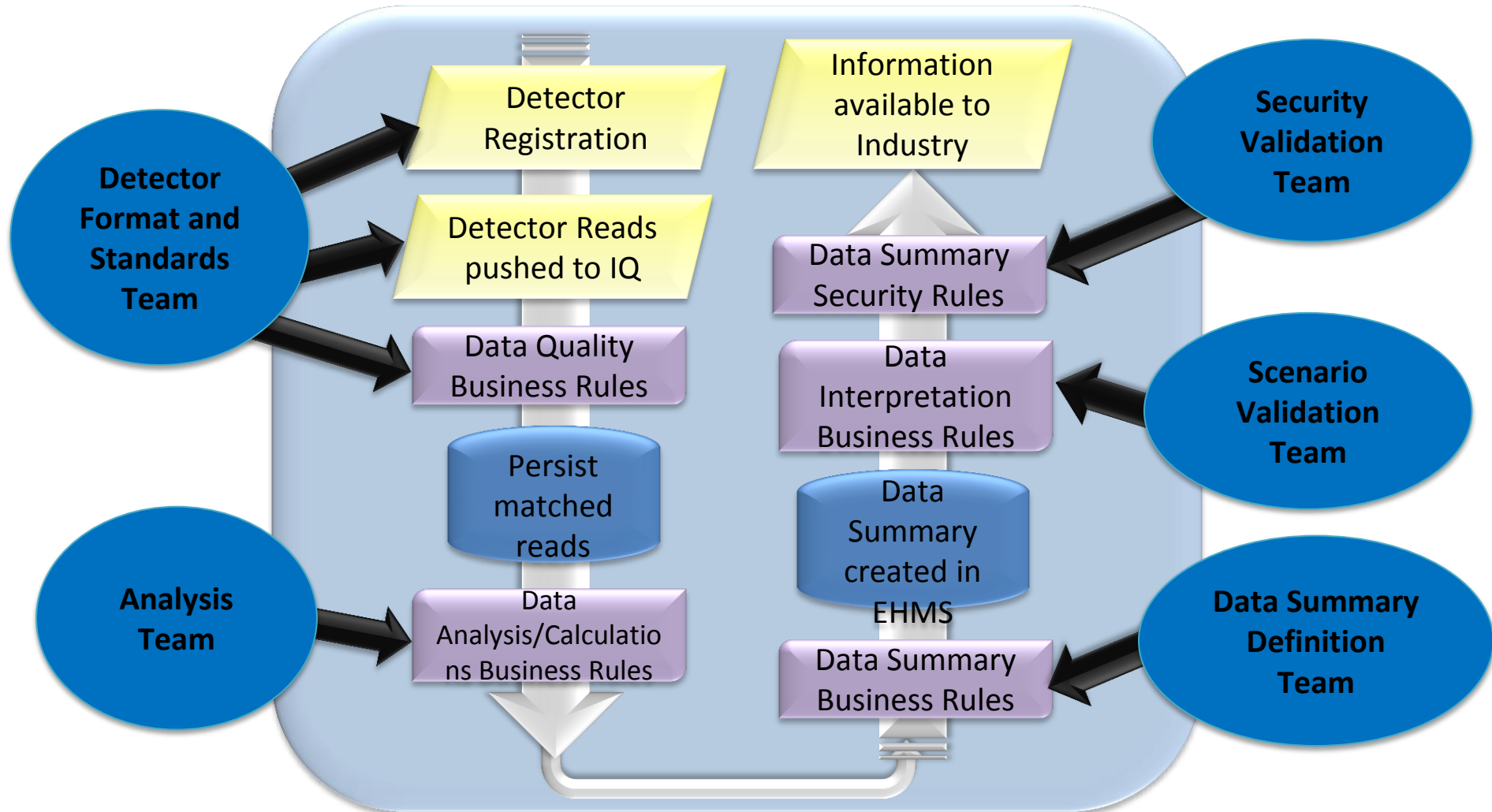
**Date of last bad detector read:**

**Note:** all times are Eastern Standard Time (EST)

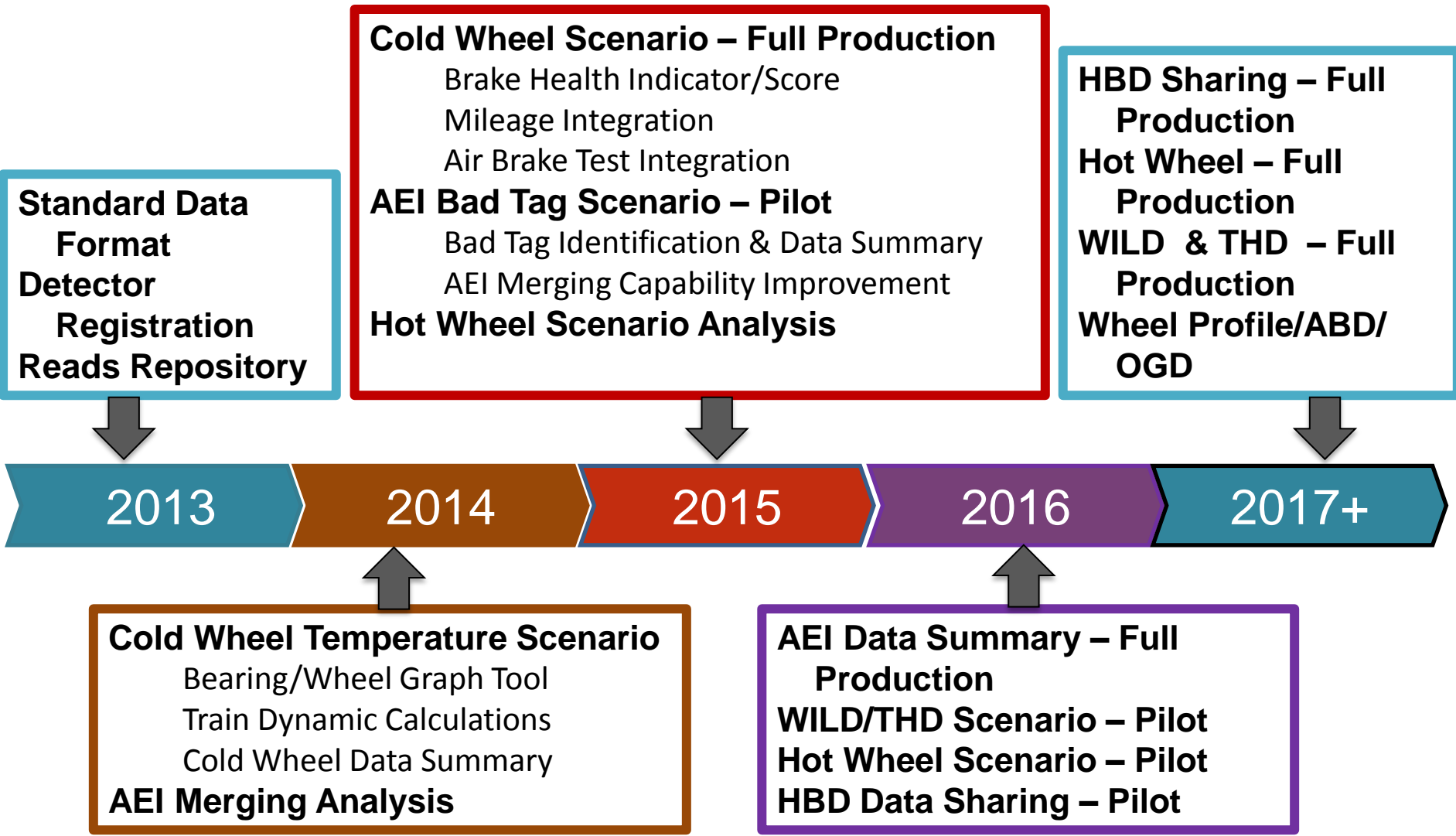
[Show Aggregate Method](#)

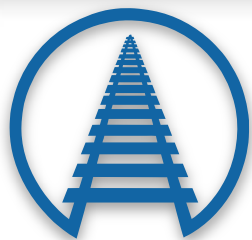
Name	Aggregation	RAIL
Open Date	07-01-2014 01:00	07-01-2014 01:00
Last Event Date	04-24-2015 10:09	04-24-2015 10:09
Count of DS Creators	1	n/a
Latest ABT Date	12-17-2014 00:00	12-17-2014 00:00
Car Brake Health Indicator	5	5
TRUCK A Brake Health Indicator	5	5
TRUCK B Brake Health Indicator	1	1
TRUCK C Brake Health Indicator		
TRUCK D Brake Health Indicator		
TRUCK E Brake Health Indicator		
TRUCK F Brake Health Indicator		
TRUCK G Brake Health Indicator		
TRUCK H Brake Health Indicator		
TRUCK I Brake Health Indicator		
TRUCK J Brake Health Indicator		
TRUCK K Brake Health Indicator		
TRUCK L Brake Health Indicator		

# Inspection Quality Reusable Platform



# Inspection Quality Platform Roadmap





# Rolling Stock Asset Health Questions?

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Minneapolis, MN - October 5, 2015

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