A background image showing a hand holding a white tablet computer over a stack of white papers. The scene is set against a light blue and white background with geometric shapes.

Eliminate the Paper, Analyze the Data

Implement a Mobile Rolling PM Application

Kenneth Mall
Educational Data Systems, Inc.

June 2018



Founded in 1979 and headquartered in Dearborn, Michigan, EDSI is a national workforce development, customized training and consulting company intertwined with one common thread: helping people and companies in transition.

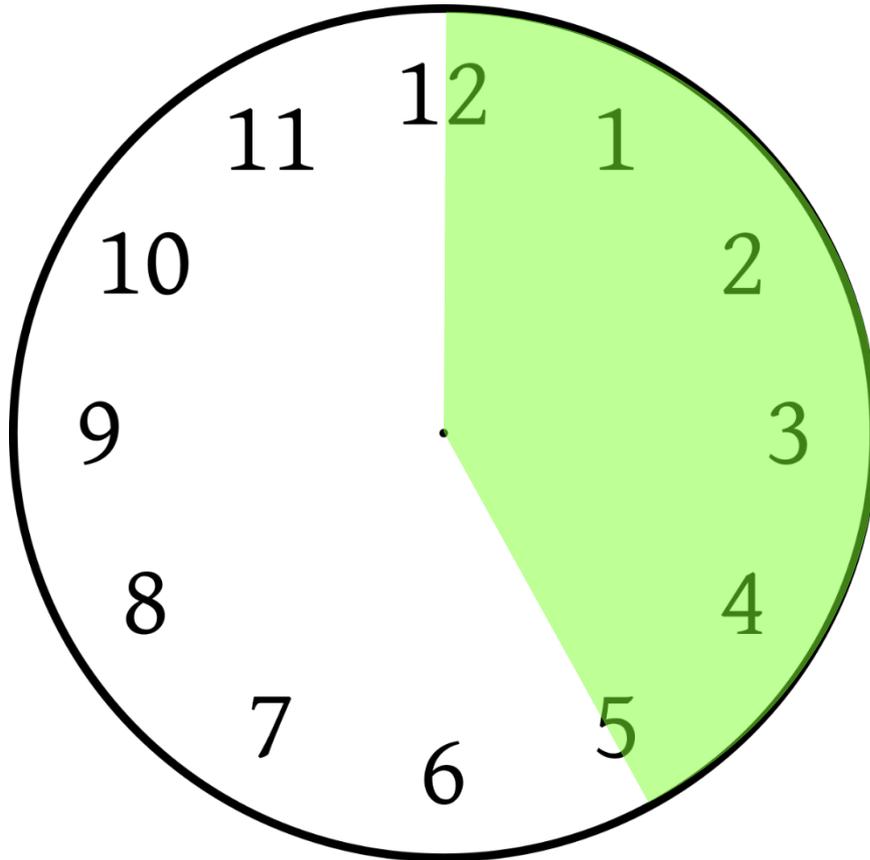


Who we've helped!



- How to design and develop a simple mobile application to collect inspection and maintenance data in real time
- Deploy the mobile application solution across the organization
- Mine the data produced to more efficiently manage assets and people

- Transit agencies are required to inspect all passenger rails cars are before they are put into service – each and every day
- The inspection is valid for 24 hours
- The only way large transit agencies can assure compliance is to inspect their entire fleet before morning pull out



All rail cars
inspected in a short
period of time

Paper Based Process



DAILY REPORT OF UNITS INSPECTED
MAINTENANCE OF EQUIPMENT DEPARTMENT

INSTRUCTIONS:

- Each unit must be inspected once in each 24 hour period and a report made on this form whether needing repairs or not.
- The units found defective must be indicated hereon by placing a (x) mark on the space provided, and a separate report made on Form ME-9 (2C).
- A (Δ) mark to indicate cab signal system has been validated and is operational and that all appropriate cocks, switches, and breakers are out-in and sealed.

The following units were inspected by the undersigned during the period of time indicated above and all were found without defects except those marked by a (x).

LOCATION: _____ DATE: 11/01/16 TIME: 07:00 AM PM

TRAIN NO. <u>706</u>			TRAIN NO. <u>716</u>			TRAIN NO. <u>722</u>			TRAIN NO. <u>736</u>			TRAIN NO.			TRAIN NO.		
TRACK NO. <u>9</u>			TRACK NO. <u>9</u>			TRACK NO. <u>5</u>			TRACK NO. <u>6</u>			TRACK NO.			TRACK NO.		
UNIT NO.	CS	DEF	UNIT NO.	CS	DEF	UNIT NO.	CS	DEF									
<u>4064</u>	<u>A</u>		<u>4326</u>	<u>A</u>		<u>4180</u>	<u>A</u>		<u>4100</u>	<u>Δ</u>							
<u>4065</u>			<u>4327</u>			<u>4181</u>			<u>4101</u>								
<u>4303</u>			<u>4306</u>			<u>4261</u>			<u>4004</u>								
<u>1302</u>			<u>4307</u>			<u>4260</u>			<u>4005</u>								
<u>4018</u>			<u>4091</u>			<u>4040</u>			<u>4270</u>								
<u>4019</u>			<u>4090</u>	<u>A</u>		<u>4041</u>	<u>Δ</u>		<u>4271</u>								
<u>4232</u>									<u>4031</u>								
<u>4233</u>	<u>A</u>								<u>4030</u>	<u>Δ</u>							

COMMENTS _____

EMPLOYEE #	PRINT NAME	SIGNATURE	OCCUPATION	DATE
<u>11025</u>	<u>DWAYNE ROCHESSE</u>	<u>[Signature]</u>	<u>ELECT.</u>	<u>11/01/16</u>
<u>11025</u>	<u>[Signature]</u>	<u>[Signature]</u>	<u>[Signature]</u>	<u>11/1/16</u>

SUPERVISOR NAME: [Signature] EMPLOYEE # 11025

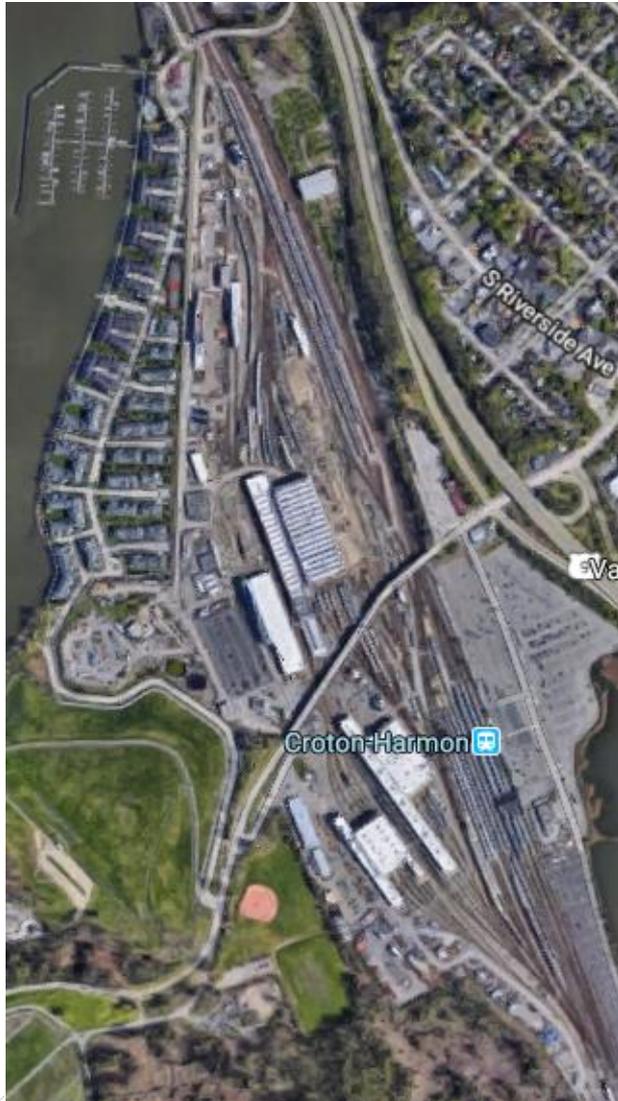
- Hard copy inspection reports
- Only verifies inspection completed
- “If” entered into asset management system, data is limited
- No analytics limiting resource management opportunities



Staff batch entering reports



Staff waiting in line to enter data into a kiosk



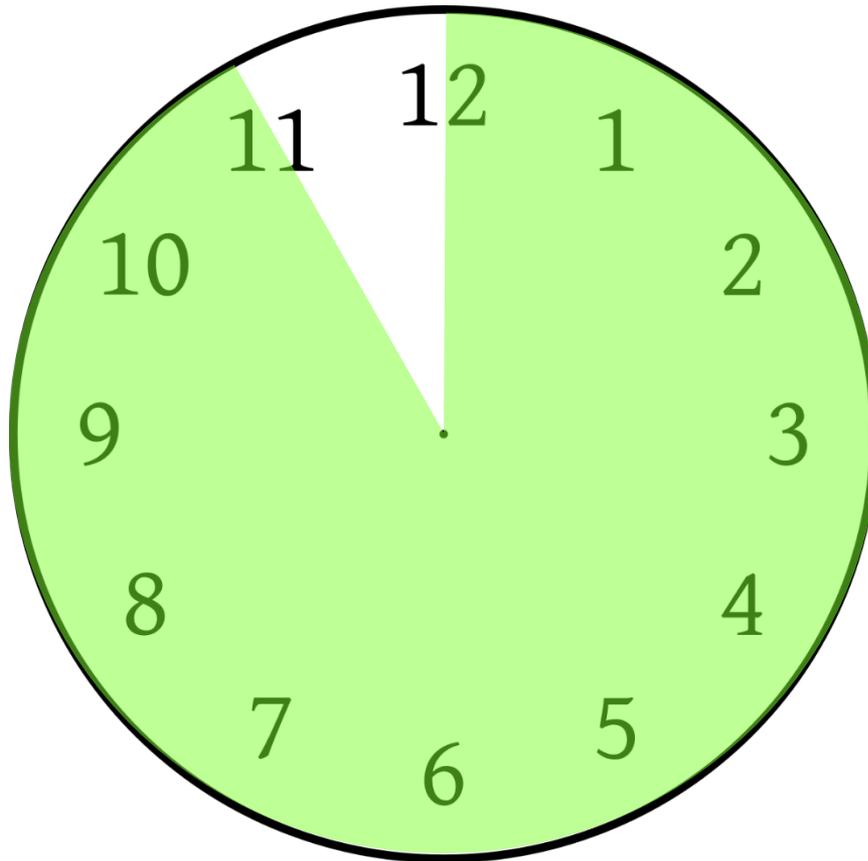
- Passenger rail car fleets are expanding to meet demand
- Yard space and maintenance facilities are **not** expanding



Rail cars inspected
here tonight . . .



. . . may be inspected
here tomorrow night.

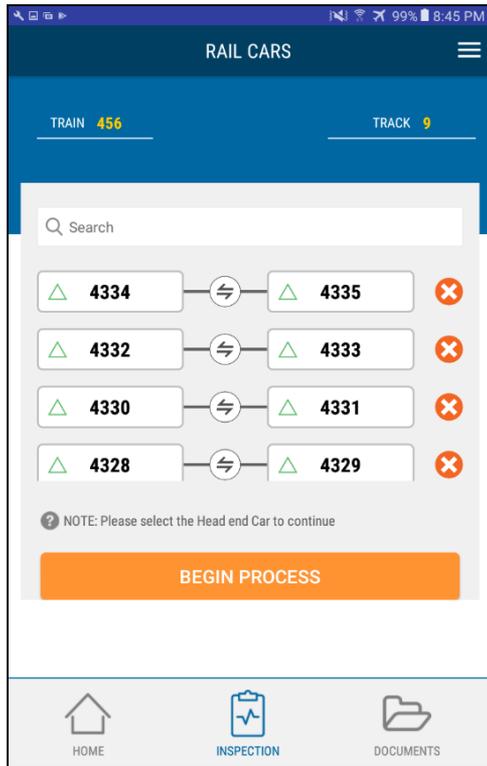


- Transition to a true 24 hour daily inspection cycle to:
 - efficiently manage yard space
 - comply with rolling stock inspection requirements
 - manage human assets



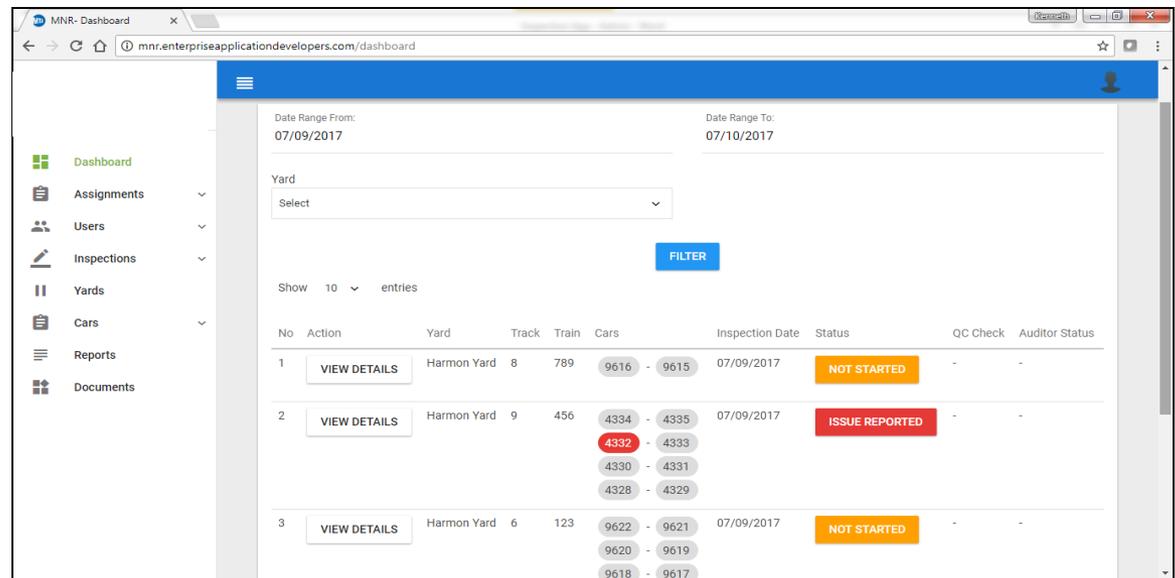
- Collect preventative maintenance and inspection data at point of use in real time
- Provide mechanics with technical information and other resources
- Maximize the time mechanics spend working on rolling stock.

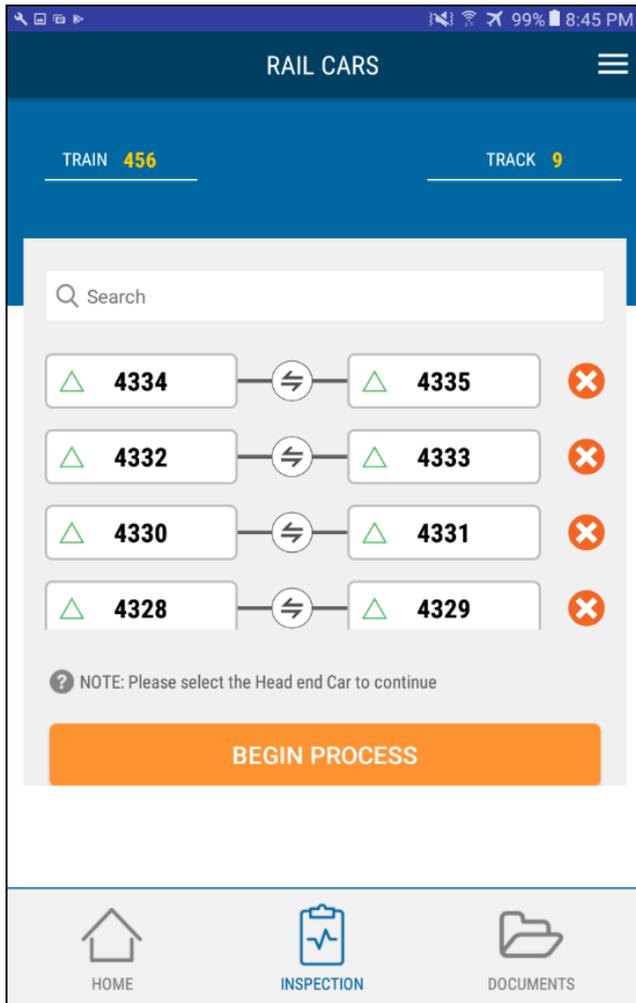
- 1. Effectively manage the 24-hour inspection window by:**
 - Knowing exactly when an inspection is completed
 - Knowing exactly where an inspection is completed
- 2. Gather inspection data in real time**
- 3. Utilize inspection data**



Mobile inspection application

Real Time Dashboard





- Designed for use on any mobile device
- Streamlines data gathering
- Mimics the inspection steps, not the data forms
- Utilizes simple drop down menus and limits text entry
- Enables the use of photos attached to inspection defects
- Pushes data real time to supervisor dashboard

The Dashboard



Date Range From: 07/09/2017 Date Range To: 07/10/2017

Yard: Select

FILTER

Show 10 entries

No	Action	Yard	Track	Train	Cars	Inspection Date	Status	QC Check	Auditor Status
1	VIEW DETAILS	Harmon Yard	8	789	9616 - 9615	07/09/2017	NOT STARTED	-	-
2	VIEW DETAILS	Harmon Yard	9	456	4334 - 4335 4332 - 4333 4330 - 4331 4328 - 4329	07/09/2017	ISSUE REPORTED	-	-
3	VIEW DETAILS	Harmon Yard	6	123	9622 - 9621 9620 - 9619 9618 - 9617	07/09/2017	NOT STARTED	-	-

- Displays in real time all inspection activity
- Enables quicker response to time to maintenance issues – reducing delays
- Data mining opportunities are endless

- Actual inspection complete date and time being recorded – restarting the clock and inspection window
- Inspection issues identified in real time; resolution recorded in database
- Inspection data collected and shared across the system

From this . . .

. . . to this

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The following units were inspected by the undersigned during the period of time indicated above and all were found without defects except those marked by a (x).

LOCATION: _____ DATE: 11/01/16 TIME: 07:00 ^{AM}/_{PM}

| TRAIN NO. |
|-----------|-----------|-----------|-----------|-----------|-----------|
| TRACK NO. |
UNIT NO.	CS	DEF	UNIT NO.	CS	DEF
4064	A		4326	A	
4066			4327		
4303			4306		
4308			4307		
4018			4040		
4019			4041	Δ	
4882			4051		
4833	A		4030	Δ	

COMMENTS

EMPLOYEE #	PRINT NAME	SIGNATURE	OCCUPATION	DATE
	DWAYNE ROCHESIA	<i>[Signature]</i>	ELECT.	11/01/16
	Edgewell	<i>[Signature]</i>	Carman	11/1/16

SUPERVISOR NAME: *[Signature]* EMPLOYEE # 11025



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LOCATION: Harmon Yard AGENCY: New York MTA DIVISION: Metro North Railroad REPORT GENERATED DATE: 04/04/2018

Train no :	Train no : 123	Train no :	Train no : 123	Train no : 456	Train no : 789
Track no : 6	Track no : 9 North	Track no :	Track no : 6	Track no : 10 Belly (Middle)	Track no : 15 North
INSPECTION DATE	TIME	INSPECTION DATE	TIME	INSPECTION DATE	TIME
04/02/2018	17:53	04/02/2018	00:00	04/02/2018	16:03
UNIT NO	CS	DEF	UNIT NO	CS	DEF
8008	Δ	X	4334		
8009		X	4335		
			9501		
			4328		
			4329		
			4248		
			4249		
			8004		
			8005		
			8002		
			8003	Δ	
			8006	Δ	
			9206	Δ	X
			9207		
			9204		
			9205		
			9202		
			9203		
			4012		X
			4013		
			4010		
			4011	Δ	

Comments :

S.NO	EMPLOYEE #	PRINT NAME	SIGNATURE	OCCUPATION	DATE
1		Steven Gonzalez		Carman	07-24-18
2		Christopher Mammano		Electrician	07-24-18

Employee # : _____ Supervisor name: _____

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Train no :		Train no : 123		Train no :		Train no : 123		Train no : 456		Train no : 789			
Track no : 6		Track no : 9 North		Track no :		Track no : 6		Track no : 10 Belly (Middle)		Track no : 15 North			
INSPECTION DATE	TIME	INSPECTION DATE	TIME	INSPECTION DATE	TIME	INSPECTION DATE	TIME	INSPECTION DATE	TIME	INSPECTION DATE	TIME		
04/02/2018	17:53	04/02/2018	00:00	04/02/2018	00:00	04/02/2018	16:03	04/02/2018	16:00	04/02/2018	15:55		
UNIT NO	CS	DEF	UNIT NO	CS	DEF	UNIT NO	CS	DEF	UNIT NO	CS	DEF		
8008	▲	X	4334			9500			9206	▲	X	4014	▲
8009		X	4335			9501			9207			4015	
			4328						9204			4012	X
			4329						9205			4013	
			4248						9202			4010	
			4249						9203	▲		4011	▲

Comments :

S.NO	EMPLOYEE #	PRINT NAME	SIGNATURE	OCCUPATION	DATE
1		Steven Gonzalez		Carman	07-24-18
2		Christopher Mammano		Electrician	07-24-18

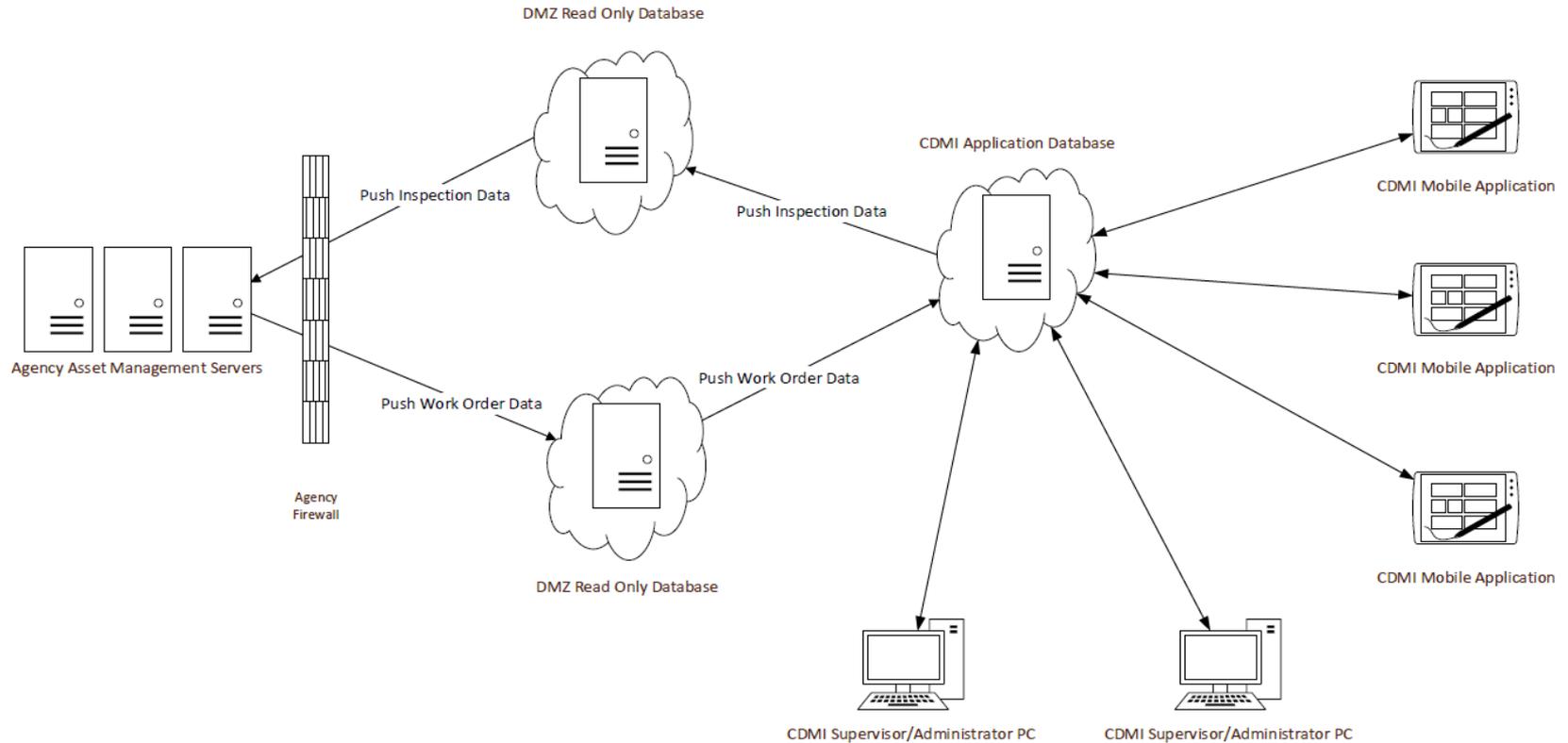
Employee # :

Supervisor name:

Detailed Inspection Report :

TRAIN NO	UNIT NO	INSPECTION TYPE	SYSTEM	COMPONENT	DEFECT	DEFECT STATUS	REPORTED BY	COMMENTS	REPORTED TIME
	8008	Brake Test	Parking Brake	Disk Brake	Emergency position on controller handle does not engage	Defect Reported	Steven Gonzalez		04/02/2018 at 6:00 pm.
	8009	Cab Signal Test	Visual Inspection	Cab signal equipment	EMI shield damaged or misaligned	Repaired	Christopher Mammano		04/02/2018 at 5:54 pm.
	8009	Cab Signal Test	Visual Inspection	Cab signal equipment	EMI shield damaged or misaligned	Defect Reported	Christopher Mammano		04/02/2018 at 5:54 pm.
	456	Brake Test	Emergency Brake Initiation	Master Controller	Emergency brake indicator on TOD not activated	Repaired	Steven Gonzalez		04/02/2018 at 5:31 pm.
	456	Brake Test	Emergency Brake Initiation	Master Controller	Emergency brake indicator on TOD not activated	Defect Reported	Steven Gonzalez		04/02/2018 at 5:27 pm.
	456	Brake Test	Parking Brake	Disk Brake	Emergency position on controller handle does not engage	Repaired	Steven Gonzalez		04/02/2018 at 5:26 pm.
	456	Brake Test	Parking Brake	Disk Brake	Emergency position on controller handle does not engage	Defect Reported	Steven Gonzalez		04/02/2018 at 4:01 pm.
	789	Daily Inspection	Exterior	Running Gear	Brakes Shoes worn/defective	Repaired	Christopher Mammano		04/02/2018 at 3:56 pm.
	789	Daily Inspection	Exterior	Running Gear	Brakes Shoes worn/defective	Repaired	Christopher Mammano		04/02/2018 at 3:56 pm.
	789	Daily Inspection	Exterior	Running Gear	Brakes Shoes worn/defective	Defect Reported	Christopher Mammano		04/02/2018 at 3:55 pm.

Utilize the Cloud – Interface with Asset Management



- Keep it simple – change is hard
- Start small – think big!
- Engage users – what's in it for them?

Same concept can be used for any asset inspection:

- Rail cars
- Locomotives
- Wayside equipment (signals, power, etc.)
- Track
- Transit buses
- Shop equipment
- Auditing and Quality Control

Thank you!

Kenneth Mall

Managing Director – Workforce Consulting
EDSI

313-271-2660

kmall@edsisolutions.com

www.edsisolutions.com