

HUMAN EVALUATION VS AUTOMATED TECHNIQUES FOR LOCAL GOVERNMENT PAVEMENT MANAGEMENT

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Overview

Factors Affecting Evaluation Differences About Adams County, IL & ARA's Surveys Comparisons





Learning Objectives

1. Effect of local pavements on automated evaluations
2. Factors that affect accuracy versus manual evaluations
3. Elements of automated systems that **you** need to consider



Image Source: Microsoft stock images



FACTORS AFFECTING AUTOMATED EVALUATION



Automation Issues on Local Pavements

Higher Level Distresses

- Lower traffic
- Thinner pavement cross sections
- Longer rehabilitation cycles
- Increased macro texture

Unique Geometry

- Curb and gutter
- Unsupported edges
- Iron in the street
- Parked cars



Image Source: Microsoft stock images



Automation Spectrum



Manual



Manual, Digital Images



Automated, with Manual QC



Image Source: Nicholas Halodi via Wikimedia Commons

Automated

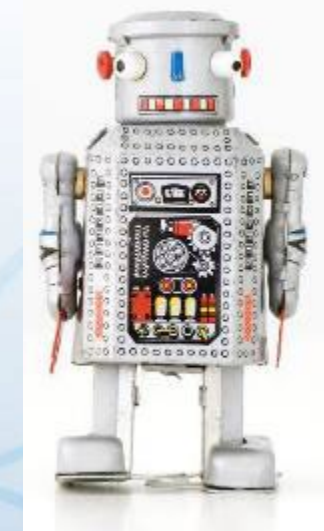


Image Source: Microsoft stock images



Factors Affecting Analysis

Location

Equipment

- Accuracy
- Detail

Methodology

- Detail Level
- Complexity





Can You Change the Methodology?

False Comparisons

- Too many variables
- Index translation
- Some details might be used by one and not the other

Consistency

- Use of old data
- Progression of condition
- Existing settings and tools

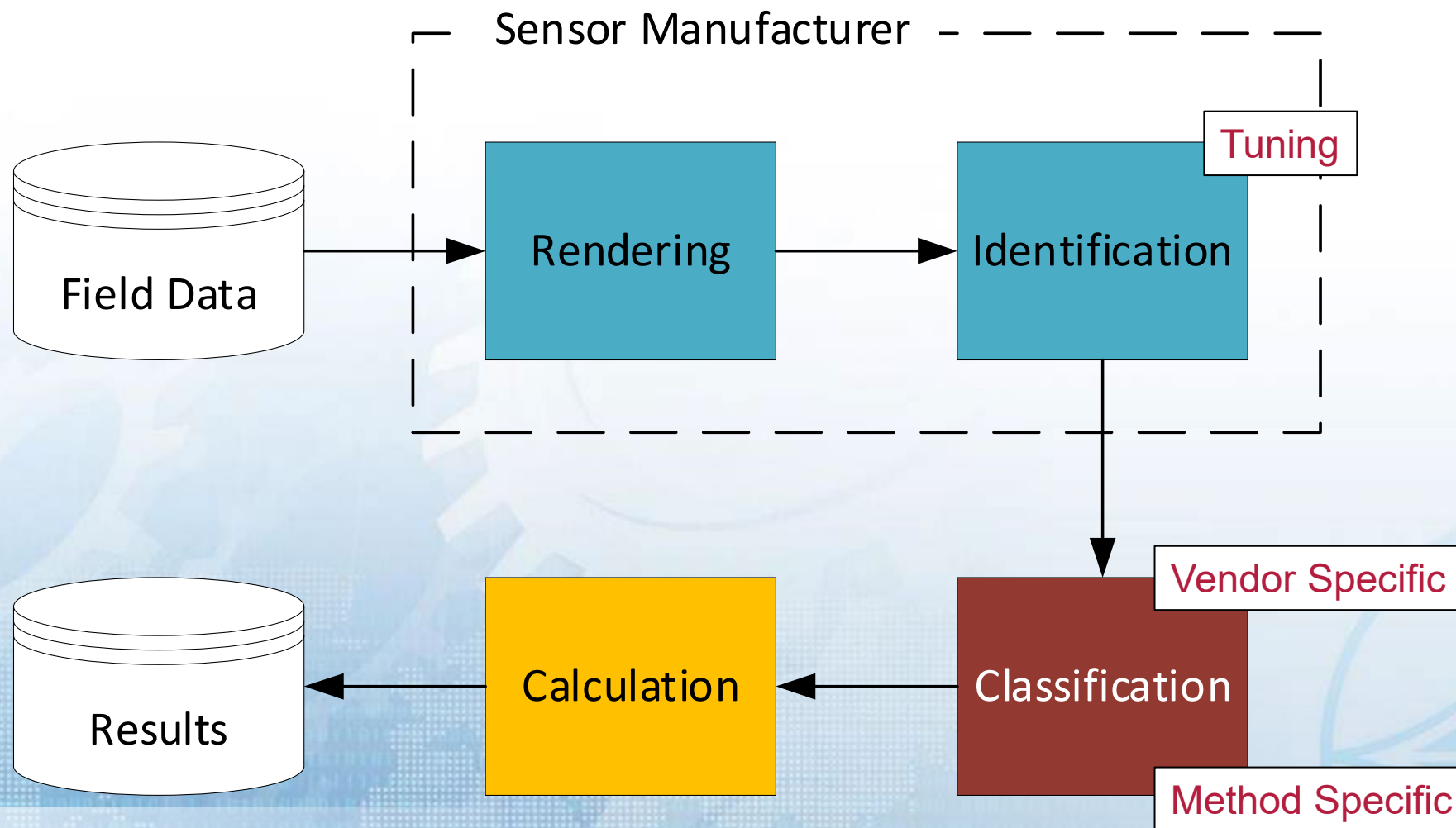
Reporting

- State requirements





Processing Pipeline





ADAMS COUNTY, IL & ARA SURVEYS



About Adams County, IL

Client: Adams County Highway Department

Size: 250 centerline miles

Timing: 2015, 2018, & 2021

Evaluations:

- Surface using modified PCI
- Structural using FWD

Surface Condition Equipment

- LCMS Sensors
- ICC Connect for LCMS to PCI





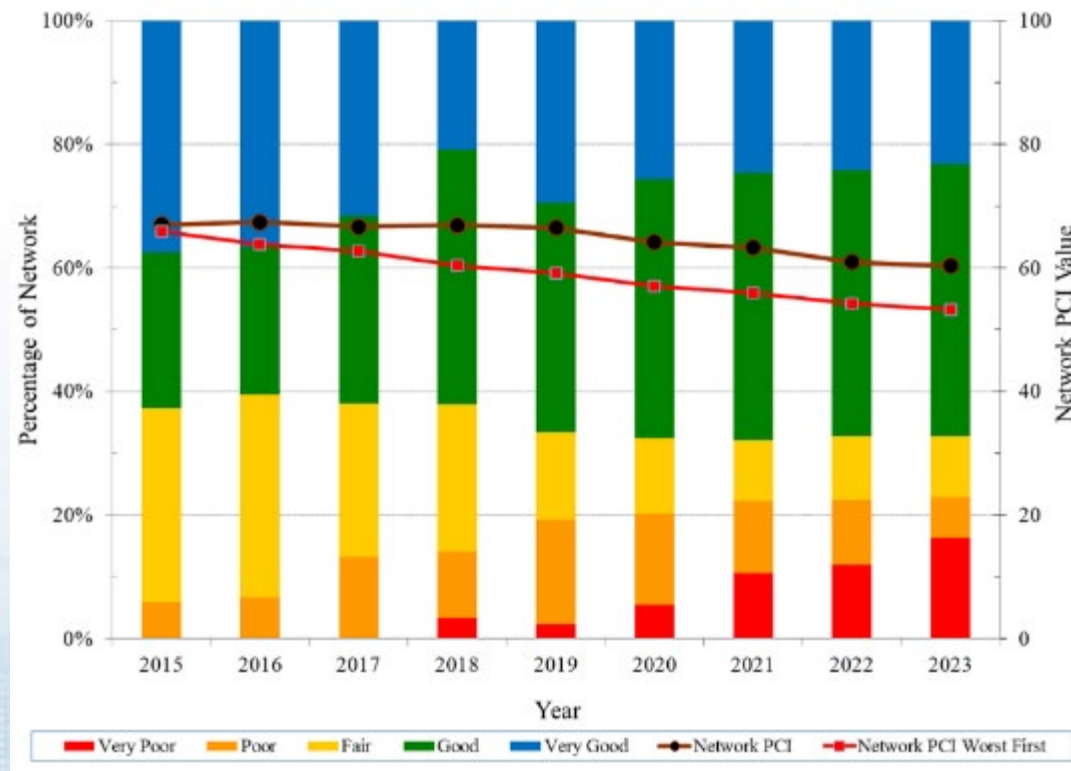
Pavement Management in Adams County

Uses ARA's RoadCare Software

Decisions based on:

- Surface Conditions
- Structural Conditions

Generates a 5 Year Work Plan





Modified Pavement Condition Index

Manual surveys performed with sampling

Automated surveys performed at 100% of surveyed area

Manual Survey	Automated Survey
Longitudinal Cracking	Longitudinal Cracking
Transverse Cracking	Transverse Cracking
Fatigue Cracking	Fatigue Cracking
Potholes	
Centerline Cracking	
Block Cracking	
Bleeding	
Patching	
Weathering	



Adams County Treatment Matrix

PCI Value	PCI Rating	Hard Surfaced Roads High Traffic (ADT > 1000)			Hard Surfaced Roads Low Traffic (ADT < 1000)			Chip Seal Roads All Traffic
		FWD Deflection, mils			FWD Deflection, mils			
		< 11 Good	11 - 18 Fair	> 18 Poor	< 16 Good	16 - 28 Fair	> 28 Poor	All Deflections
100	Very Good	Defer Maintenance			Defer Maintenance			Chip seal
80		Crack sealing (maximum 2 time)			Crack sealing (maximum 2 time)			
60	Good	Microsurfacing (maximum 1 time)	Crack sealing (maximum 2 time)		Microsurfacing (maximum 1 time)	Cape Seal (maximum 2 times)	Defer Improvements	
40		Cape Seal (maximum 2 times)						Mill 1.5 - Replace 1.5 Poly
20	Fair	Mill 2 - Replace 2 Poly	Mill 3 - Patch - Replace 3 Poly	Mill 3 - Patch - Replace 4 Poly	Mill 2 - Replace 2 HMA	Mill 3 - Patch - Replace 3 HMA		Double Chip Seal
0		Reconstruction (FDR, Rubblize, CIR)			Reconstruction (FDR, Rubblize, CIR)			

Cold-Inplace Recycling Options

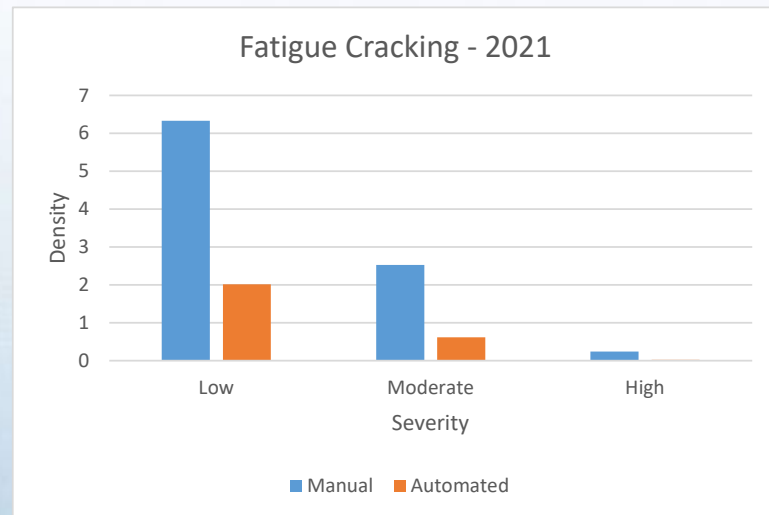
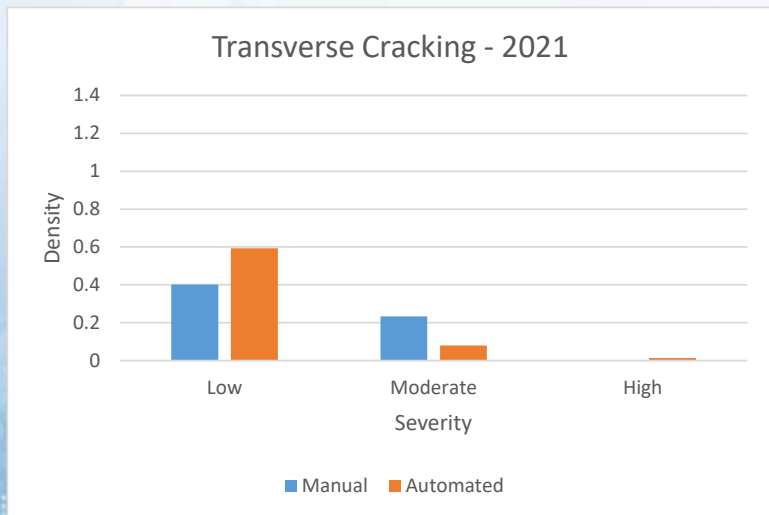
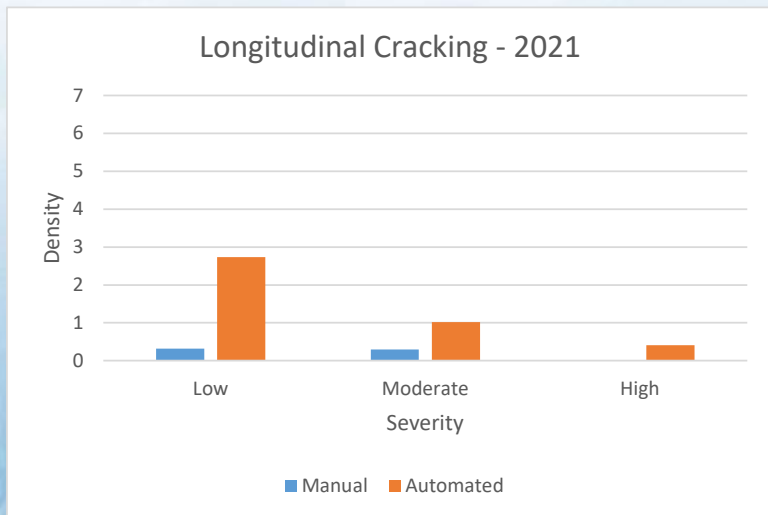
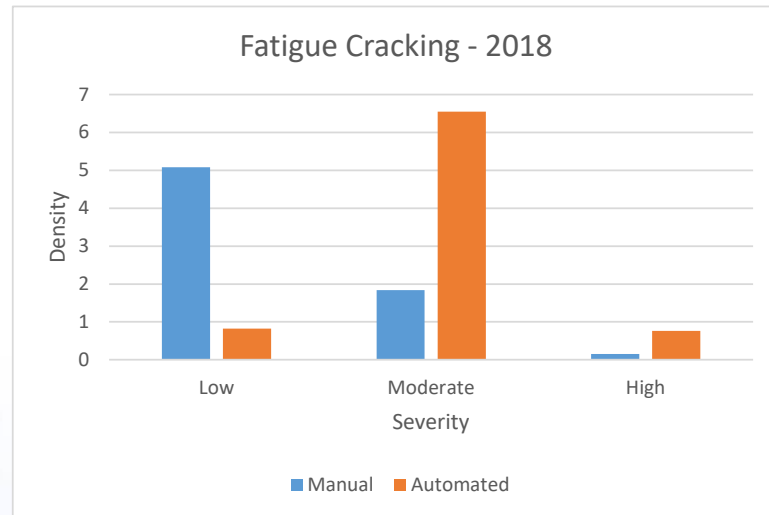
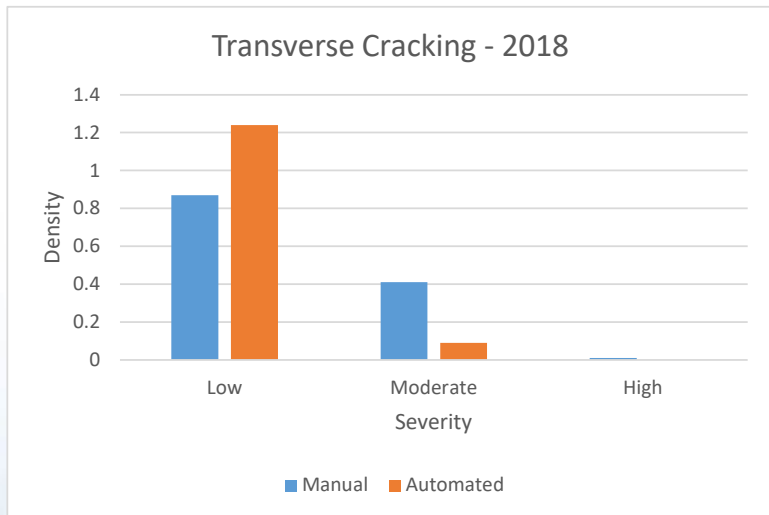
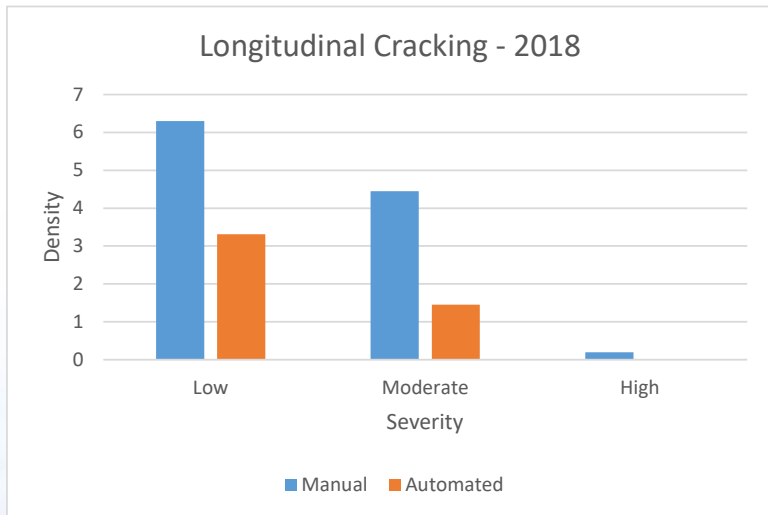
60	Fair	CIR 4 (max) + Cape Seal	CIR 4 (max) + 1.5 Poly	CIR 4 (max) + 2 Poly	CIR 4 (max) + Cape Seal	CIR 4 (max) + 2 HMA
40		CIR 4 (max) + 1.5 Poly	CIR 4 (max) + 2 Poly	CIR 4 (max) + 2.5 Poly	CIR 4 (max) + 1.5 HMA	CIR 4 (max) + 2.5 HMA
20	Poor	CIR 4 (max) + 1.5 Poly	CIR 4 (max) + 2 Poly	CIR 4 (max) + 2.5 Poly	CIR 4 (max) + 1.5 HMA	CIR 4 (max) + 2.5 HMA



COMPARISONS



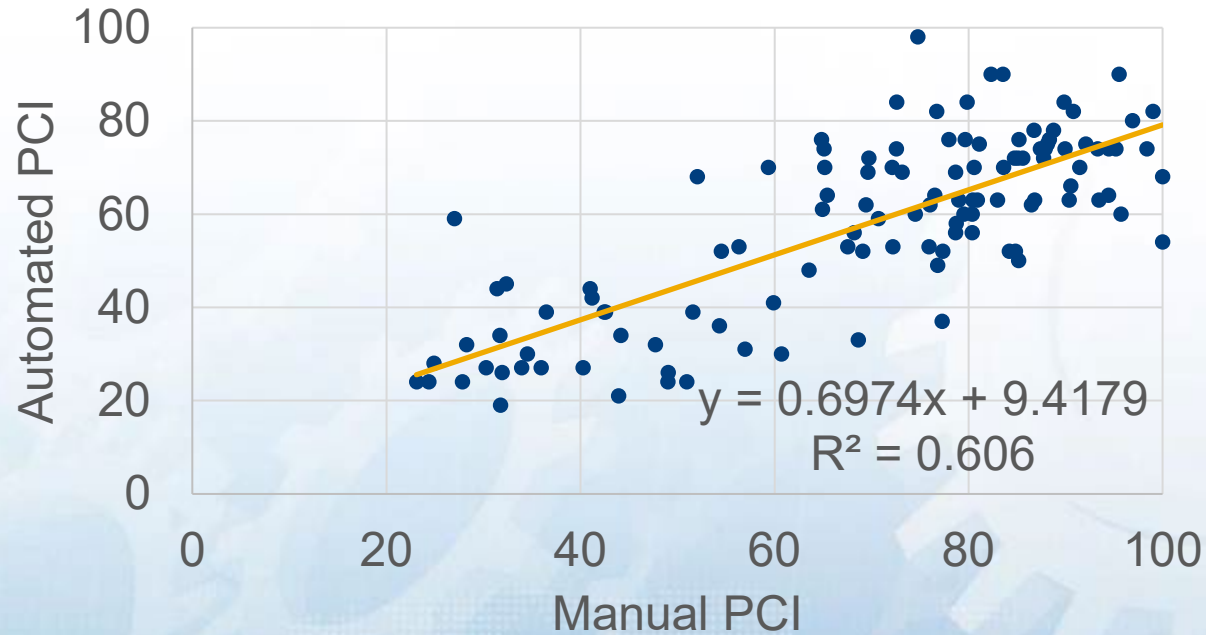
Individual Distresses



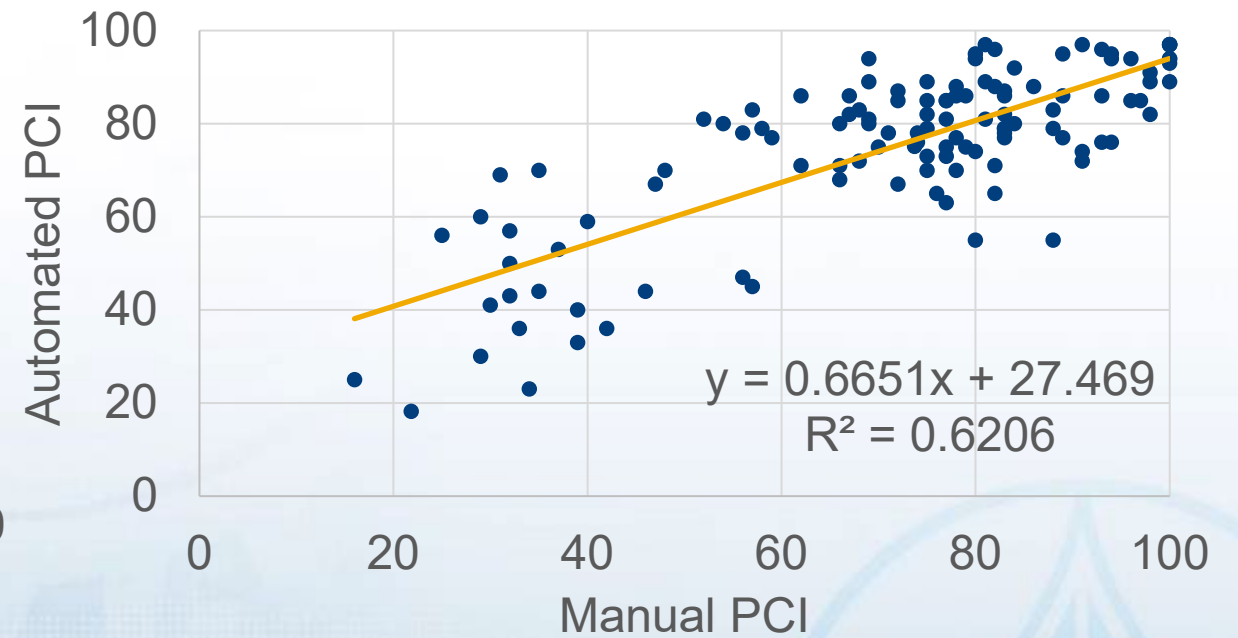


Pavement Condition Index

2018 Data

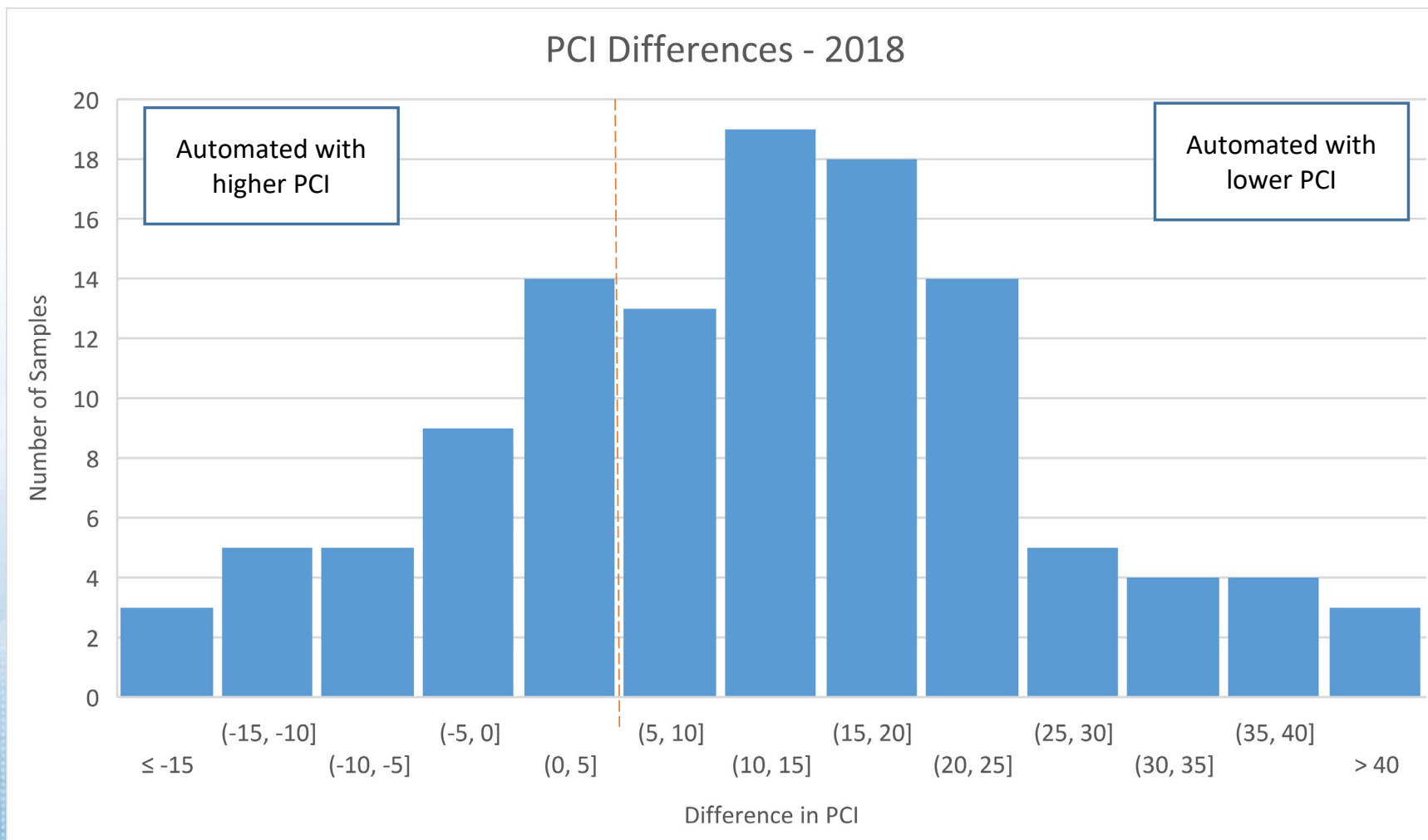


2021 Data



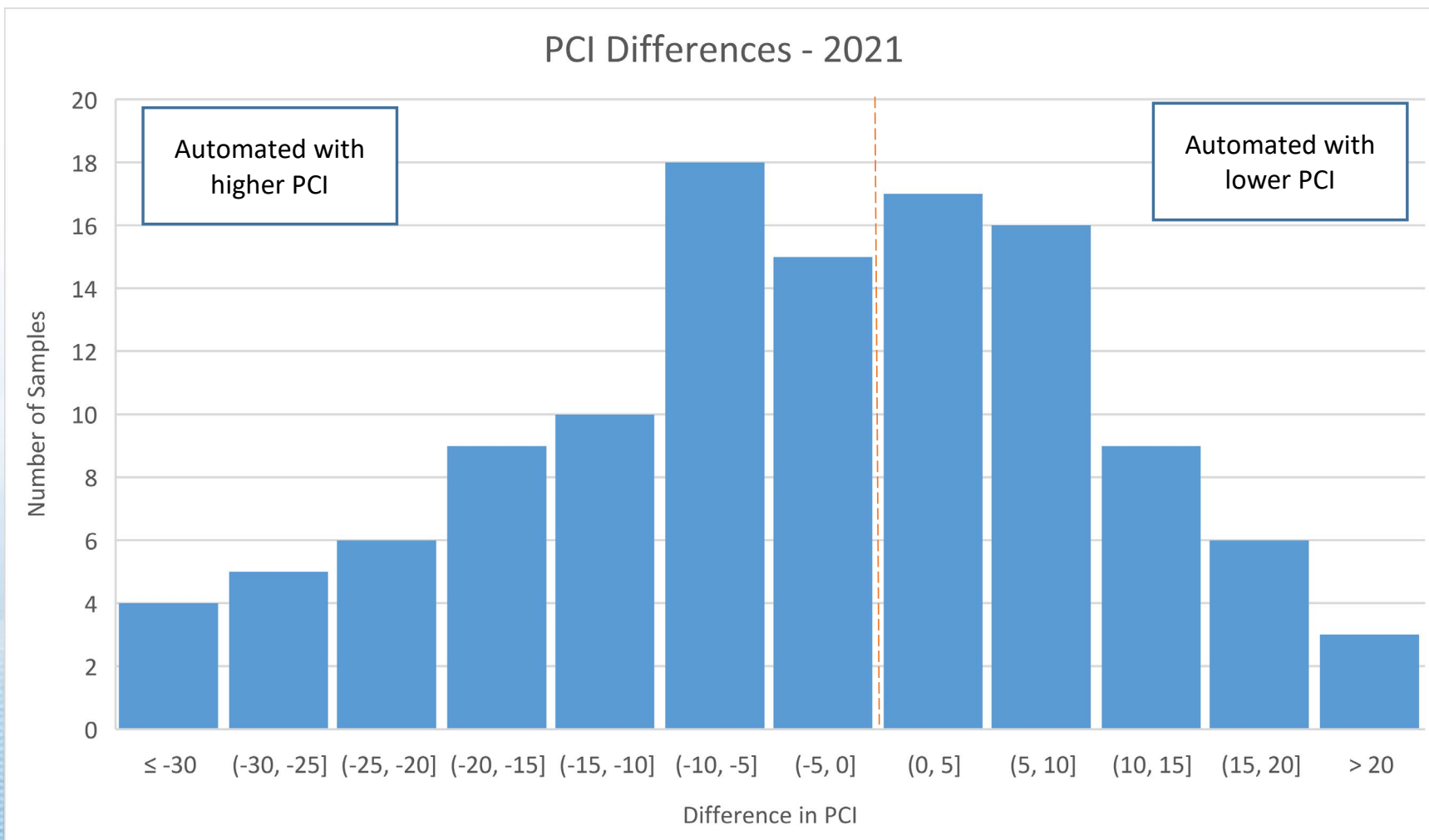


PCI Difference Histogram





PCI Difference Histogram



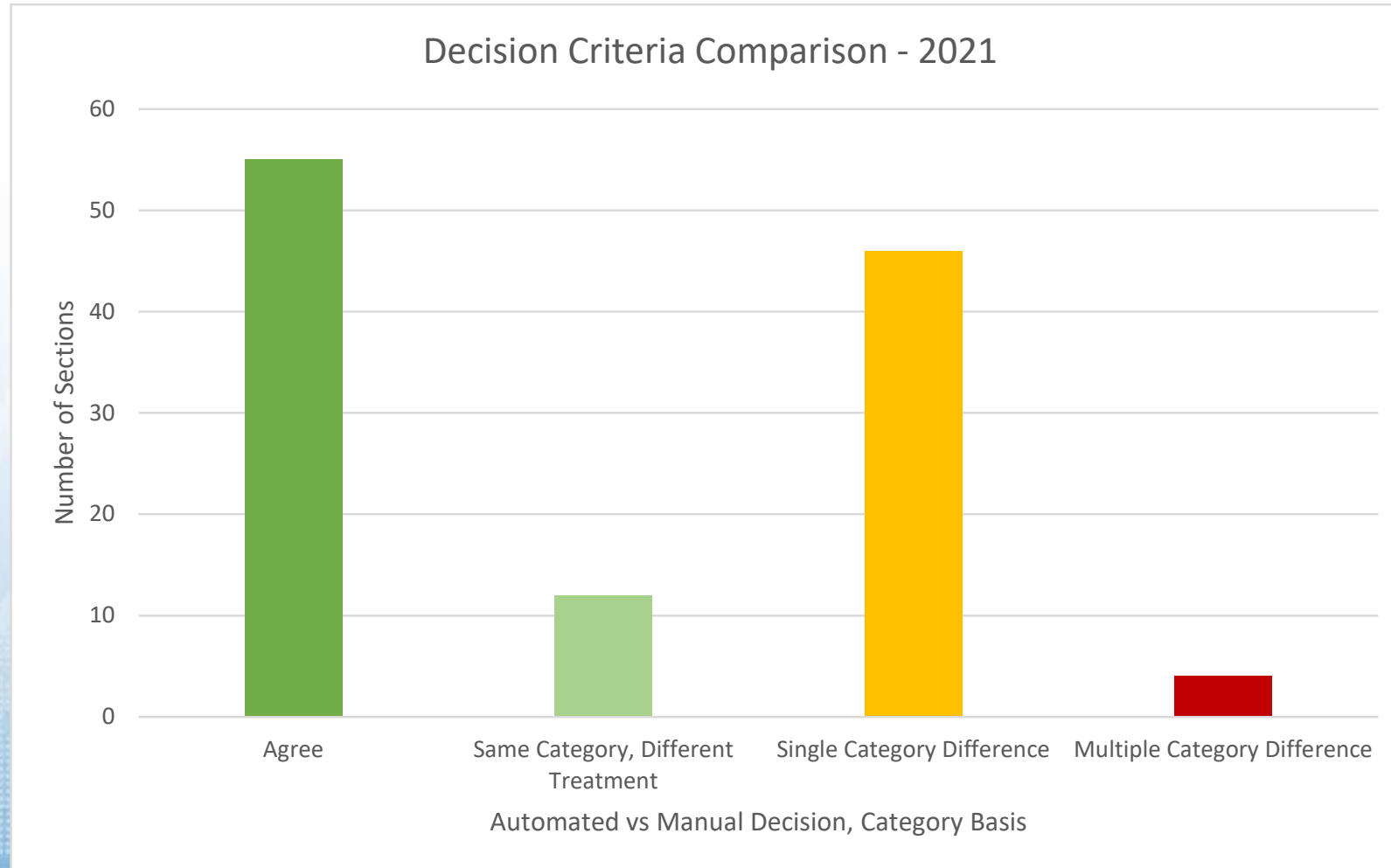


Decision Categories





Decisions





CONCLUSIONS



Conclusions

Fatigue Cracking is Hard

- Pattern recognition issues

Vendor Software Changes

Pavement Management Critical Items

- Decisions were affected
- Effect of sampling
- Missing critical distresses?



Image Source: Microsoft stock images



Other Automated Evaluation Thoughts

Lack of Baseline

- There are still disagreements about evaluation details

Implementation Specifics

- Agencies have been customizing their evaluations for years
- Addresses their specific concerns

Automated Sampling

- Local roads can have drastic differences transversely – they are much more affected by vehicle path

Changing Targets

- Rapid evolution in the automated evaluation space



Acknowledgements

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Adams County Highway Department





THANK YOU