



# Connected vehicle roughness data collection is real and could change our industry.

Pavement Evaluation 2019  
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# Pavement evaluation continues to evolve

Manual (PCI)

Vehicle Based Systems

Advanced 3D Systems

Simplified Systems

Smartphones

Connected Vehicles



# We started with manual data collection





**Early Attempt at Pavement Data Collection**



# We evolved to mounting video camera and using high speed profilers





# The camera systems then went digital





# Now we have advanced 3D scanning lasers

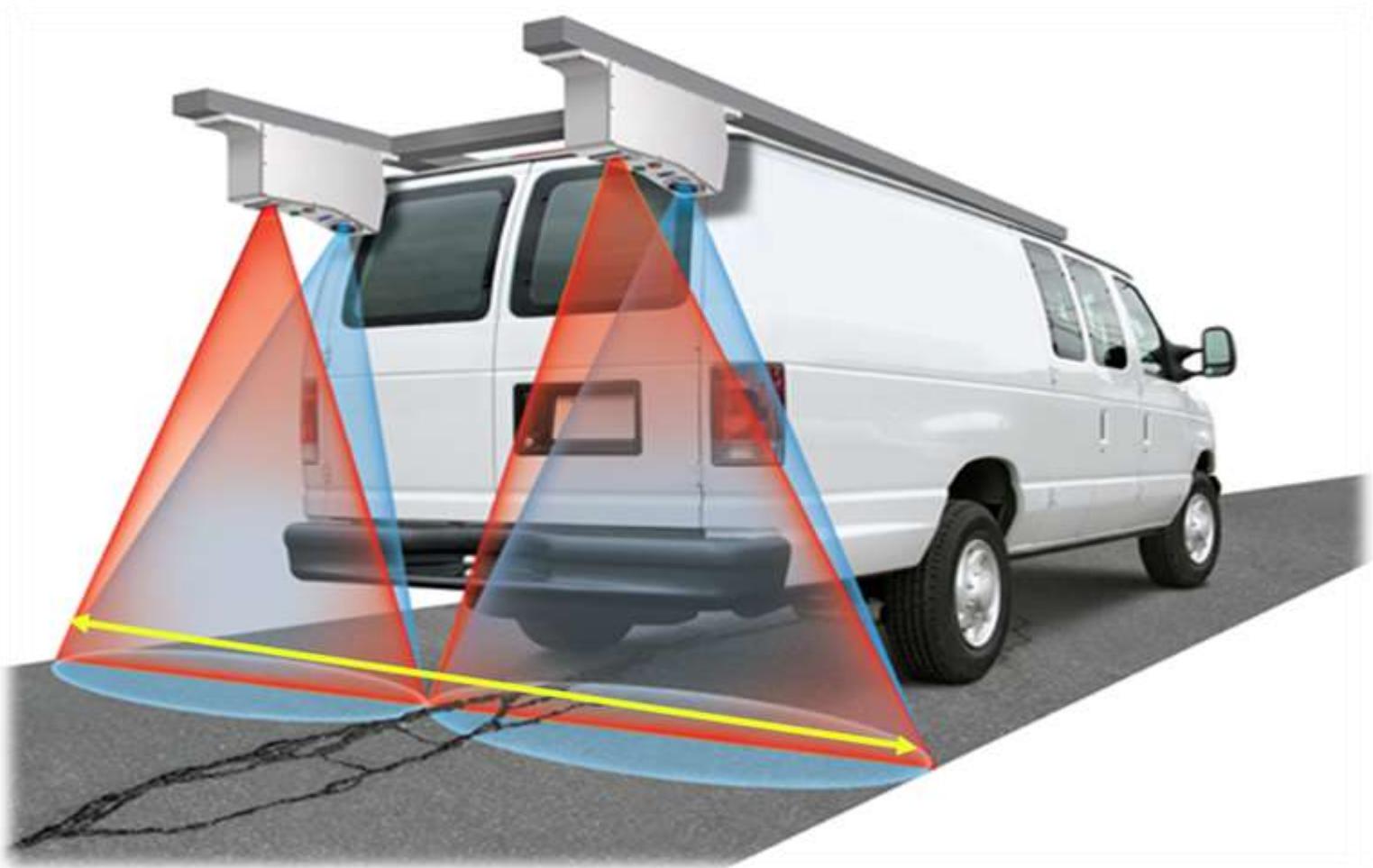


Photo: Pavemetrics



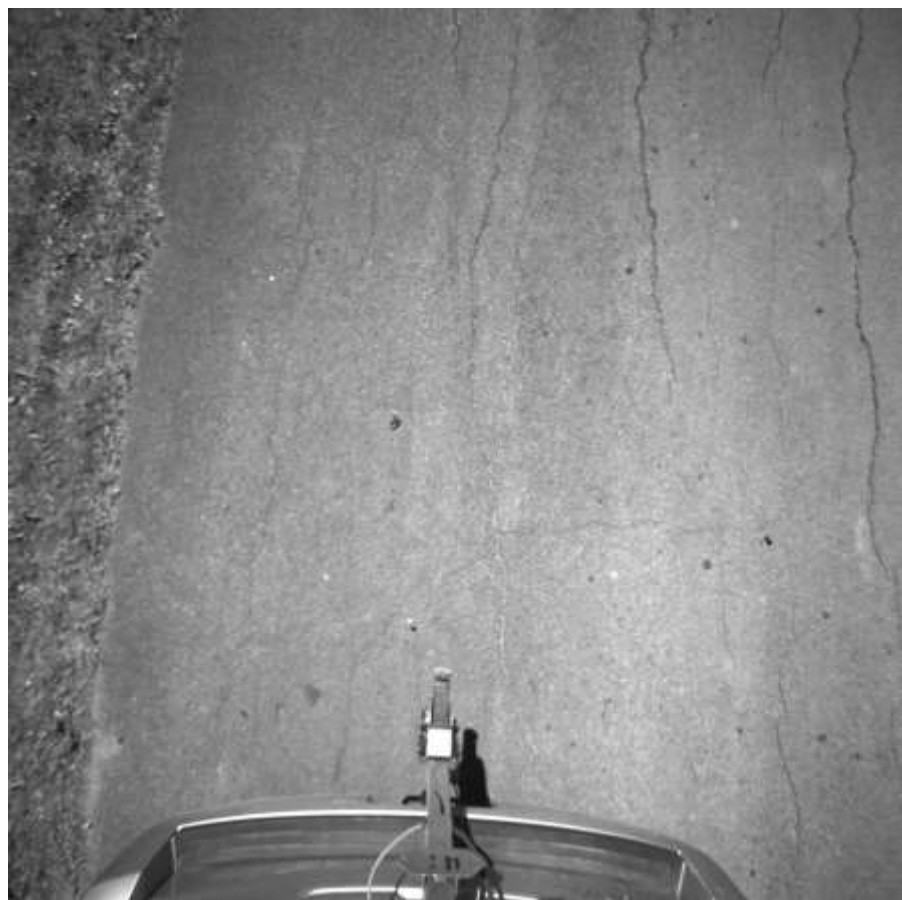
# Because of cost, a new market is open





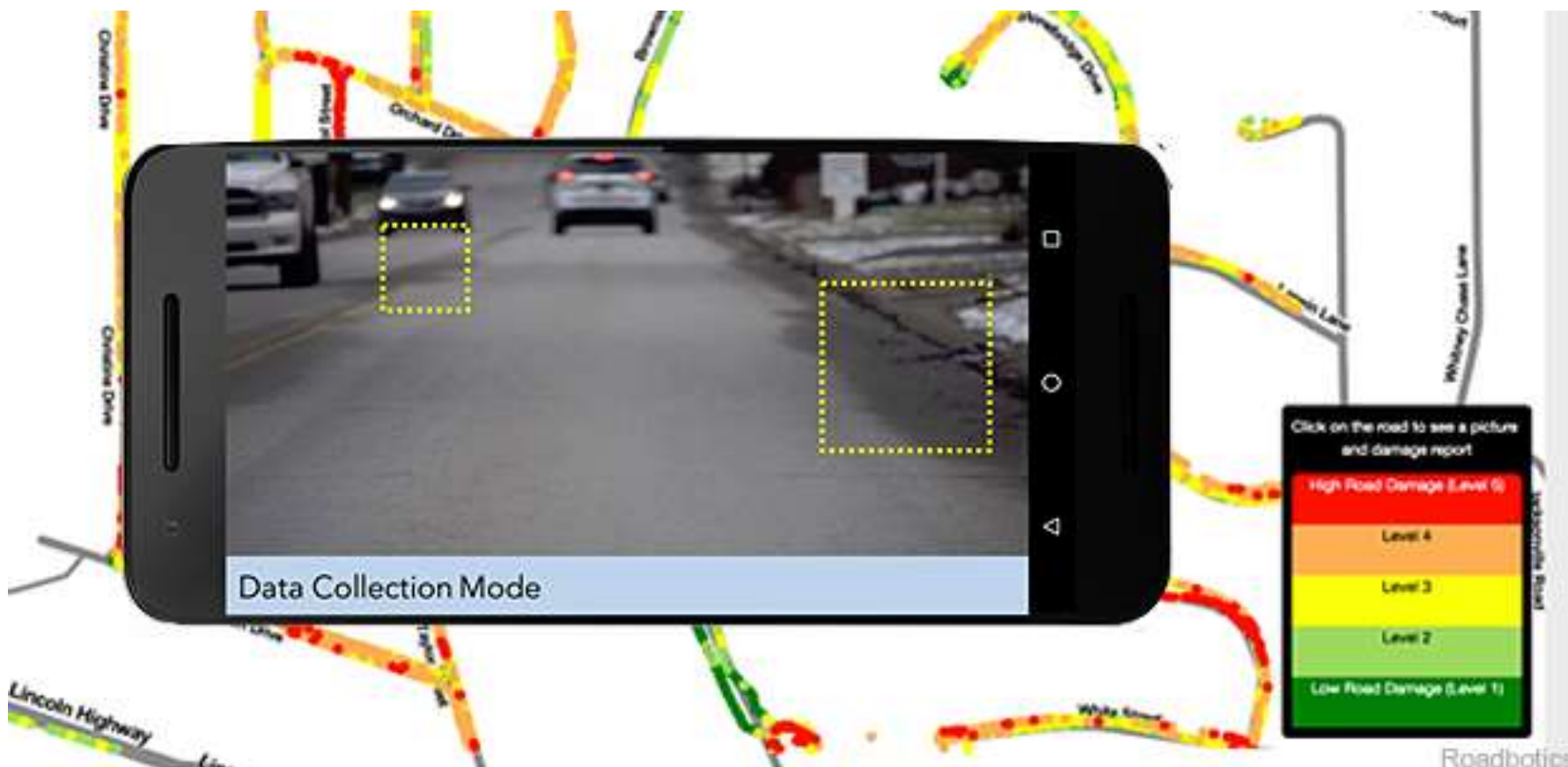


# Low cost systems allow automated distresses and roughness data





# We continue to look to more simple technology to fill a market need



Roadbotics  
Photo: Roadbotics



**Where we have been is not the limit to where we are going**

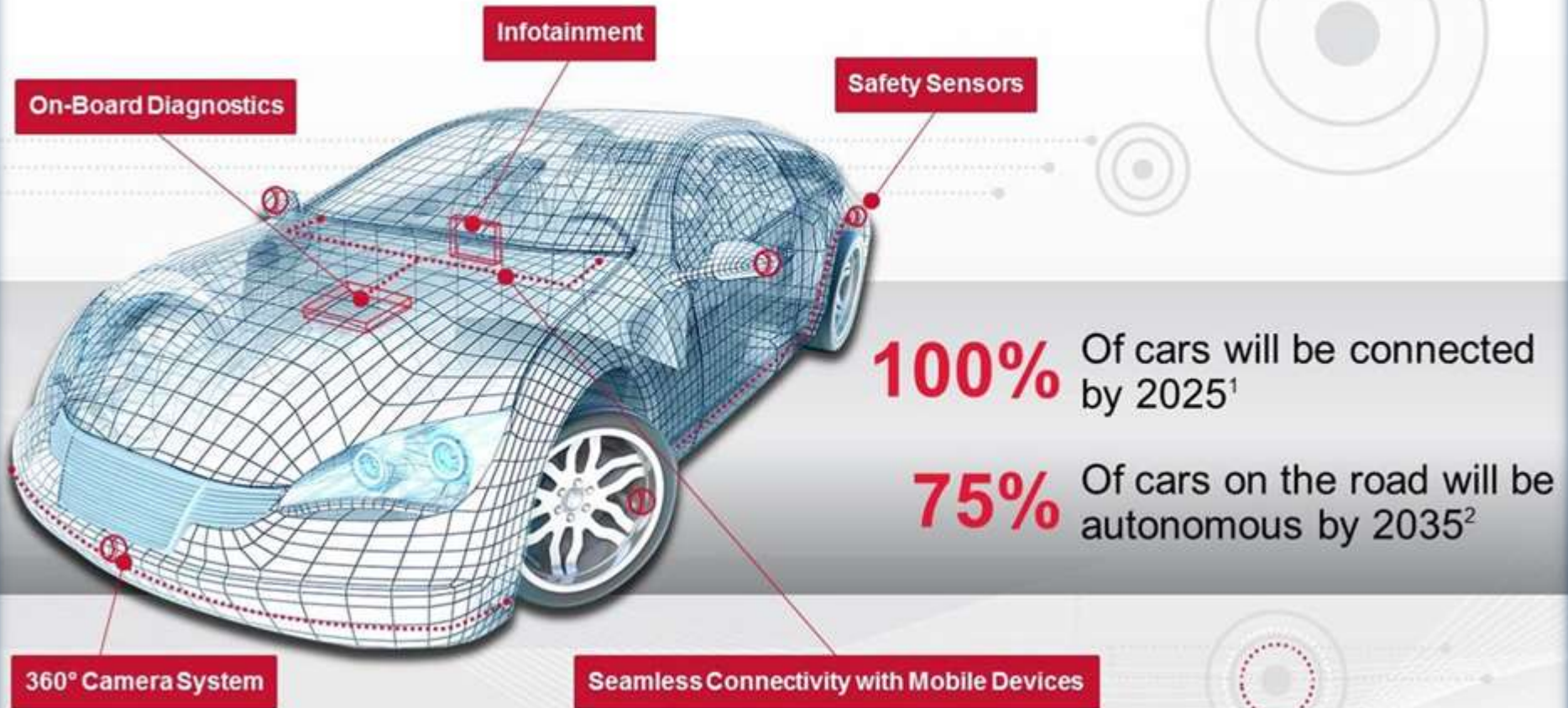
**Phones can be sensors**

**Cars can be sensors**

**Agencies will see more data**

**Should lead to better decisions**

# THE CONNECTED CAR



Source: <sup>1</sup>GSMA 2013, <sup>2</sup>Navgant Research 2013

There are connected vehicles  
on the road today

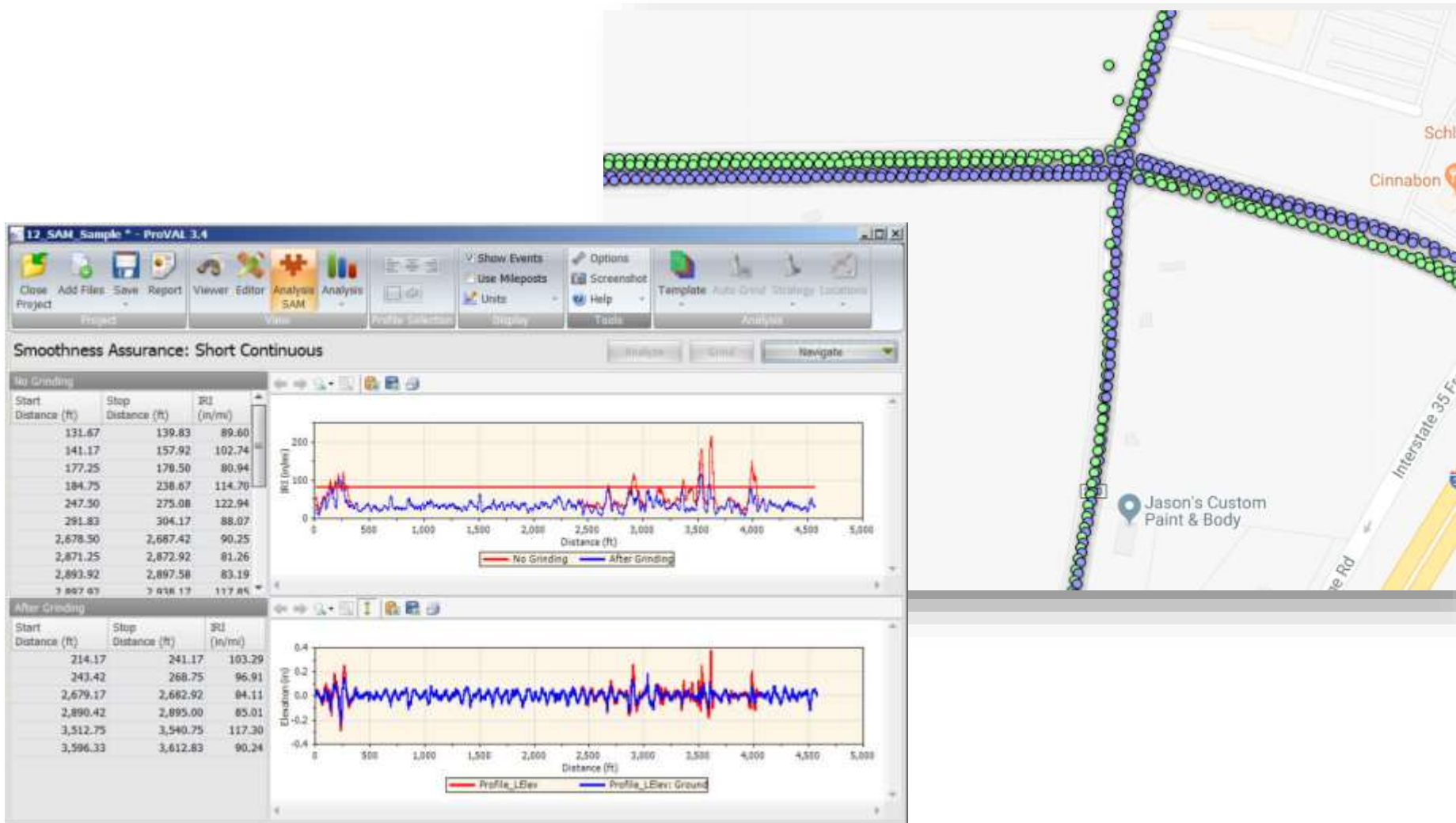


# Last year we evaluated these connected vehicles against a class 1 profiler



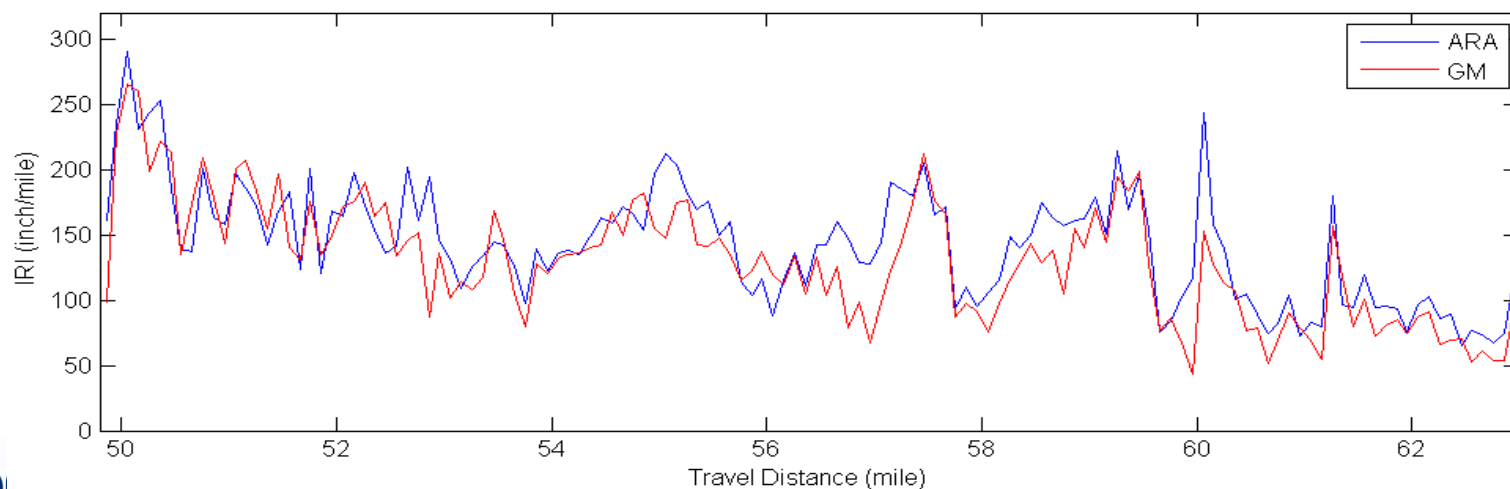
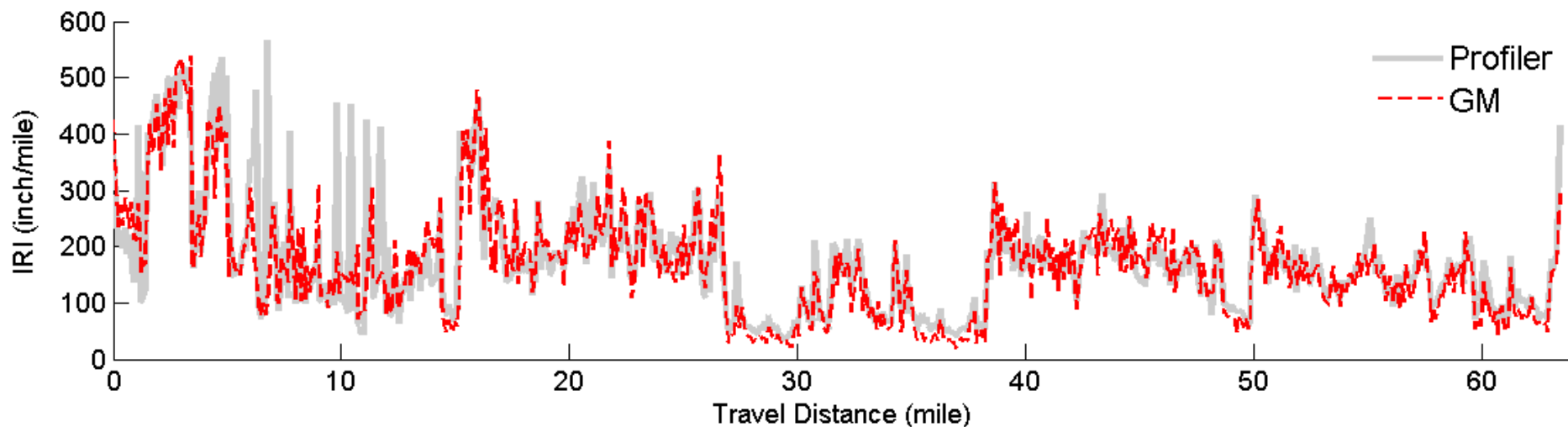


# The data collection is different the answer can be the same





# The data looks promising







# Technology will evolve and it will change our industry

Connected vehicle data is not perfect

We could have large volumes of vehicle data

3D Lasers and Class 1 profilers are still the modern standard

We could have some data on all roads

We could have monthly data, or weekly, or ...



# The first step is just a first step

## First Step

- IRI data for all US roads (snapshot in time)

## Next Step

- Time series IRI data
  - Could show freeze/thaw, swelling soils, other pavement changes
  - Could show development of localized distress

## Where we will go

- More vehicle sensors to get other road condition aspects



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