

The Truth About Ground Truth

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To Compare New Technology to Existing Methods and decide what to Implement...

- Must have a plan for data analysis
- Must establish ground truth, including variability.
- Agency needs to interpret results considering that features have different economic impacts.
- Agencies must also consider their budgetary control mechanisms, which limit full economic analysis.

-Gary Elkin, Mactec

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Outline of this presentation

- Definitions
- Key issues in determining truth
- NCDOT loop description and features
- Conclusions

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Definitions

- **Ground truth:** a reading or series of readings against which you compare other data.
- **Reliability:** the probability that the item will function within specified limits for at least a specified period of time under specific environmental conditions.

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Definitions (continued)

- Accuracy: deviating only slightly or within acceptable limits from a standard.
- Precise: a process that is successfully repeated within closely specified limits.
- Bias: a tendency toward a specific direction.

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About these definitions: So What!

- Why do we care?
We collect data for 15 years using protocol A. During that time we assume that this protocol leads to a level of accuracy and precision. After 15 years a new technology appears and we want to see if it is as accurate and as precise as protocol A.

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Another reason to care...

- Let us say that national \$ are apportioned to states in part based on their pavement conditions as measured by a particular method.
- Every state sets about doing these measures with their own interpretation.
- Will the differences in methodology influence the apportioned \$?

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Another Twist on Ground Truth.

- Research quality data is not the data used in the day to day operations of a DOT.
- Example: LTPP distress identification versus state windshield survey.
- As you may see later, asking DOT employees to change from their familiar method to a detailed method does not necessarily improve precision.

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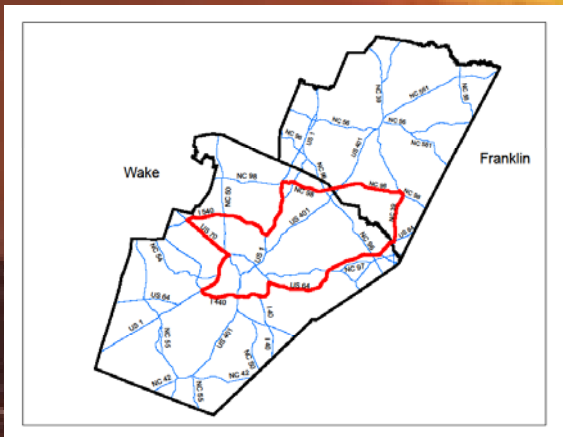
From the White Paper Outline...

- “Today’s technology can take the individual subjectivity or **variability** out of the collection process, but can it do so quickly and at a reasonable cost?”
- “In any case, it must be possible to relate the new measures to historic measures used by the agency.”

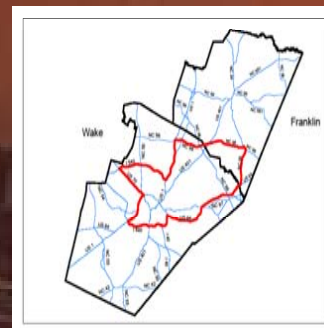
About the Test Loop

Wanted the test loop to include a variety of pavement sections. Also wanted a variety of traffic levels, widths, physical features, etc.

The loop began and ended at the DOT facility at Century Center in Raleigh and was 93 miles in length.



Segments in Test Loop



- I-440 and I-40 concurrent 10.4 miles
- SR 1728 Wade Ave 2.75 miles
- I-440 North 2.65 miles
- US 70 West 6.99 miles

Segments (continued)



- I-540 East 12.1 miles
- US 1/Capital Blvd 6.5 miles
- NC 98 east 17.25 miles
- NC 39 south 6.5 miles
- US 64 west 20.38 miles

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Features on Loop

- 25.15 miles of interstates
- 33.87 miles of US routes
- 23.75 miles of NC routes
- 2.75 miles of SR route (but very high traffic volume)

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Features (continued)

- Mix of asphalt and concrete surfaced pavements.
- # of lanes varied from 10 to 2.
- Shoulder width varied from 1' to 10'.
- Both rural and suburban/urban environments.

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Other Features

- Noise walls on I-440 and I-540
- Variety of types and sizes of signs
- Guardrail and cable guard systems
- Median barriers
- Paint striping- both polyurea and thermoplastic – and varying degrees of aging.

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Other Features (continued)

- Variety of drainage features, drop inlets, etc.
- Bridges
- Multiple interchanges
- Decorative plantings
- Limited number of traffic signals

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Conclusions

- There is no single measure of “truth”. What we consider as our historic measure is often high in variability.
- New technology may also be high in variability or have limitations. Agencies must weigh + and -.

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Closing Comments

- Tomorrow in the breakout sessions you can hear details on the ground truth results as well as the vendor results for some features.
- It will be critical that we each approach the subject aware of our view of truth and the limitations it has.

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