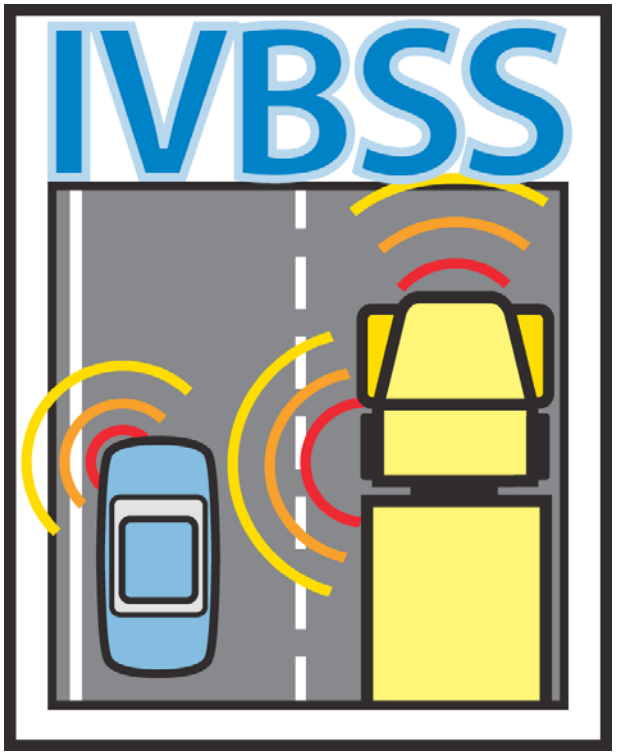


IVBSS Data Collection and Analyses

Scott Bogard
UMTRI

2009 ITS America Annual Meeting

Session SS09

June 1, 2009

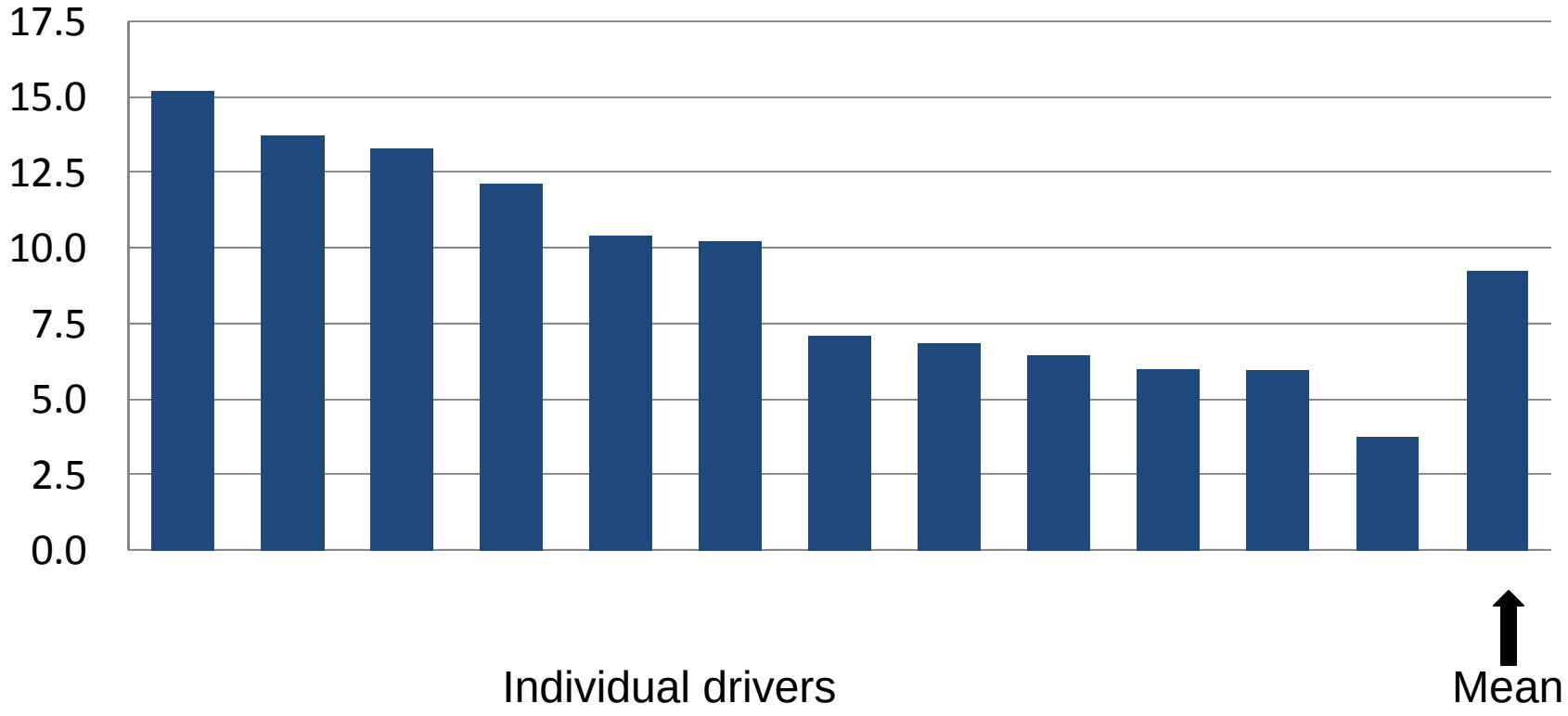
Outline

- Descriptions of the types of analyses being performed
- Overview of the IVBSS data collection process and archiving
- Sample data from the car and truck platforms

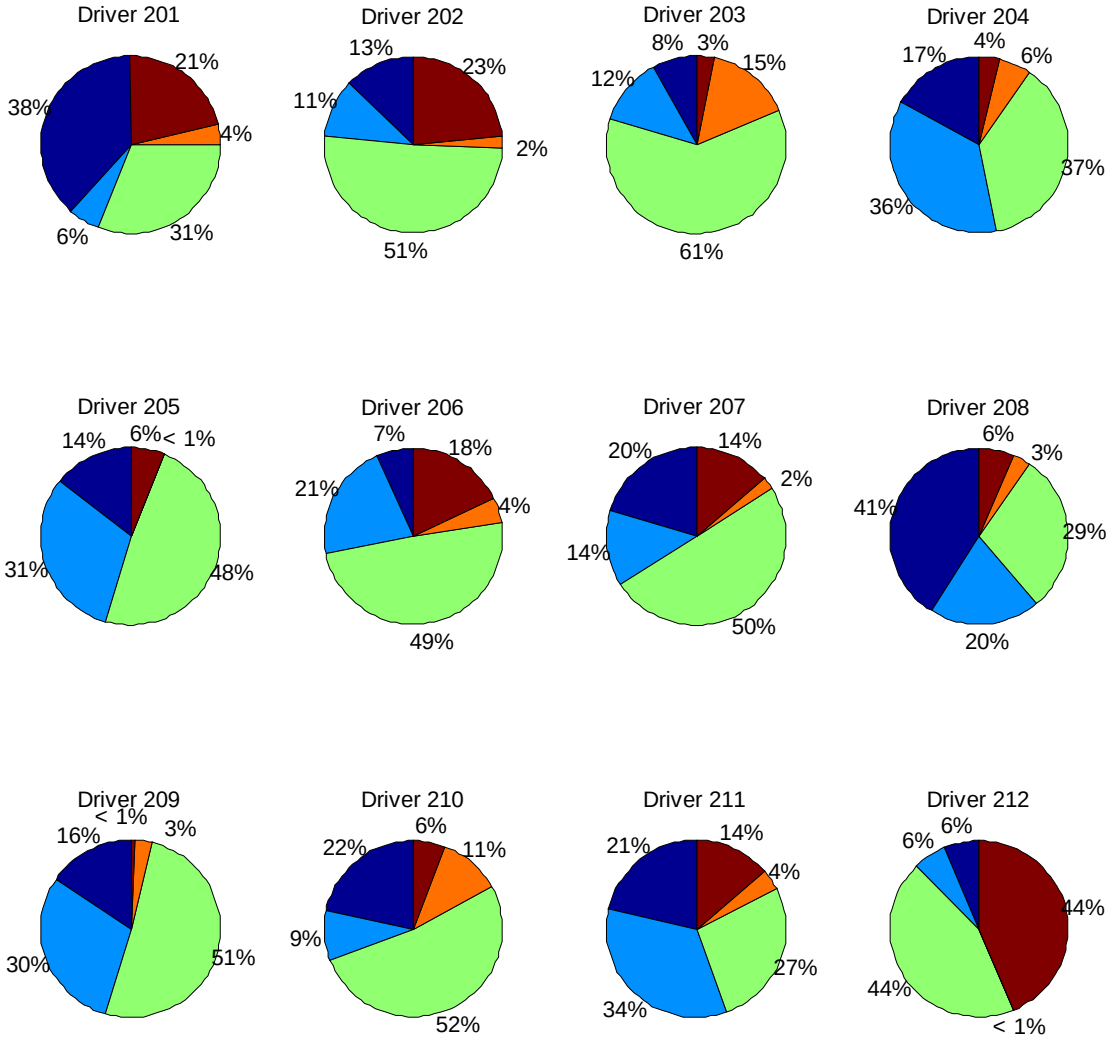
FOT Analysis Themes

- UMTRI team
  - Drivers' experience
    - Exposure and alert rates
  - Safety impacts & driver interactions
    - Changes in baseline and treatment condition driver behaviors
  - Driver acceptance
    - Subjective assessment
  - System performance
    - Categorization of alerts, alert rates

Alerts Per 100 Mi (161 Km)



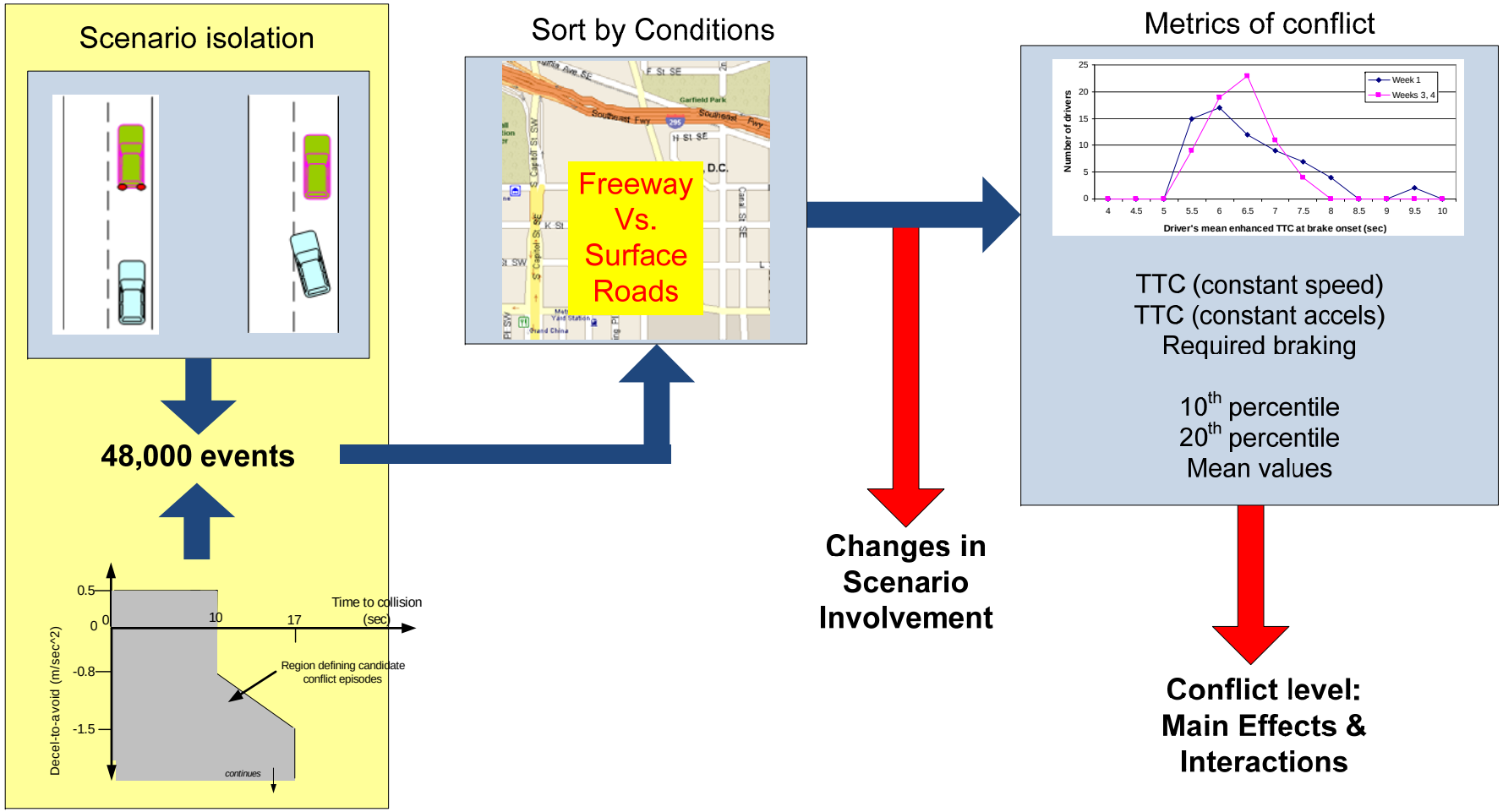
Alert Experience Varies by Driver



LDW-unoccupied
LDW-occupied
LCM
FCW
CSW

Example - Forward Conflict – Analysis Steps*

** ACAS FOT [USDOT HS 809 901]*



Subjective Data

- Pre-drive questionnaires
- Post-drive questionnaires
  - On-site
- Driver debriefs
- Focus groups

- Driver style
- Driver behavior
- General impressions, combinatorial effects of warnings, acceptance, display & controls, ease of learning, individual warning types
- Events from their own driving

Subjective Results (LV Extended Pilot Test)

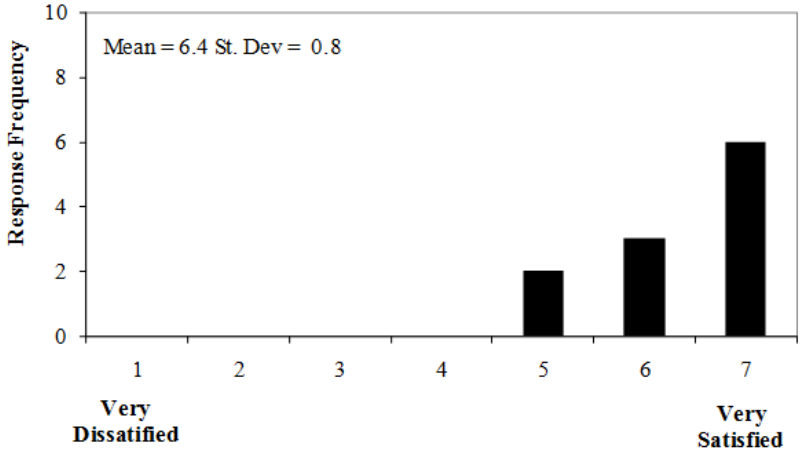
Overall, I felt that the Integrated system was predictable and consistent.

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

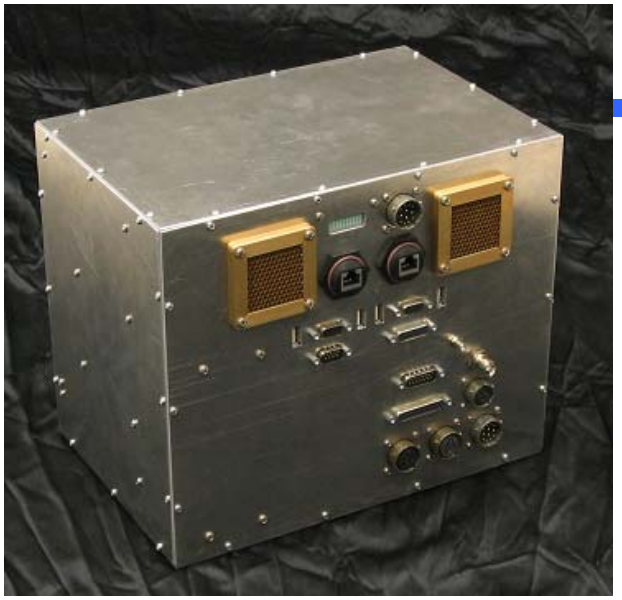
Selected results: mean ratings

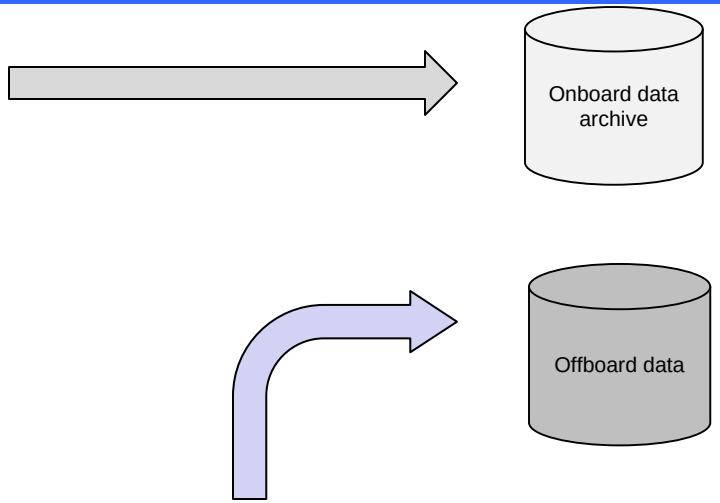
Questionnaire topic	Mean
Helpful	6.3
Attention-getting	6.6
Not annoying	6.1
Not distracting	5.7
Will increase driving safety	6.3

"Overall, how satisfied were you with the integrated system?"



Data Acquisition & Archiving





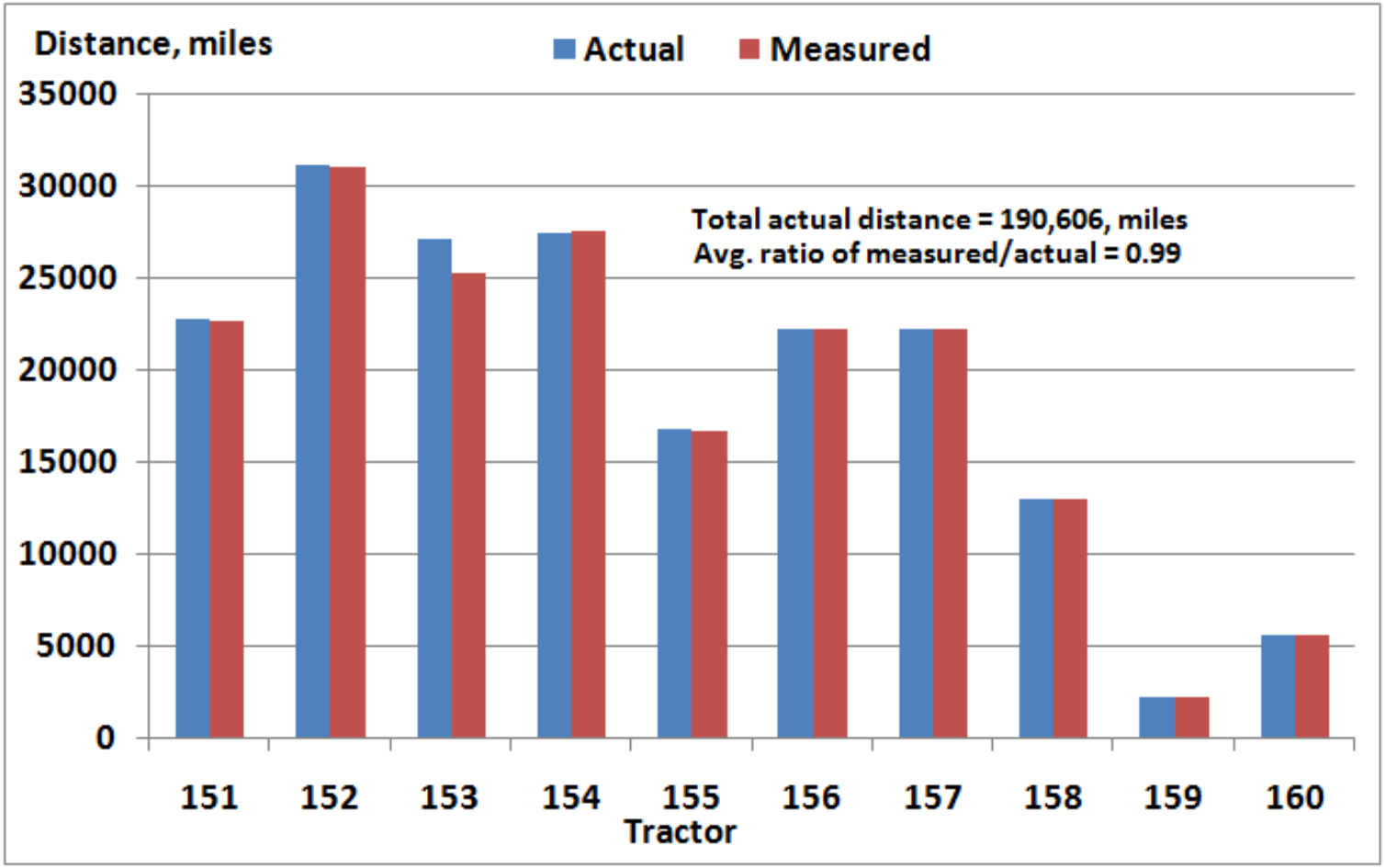
On-Board Data sources:

- CAN buses – IVBSS, OEM
- 5 cameras with video capture & compression
- 6 or 7 radars
- Onboard map match (LV)
- Second GPS
- Vehicle motion IMU
- Microphone
- GPRS cellular modem

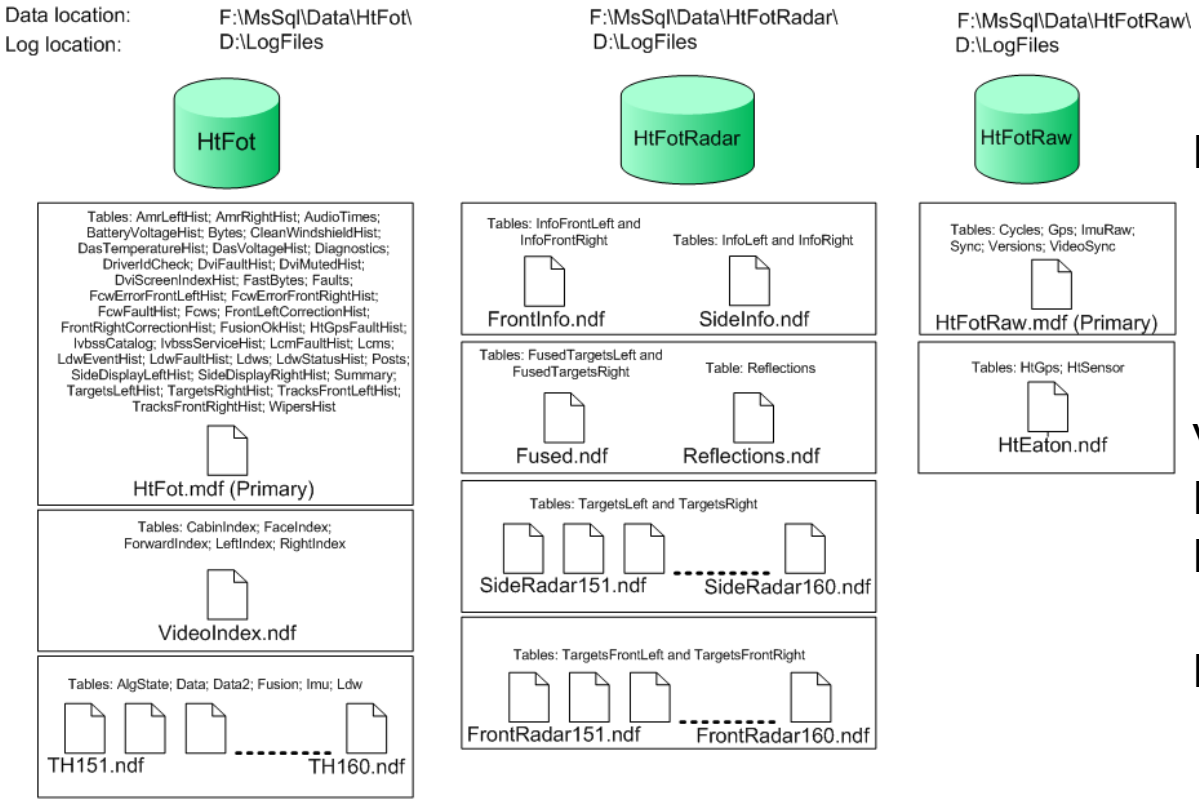
Off-board Data Sources:

- Driving records
- Highway information:
  - Michigan state base maps (e.g., intersections)
  - FHWA's HPMS roadway information
  - Southeast Michigan Council of Government maps (e.g., traffic signals)
  - Roadways mapped in previous FOTs
- Weather databases

Example DAS Performance



Example Database Structure



Design optimized for:

- Back-up
- Query efficiency
- Data loading

Views link tables in HtFotRadar and HtFotRaw to HtFot

Lv Design is similar

Partition Tractor_pf(tinyint) as range left for Values(151,152,...159)

Scheme FrontRadarPS as partition TractorPF to (FrontRadar151,FrontRadar152,...,FrontRadar160)

Scheme SideRadarPS as partition TractorPF to (SideRadar151,SideRadar152,...SideRadar160)

Scheme Th_ps as partition Tractor_pf to (Th151_fg,Th152_fg,...Th160_fg)

Example SnapShot Viewer

Time 20613
3400 bytes
Frame 411
Avg. Size 3208 bytes

Vehicle Data Signals and Volume Estimates

- 500+ data channels, plus 7 radar tracks
  - Primary: vehicle state, system measures
  - Summary: histograms, counts, aggregates
  - Diagnostic and health

Exposure Summary, hours		
	No units	Total Hrs
LV	108	9307
HT	10	24600

Data Rate Summary MB/hour		
	Video	Data
LV	149.7	101.1
HT	131.5	54.4

Estimated Total Data Size (GB)		
	Video	Data
LV	1394	941
HT	3235	1337

Light Vehicle Camera Views

- Insert LV EPT video clip of choice

Heavy Truck Camera Views

- Insert HT EPT video clip of choice