Performance-Based System Operations During Non-Recurring Events: Lessons Learned from Virginia

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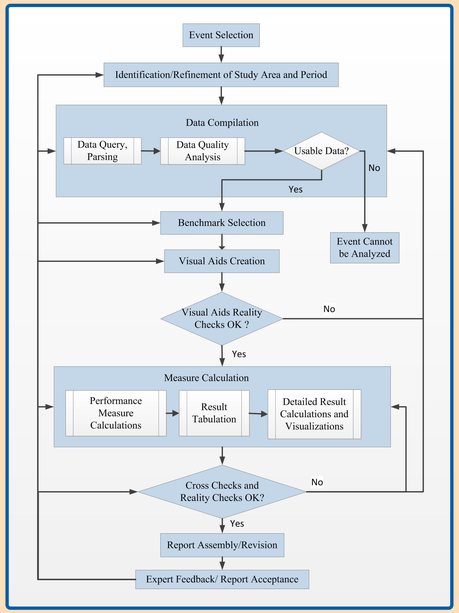
INTRODUCTION AND METHODOLOGY

Non-recurring events such as incidents, work zones, and severe weather significantly impact transportation systems. Agencies are increasingly applying operations strategies to mitigate these impacts. To improve agency performance, these questions are critical to answer:

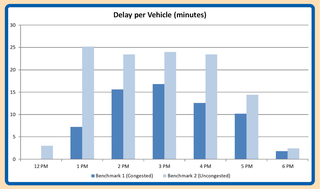
1. How intense were the impacts across space and time?
2. What actions did the agency take?
3. What (if any) changes are needed in actions in the future?



RESULTS AND LESSONS LEARNED

1. Benchmarks

- The inherent, stochastic nature of traffic implies one "best" benchmark with 100% confidence may not be found. Acknowledge the challenges in all cases.
- Use no, one, or multiple benchmarks as needed.

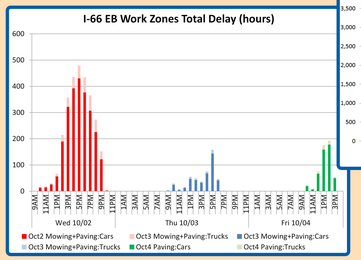


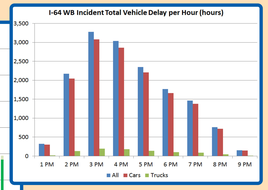
2. Data and calculation methodology

- Assumption of "average traffic volumes" is often not appropriate.
- Delay calculations during full road closures need particular attention. Better to use queue data.
- Many data sources available now: volumes from agency detectors, 3rd party probe speed data, agency event logs, snow plow AVL, National Weather Service, media reports.

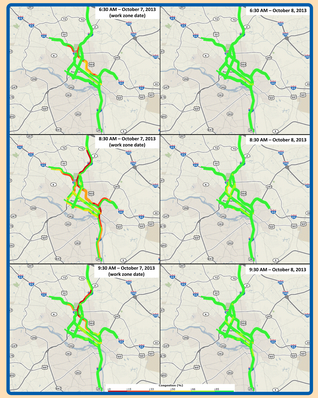
3. Visualizations

- Visual aids play a crucial role to tell the "operations story."
- "No one size fits all": Adapt visual aid to event, duration (hours vs. days), and measure.
- Trend maps show a system perspective in both space and time.

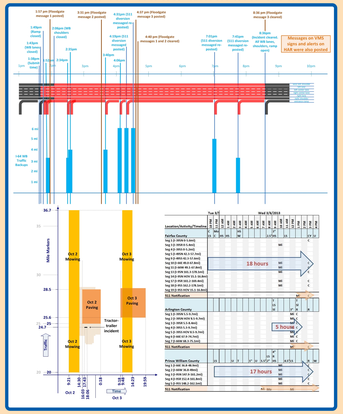




Trend maps (source: RITIS VPP Suite) screenshots from three points in time

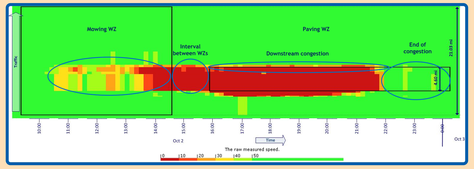


Timelines for three different events



4. Data quality

- Poor data quality undermines credibility of measures and the "operations story."
- Even with large datasets, where minor errors wash out, watch for widespread errors.
- Check all datasets: volumes, speeds, events.



5. Balanced event assessment

- Diverse set of measures and comparing events side-by-side paint a balanced picture, and avoid skewing results.
- Automation often possible and necessary for continued agency-level performance monitoring.

Measures from Richmond I-95 bridge restoration:

Performance Measure/Context	Friday Evening Work Period	Saturday Afternoon Work Period	Monday Contractor Overstay
Work zone start time	8:09 PM	12:00 PM	6:00 AM
Work zone duration	3 h 50 m	8 h	3 h 58 m
Average delay per vehicle (minutes)	9	8	20
Total delay (hours)	1,400	3,800	6,550
Max bottleneck queue length (miles)	5.62	5.34	7.21
Max bottleneck queue length (hours)	3 h 36 mins	7 h 52 mins	3h 58 mins
Number of vehicles affected	13,500	41,600	27,700
VMT Affected (vehicles*miles)	41,000	110,000	116,000
Max vehicle delay (minutes)	24	19	42
Impact Length (miles)	5.99	4.41	14.43

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