

# Utilizing Crowdsourced Data to Analyze Impacts of Nuisance Flooding on Travel in Norfolk, VA

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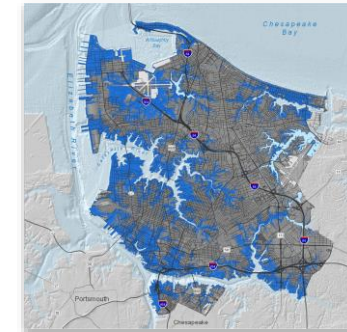
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## Research Motivation

- Increased frequency & severity of nuisance flooding due to climate change and sea level rise.
- Flooding of roadways impacts stormwater and transportation systems, but also has cascading impacts for users.
- Lack of decision support for interdependent transportation and stormwater systems to guide investments.



FEMA flood hazard zone



Sewell's Point in Norfolk, VA

## Research Framework

Agency & citizen science crowdsourced  
sensor networks



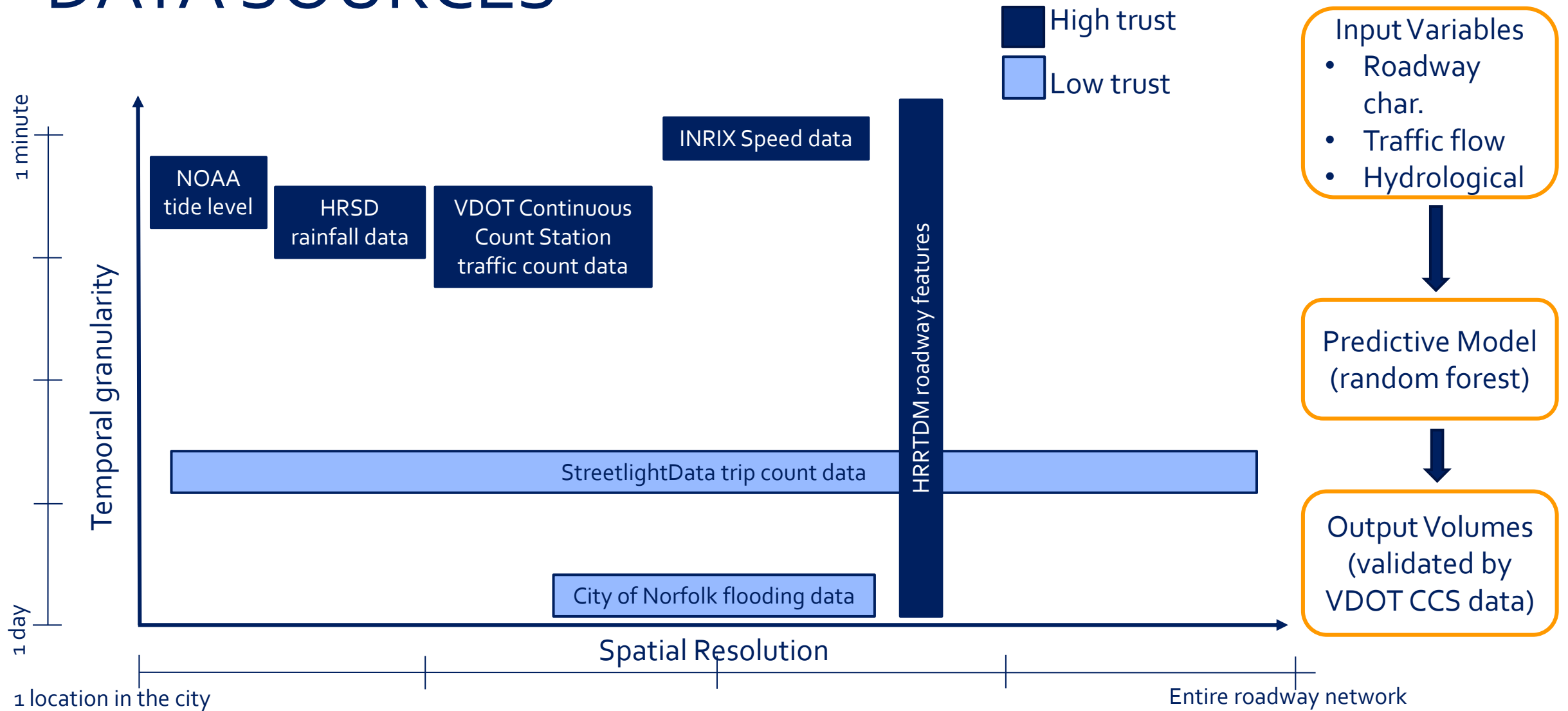
Physically-based & data-  
driven prediction models



Smart real-time control of  
interdependent infrastructure  
systems  
**Control**



# DATA SOURCES



# RESULTS

## Preliminary Results

- In the City of Norfolk, for 8 flooded days in 2017, model results indicate vehicle-hours traveled (VHT) reduced by **21%**. This reduction comes from reduced traffic volumes & reduced speeds.
- From CCS data:
  - Average volume reduction: **12%**
  - Average speed reduction: **6%**

## Ongoing Work

- Inclusion of raw WAZE data to provide more spatial coverage for flood reports, but data is less trustworthy & thus requires a verification process.
- Installation of low-cost, low-power rain gauges & sensors to be deployed throughout the city to reflect spatial heterogeneity of rainfall events.
- Integration of travel demand model to reflect changes in upstream trip generation & downstream changes in route choice, to reflect distribution of transportation impacts across zones.