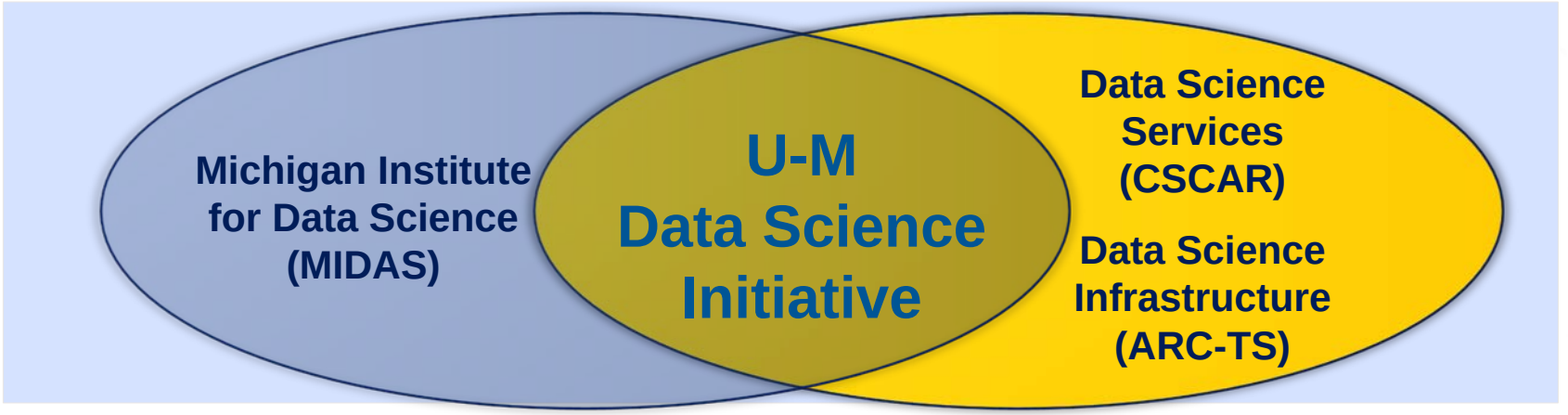


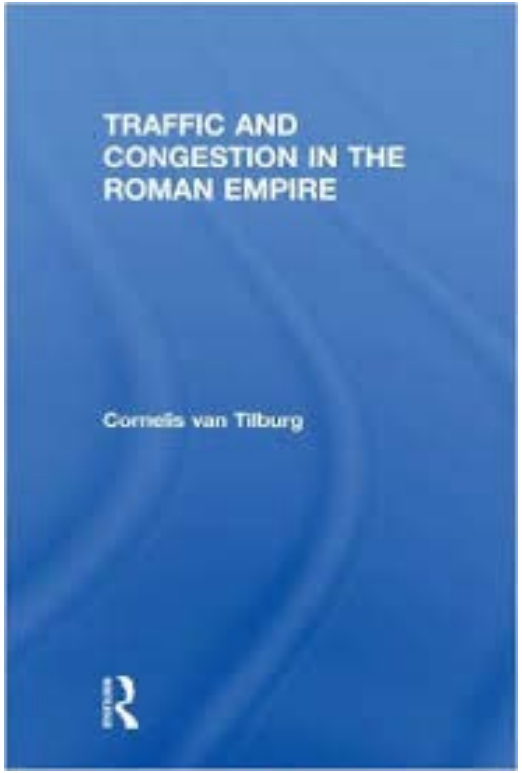
MBDH Transportation Spoke Workshop

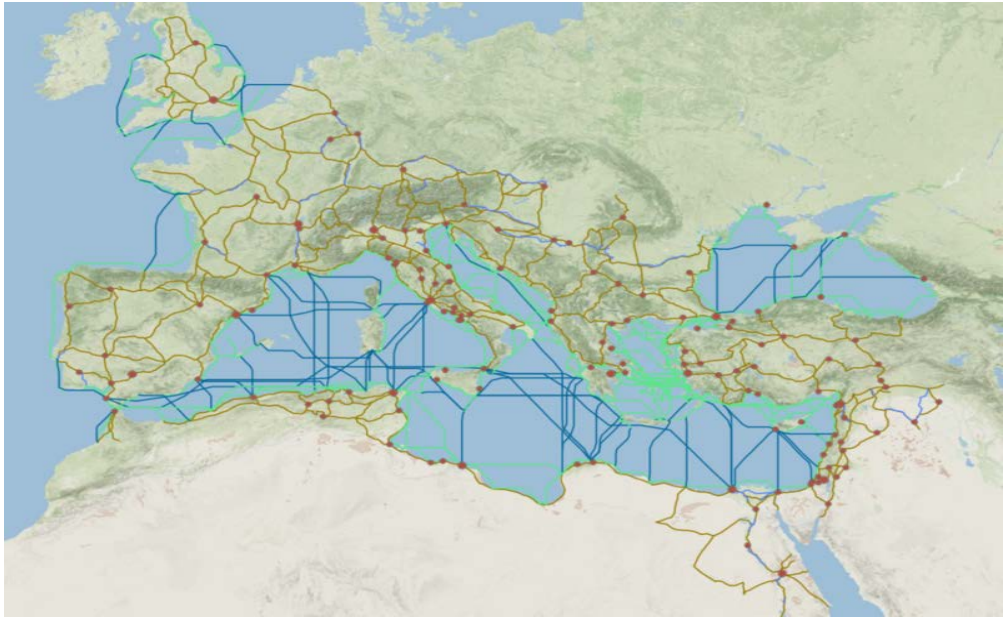
June 22, 2017

Alfred O. Hero; Co-Director
Brian D. Athey; Co-Director

UNIVERSITY OF MICHIGAN

Transportation system in 180 CE





Transportation infrastructure at height of Roman empire

Data on transportation in antiquity

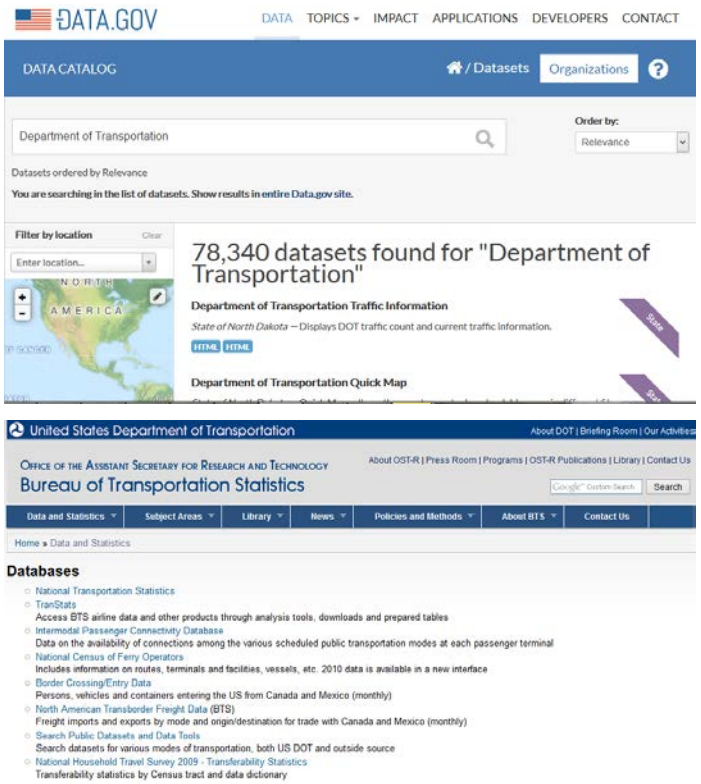
Van Tillburg used data to draw inferences on

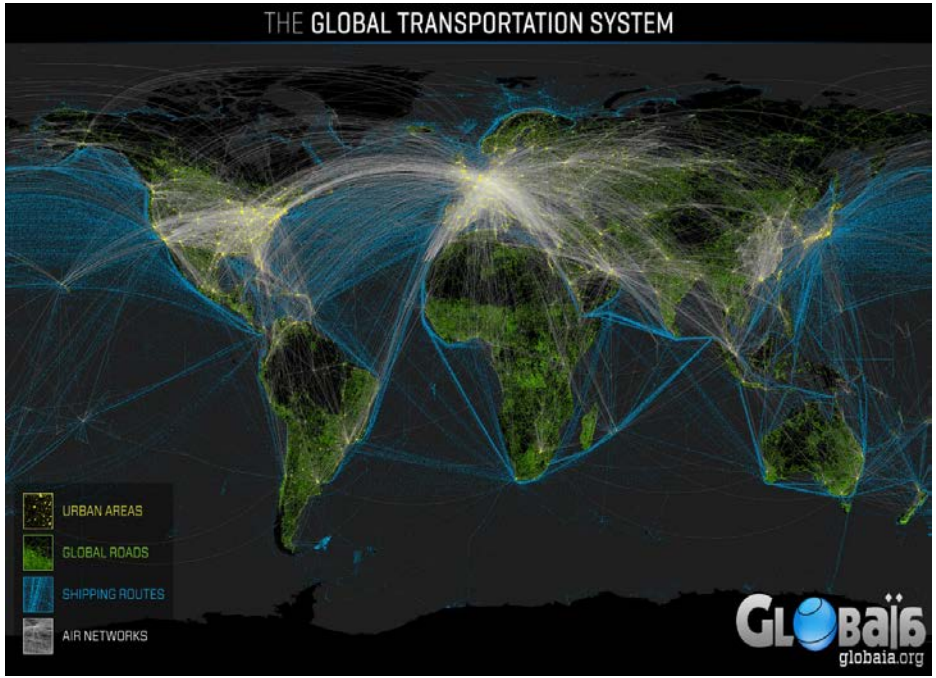
- Roads, road-users, traffic congestion, traffic policy

Data came from large variety of sources

- Written legal and construction records (Domitian, Nero)
- Written travel logs (Theophanes)
- Frozen-in-time physical evidence (Pompei)
- Archeological evidence for flows of trade
- Remote sensing and hyperspectral imaging

Transportation system today



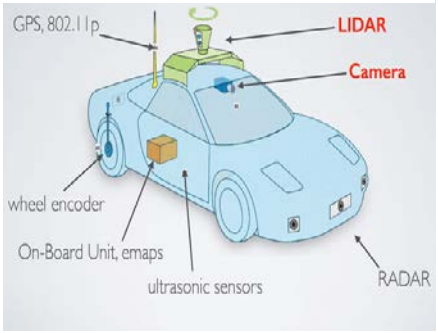


Transportation system in 2017

http://www.computerworld.com/article/3005436/

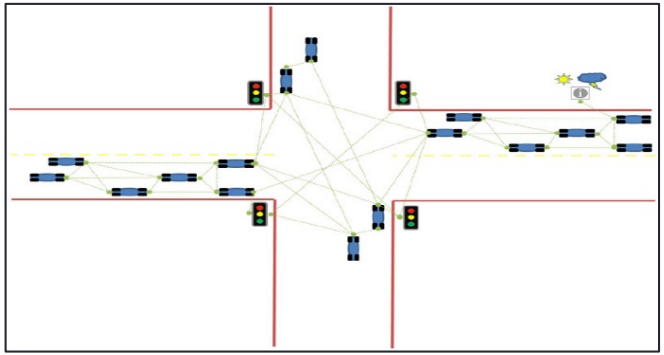
Big Data for modern transportation

Autonomous sensing systems



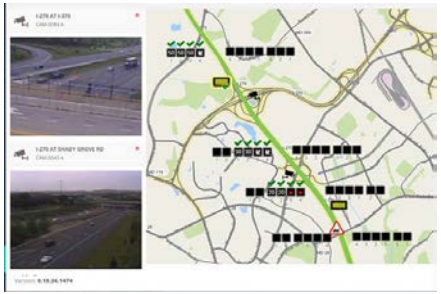
http://www.computerworld.com/article/3005436/

Ad Hoc Vehicle and Road Networks



http://www.rtcmagazine.com/articles/view/103169

Cloud data services



http://www.traffictechnologytoday.com/news.php?NewsID=79828

Data/sensor integration
Telematics
Automated routing
Mobility-on-demand

Clients and users

waiting-for-bus-clip-art-waiting-for-bus-clipart

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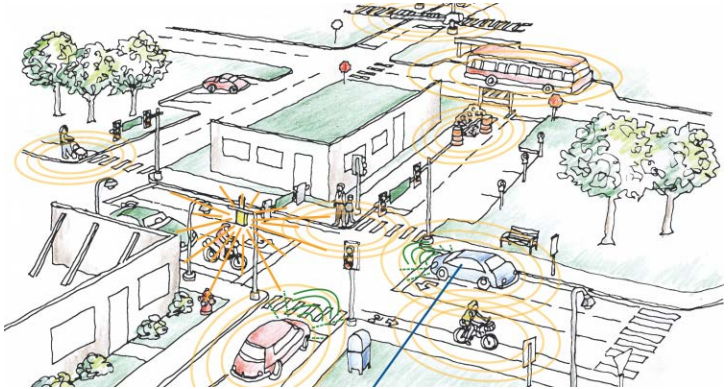
Big Data impact on transportation

- Data for improved transportation accessibility
  - Access to federated and standardized databases and datastreams
- Data for improved transportation safety
  - Prediction and early warning of traffic/weather conditions
- Data for improved energy efficiency
  - Efficient routing, load balancing, and traffic flow control
- Data for improved public service
  - Optimization of essential and emergency services

MIDAS transportation research thrust



Mcity: A 32-Acre Outdoor Lab

Mobility-on-demand systems

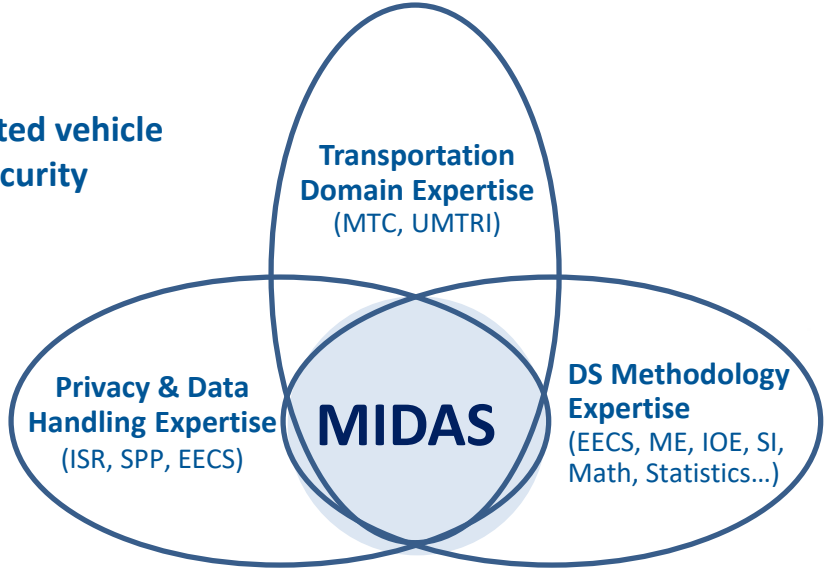
Visual analytics and data fusion

Accident and safety data analytics

Smart cities and infrastructures

Transportation data ecosystems for connected vehicles

Connected vehicle cybersecurity



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MIDAS funded research in transportation

Building a Transportation Data Ecosystem: creating a system for data on driver behavior, traffic, weather, accidents, vehicle messages, traffic signals and road characteristics, with a parallel and distributed computing platform.

Flannagan (PI), UMITRI; **Elliott, ISR;** **Hampshire, UMTRI;** **Jagadish, CoE**
Jin, CoE; **Mars, CoE;** **Murphey, UM-Dearborn;** **Nair, LS&A, CoE**
Rupp, UMTRI; **Shedden, LS&A;** **Tang, CoE;** **Witkowski, ISR**

Reinventing Public Urban Transportation and Mobility: using predictive models for travel demand, accessibility, driver behavior, and transportation networks to design an on-demand public transportation system for urban areas.

Van Hentenryck (PI), CoE; **Budak, SI;** **Cohn, CoE;** **Cunningham, Med, SPH**
Dillahunt, SI; **Hampshire, UMTRI;** **Lynch, CoE;** **Levine, Taubman**
Merlin, Taubman Coll.; **Ortiz, UM-Dearborn;** **Sayer, UMTRI;** **Wellman, COE**

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