

# SMARTSe<sup>SM</sup> Center



Center for Surface Mobility Applications & Real-Time Simulation environments

SENSING • COMPUTING • WIRELESS

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NDSU



## MISSION

Apply advancements in low-power sensing, wireless communications, and mobile computing to demonstrate leaps in multi-modal and intermodal transportation system efficiencies, responsiveness, reliability, sustainability, safety, and security.

### Objectives:

- Develop new technologies, signal processing, and information processing methods
- Evaluate existing and emerging technologies
- Demonstrate innovative applications in transportation
- Promote knowledge dissemination and technology transfer
- Train professionals on new methods

The NDSU campus and surrounding areas will provide real-world agricultural, industrial and residential settings for SMARTSe<sup>SM</sup> research and development. The area:

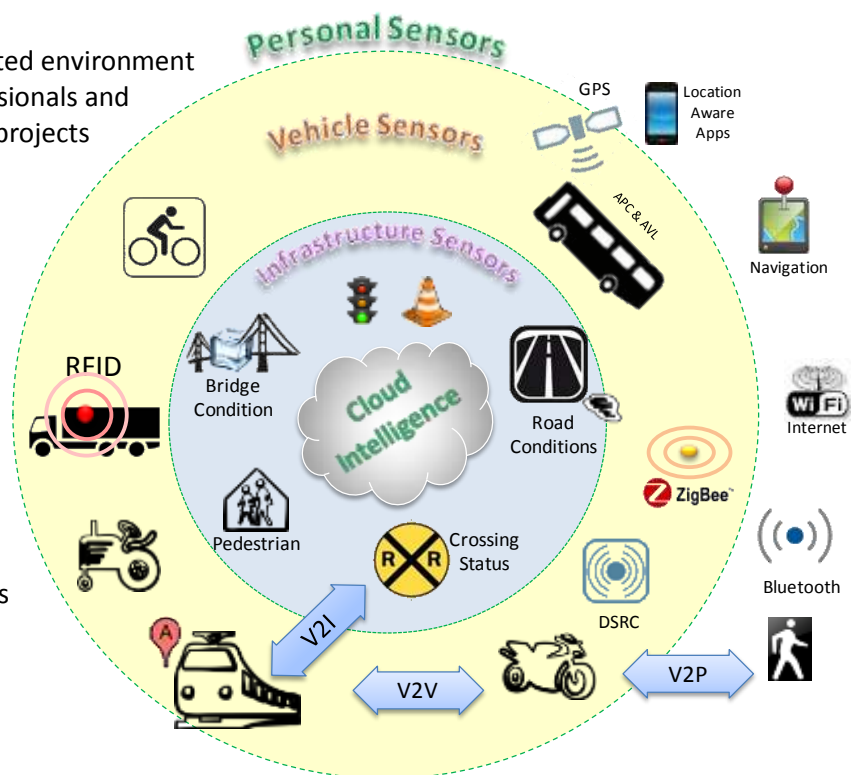
- Is a multimodal transportation hub for rail, highway and air
- Has environmental extremes to test reliability of technology
- Features light industrial, residential, agricultural and commercial land-use patterns

### POTENTIAL BENEFITS:

**Researchers** will have a highly instrumented environment for training the next generation of professionals and researchers and for developing research projects that will attract research grants.

**Government agencies** will work with world-class experts and resources to enhance community livability, transportation sustainability, and energy independence. Collaborations will lead to greater impacts and efficiencies from tax dollar investments.

**Technology providers** will gain a realistic proving ground for product reliability testing. They will be able to demonstrate their products for customers and test their products for customer's applications.



The SMARTSe<sup>SM</sup> vision

### FOCUS AREAS AND CURRENT PROJECTS

#### Transportation Infrastructure Monitoring & Systems enhancements (TIMSe)

- **Pavement Analysis Via Vehicle Electronic Telemetry (PAVVET)** utilizes low-cost embedded inertial sensors and smart phone apps in a connected vehicle

environment to collect roughness data, forecast deterioration, and link to asset management and decision support systems

- **Rolling-stock Automatic In-situ Line-quality, Car Operations, and Tracking System (RAILCOTS)** utilizes low-cost microelectromechanical (MEMS) sensors to locate rail distress symptoms and geometry misalignment to reduce the risks of derailment
- **Smart Infrastructure** deploys ground and aerial sensors via unmanned aircrafts to remotely monitor bridges and pipelines for existing and emerging defects

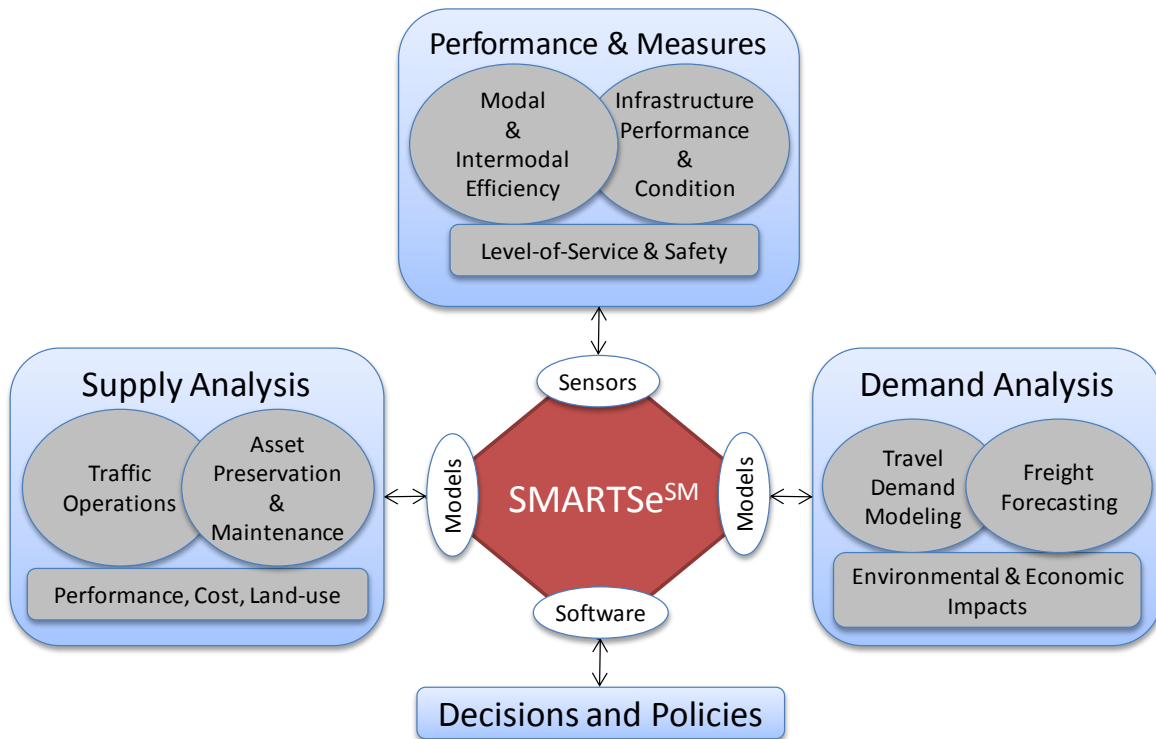
#### Vehicle Info System enhancements (VISE)

- **Smart Parking** detects and communicates available parking spaces for commercial vehicles, and to minimize passenger vehicle search time in developing areas
- **Wireless Inspections** enables safety inspections without stopping the vehicle by connecting in-cab technologies to vehicle information and roadside systems
- **Traffic Analysis** utilizes embedded sensors and connected vehicle data to analyze

traffic, provide travel advisory information, and to calibrate demand forecast models automatically

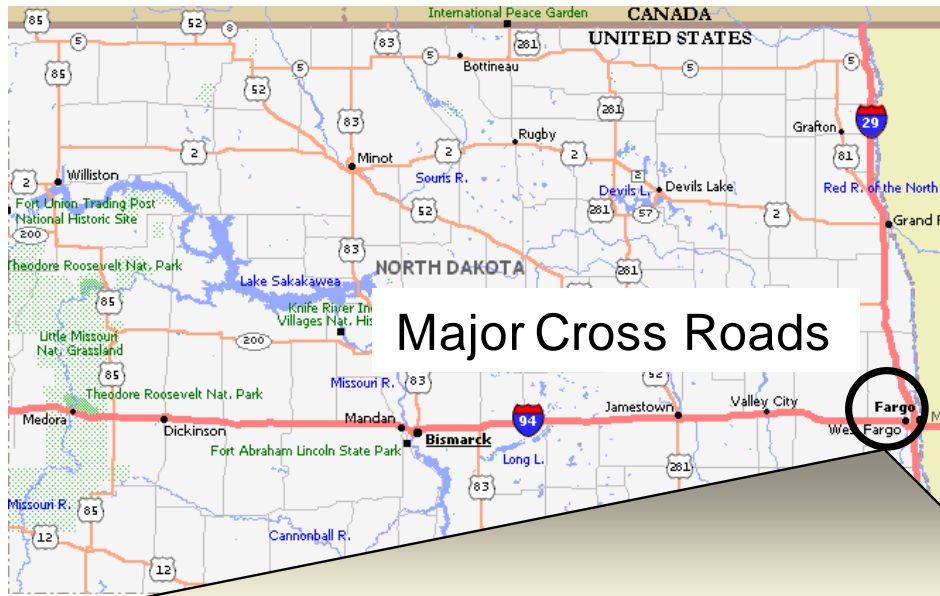
#### Transit Operations & Passenger Service enhancements (TOPSe)

- **Transit Ridership Improvement Policies for Real-time Information Technology environments (TRIPRIte)** deploys smart phone applications and low-cost vehicle identification technologies to put low-cost, real-time arrival information in the hands of nearly all passengers
- **Transit Wi-Fi** embeds low-cost wireless internet technologies into transit vehicles to enhance ride experience and promote safety through location based services and mobile internet access
- **Smart Ride Share** implements advancements in information technology and social networking to match passenger needs with providers in a safe and security arrangement



**SMARTSe<sup>SM</sup>** promotes a globally integrated solution through collaborations

# SMARTse Intelligent Technology Test Bed



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