Preliminary System Development Plan for an AERIS Data Capture and Management System

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AERIS Webinar

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Project Relevance to AERIS

"Cleaner Air Through Smarter Transportation."

- Actionable information
- To facilitate "green" transportation choices
- For system users and operators

Project Overview

Preliminary System Development Plan for an AERIS Data Capture and Management System

Sponsor: Federal Highway Administration

- Lead: Mixon Hill, Inc.
- Support:
  - Texas Transportation Institute (TTI)
  - Mid-America Regional Council (Kansas City)
  - Michigan Department of Transportation

Project Overview

Preliminary System Development Plan for an AERIS Data Capture and Management System

Purpose

To examine these "readily available" data sources and their usefulness and ability to feed current and future environmental models.

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Project Overview

Preliminary System Development Plan for an AERIS Data Capture and Management System

Fixed Data –

- FHWA's *Clarus* System
  - Environmental Sensor Stations
    - Atmospheric
    - Surface
    - Sub-surface

Mobile Data –

- Michigan's DUAP Project
  - Vehicle Sensors
    - Atmospheric
    - Air Quality
    - Everywhere (potentially)

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Clarus System Data Subset*		
In Use	**Parameter Name**	**Parameter Description**
0	essLatitude	Latitude of the ESS station
0	essLongitude	East longitude from the Prime
0	essReferenceHeight	Reference elevation of the ESS
1	essAtmosphericPressure	Force per unit area exerted by the atmosphere
1	windSensorAvgSpeed	Two-minute average of the wind speed
1	windSensorAvgDirection	Two-min. average of wind direction
1	windSensorSpotSpeed	Instantaneous wind speed
1	windSensorSpotDirection	Instantaneous wind direction
1	windSensorGustSpeed	Maximum wind gust recorded during preceding 10 min.
1	windSensorGustDirection	Direction of max. wind gust during preceding 10 min.
1	essAirTemperature	Instantaneous dry-bulb temperature
1	essMaxTemp	Maximum air temperature during preceding 24 hours
1	essMinTemp	Minimum air temperature during preceding 24 hours
1	essRelativeHumidity	Relative humidity

* There are 74 *Clarus* Data Elements

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Michigan DOT DUAP System Data Subset*		
In Use	**Parameter Name**	**Parameter Description**
0	0101	Monitor status
0	0103	Fuel system status
0	0104	Calculated engine load
0	010A	Fuel pressure
0	010B	Intake manifold absolute pressure
0	010C	Engine RPM
1	010D	Vehicle speed
0	010E	Timing advance
0	010F	Intake air temperature
0	0110	Mass air flow rate
0	0111	Throttle position
0	0112	Commanded secondary air status
0	0113	Oxygen sensors present

* There are 83 DUAP Data Elements

Environmental Models

- MOVES Model
  - Motor Vehicle Emissions Simulator
  - Regional and project level air quality model
  - EPA standard
- VISSIM Model
  - Micro-simulation
    - Freeways
    - Arterials
    - Transit
  - Calculates vehicle emissions (CO, CO_2, HC, Fuel, Nox, etc.)

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Most Relevant Existing Data Fields

- Location
- Wind
- Temperature
- Precipitation type
- Precipitation amount
- Surface Conditions

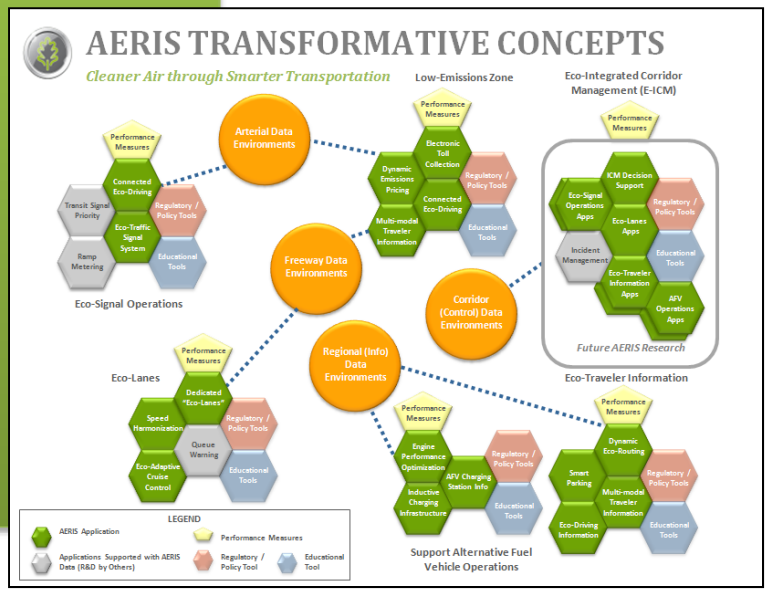
- Atmospheric gas make-up
- Engine performance
  - Drive cycles
  - Emissions

Most Relevant Existing Data Fields

	Services									
	Planning			Operations			Infrastructure		Reporting	
	Emissions Models MOVES	Travel Demand	Traffic Simul VISSIM	Traffic Mgmt	Traffic Control	ATDM	Asset Mgmt	Maint Mgmt	Perform Meas	Outreach /Edu
Data Applicability	√	X	?	√	√	√	√	√	√	√

AERIS Data Environment System Development Needs

- Core data management functions
- Data collection
- Data quality checking & pseudo-observation derivations
- Data presentation and distribution



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Project Relevance

- *Clarus* and DUAP core systems are robust and serve as good basis for AERIS DCM component
- Mobile data can be “easily” incorporated
- Quality of system concepts and completeness of user needs depends on extensive stakeholder involvement more than any other factor