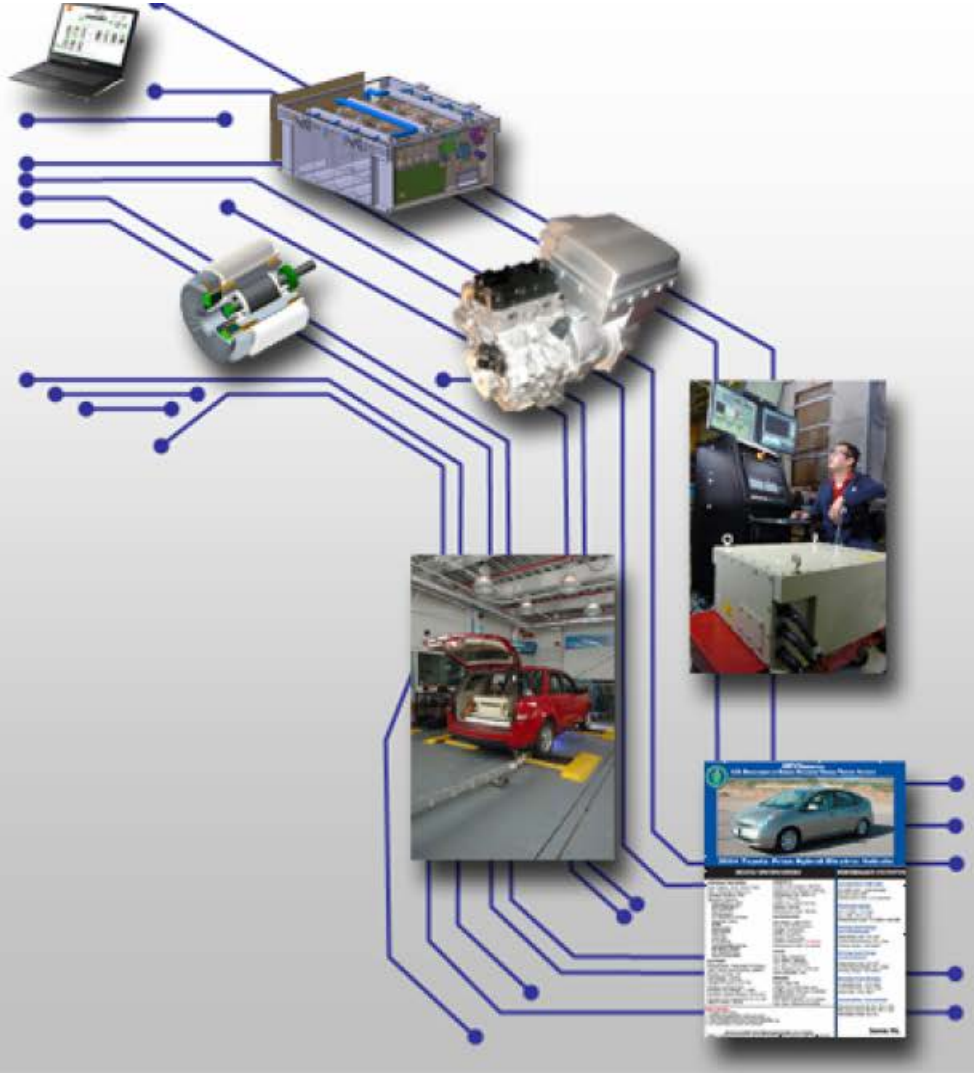


Vehicle and Systems Simulation and Testing

Lee Slezak
US Department of Energy
Office of Vehicle Technologies

OVT Program Structure

OVT/PHEV Program Mgmt.

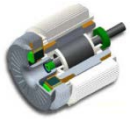
Industry/Gov't Collaboration

Technology Assessment

- Benchmarking
- Analytical Studies
- Risk Assessment

Research & Development

- Energy Storage



- Power Electronics & Electric Motors

- Engines and Fuels

- Vehicle Efficiency Technologies

Testing & Validation

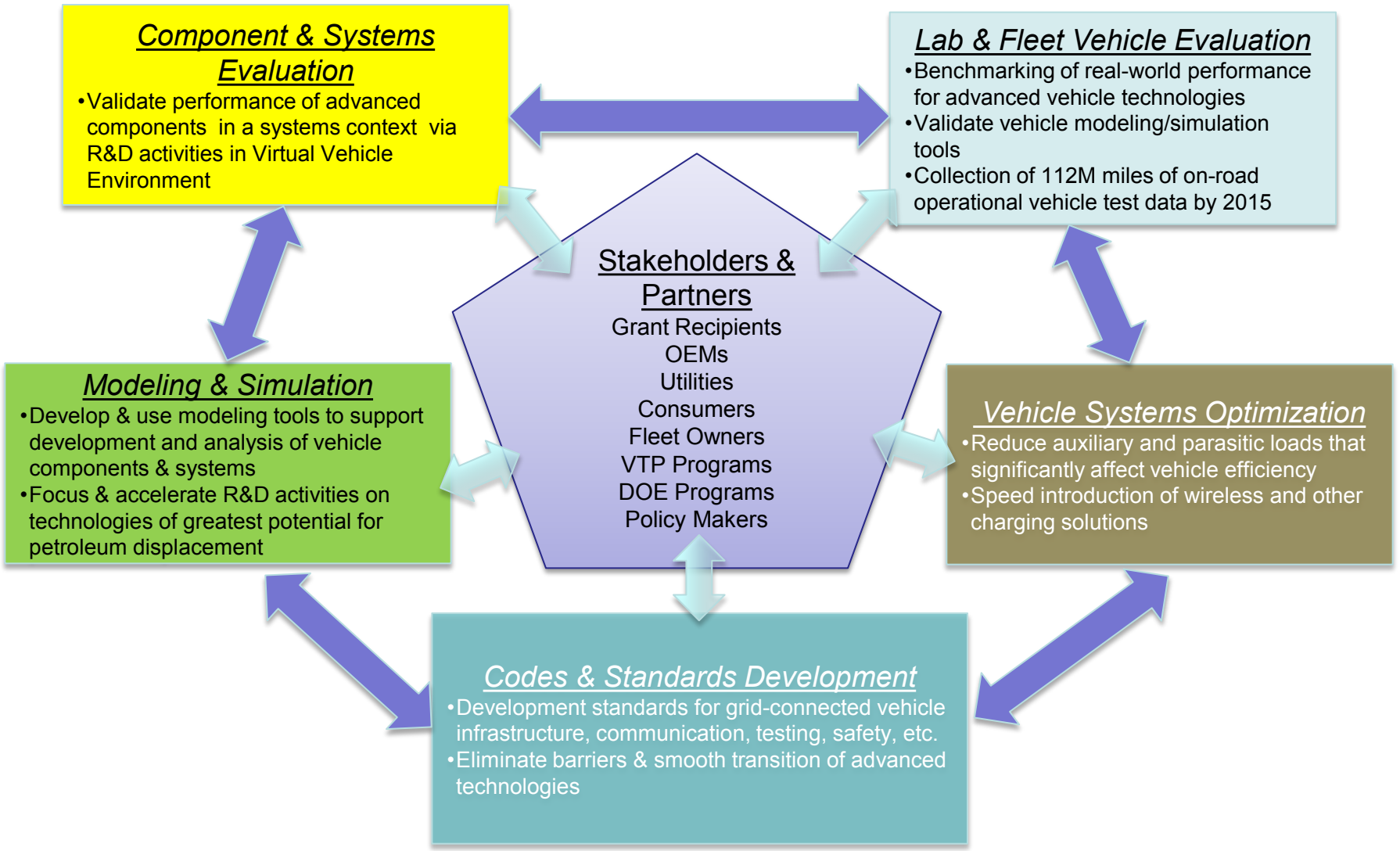
- Standard Procedures
- Lab Testing and Validation
- Field Reliability Testing and Validation
- Field Testing and Demonstration

Deployment Issues

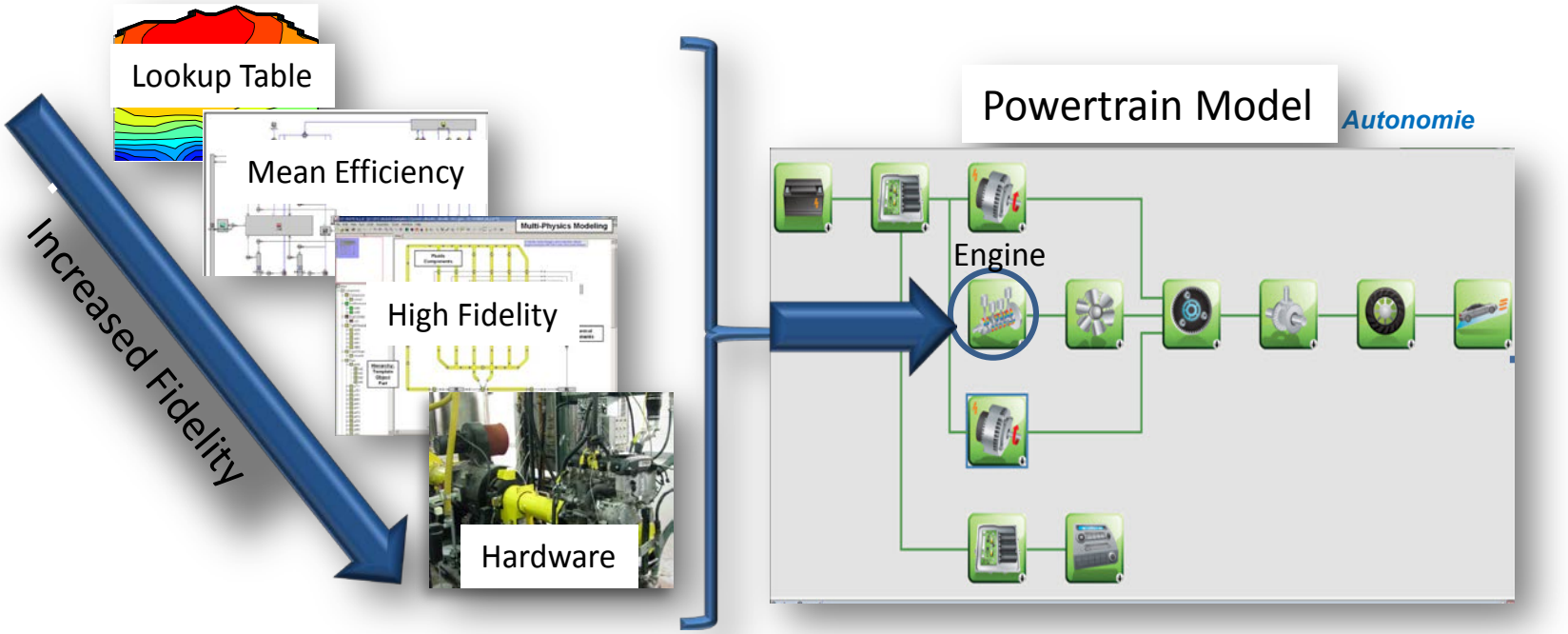
- Grid Interactions
- Automotive-Utility Industry Interactions
- Incentives
- Education and Learning Demonstration
- Codes & Standards

Vehicle & Systems Simulation & Testing Missions

Focus Area activities provide direct and indirect support for evolution of high efficiency vehicles as real world product offerings



Modeling & Simulation



- Develop Modeling Tools
  - Autonomie
  - System Models
- Support GPRA Reporting

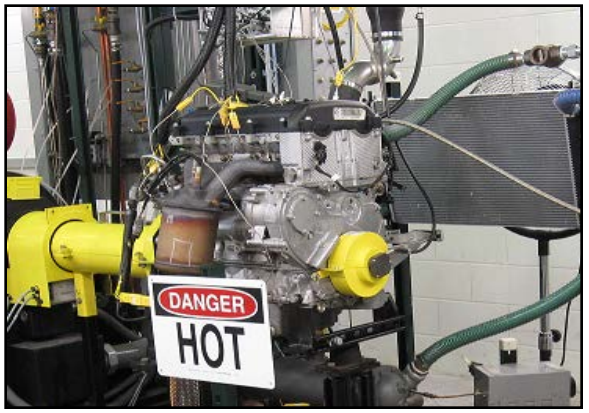
- Vehicle & Component Simulations
  - Configurations
  - Control Methods
  - Requirements
  - Sizing
  - Interactions

Hardware in the loop (HIL) and advanced controls simulation speeds development of new solutions.

- Electric Drive Advanced Battery Test Mule Development and Utilization
- Improved Cold Temperature Thermal Modeling & Strategy Development
- Meritor Dual Mode Hybrid Powertrain Controls Development (CRADA)

Component and control algorithm tests are developed on the bench

Components are tested in a real-world environment



Vehicle components are operated real-time in an emulated vehicle context

Lab & Field Evaluations

Structured, repeatable testing methods and real-world usage

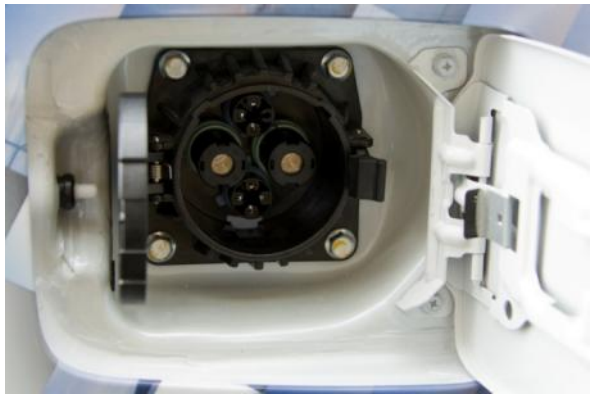
- Advanced Vehicle Testing & Evaluation (AVTE) in-use data collection
- Advanced Powertrain Research Facility (APRF) vehicle test and test development
- Medium duty drive cycle analysis and route optimization
- Truck cab environmental control optimization (Cool cab) and evaluation
- EDV Charging Infrastructure Evaluations

~ 75 Testing partners in the U.S. and Canada,

- Utilities
- State & local governments
- Universities and colleges
- Private companies/advocacy organizations
- Canadian provinces
- U.S. military organizations
- OEMs & conversion companies

Recommended Practices for Plug-in Vehicles, Charging Equipment and Grid Connectivity

SAE standards committees participation



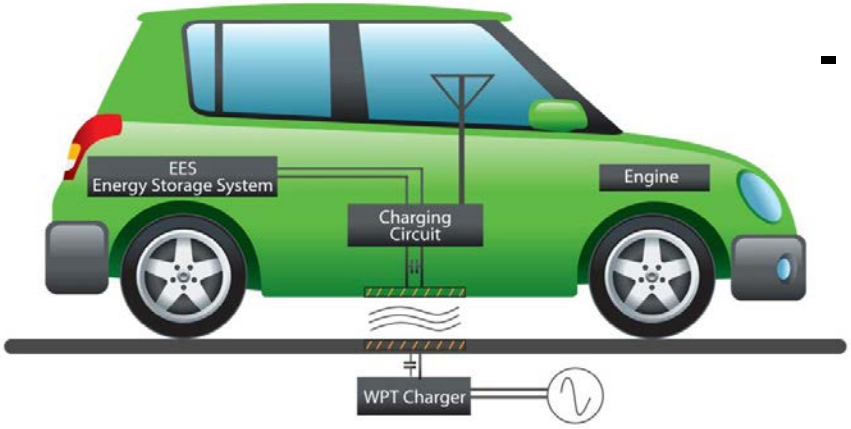
Development and validation of standards

Technology development

National Recommended Practices for permitting and installation of charging equipment (streamlined/automated process) turned over to Clean Cities.

Vehicle Systems Optimization

Vehicle Systems Optimization poses a growing opportunity for directly reducing petroleum consumption.



-Aerodynamic drag reduction

-Friction and wear reduction

-PACCAR CRADA for nucleate boiling

- Boundary layer lubrication

- TARDEC/ANL fuel economy demonstrator (FED)

- Parasitic & auxilary load reduction

- Wireless EDV Charging

- Advanced HVAC Systems

- SuperTruck

Office of Vehicle Technologies Budget

(dollars in thousands)	FY 2011 Appropriation	FY 2012 Current Appropriation	FY 2013 Request
Vehicle & Systems Simulation & Testing			
Simulation & Validation	5,260	4,575	5,455
HIL & Component Evaluations	1,950	2,350	2,802
Laboratory & Field Evaluations	11,690	10,475	10,931
Codes & Standards	3,560	2,565	3,058
Vehicle Systems Optimization	2,225	3,820	4,554
PHEV TADA	7,000	0	0
Advanced Vehicle Testing & Evaluation	3,000	4,500	5,000
Super Truck	4,000	7,000	7,000
Wireless Charging	0	4,000	4,000
Zero Emission Cargo Transport	0	5,000	0
High Efficiency HVAC	0	0	10,000
Total, Vehicle Systems	38,685	44,285	52,800

Recovery Act: Transportation Electrification Initiative

Largest US EV & Charger Deployment Ever

- Approximately $400 million in federal funding to
  - Automotive and Charging Industry
  - Educational Institutions
- Deploys over 13,000 electric-drive vehicles & 22,000 charging stations
- Collect detailed data
- Two EVSE specific projects

Thank you