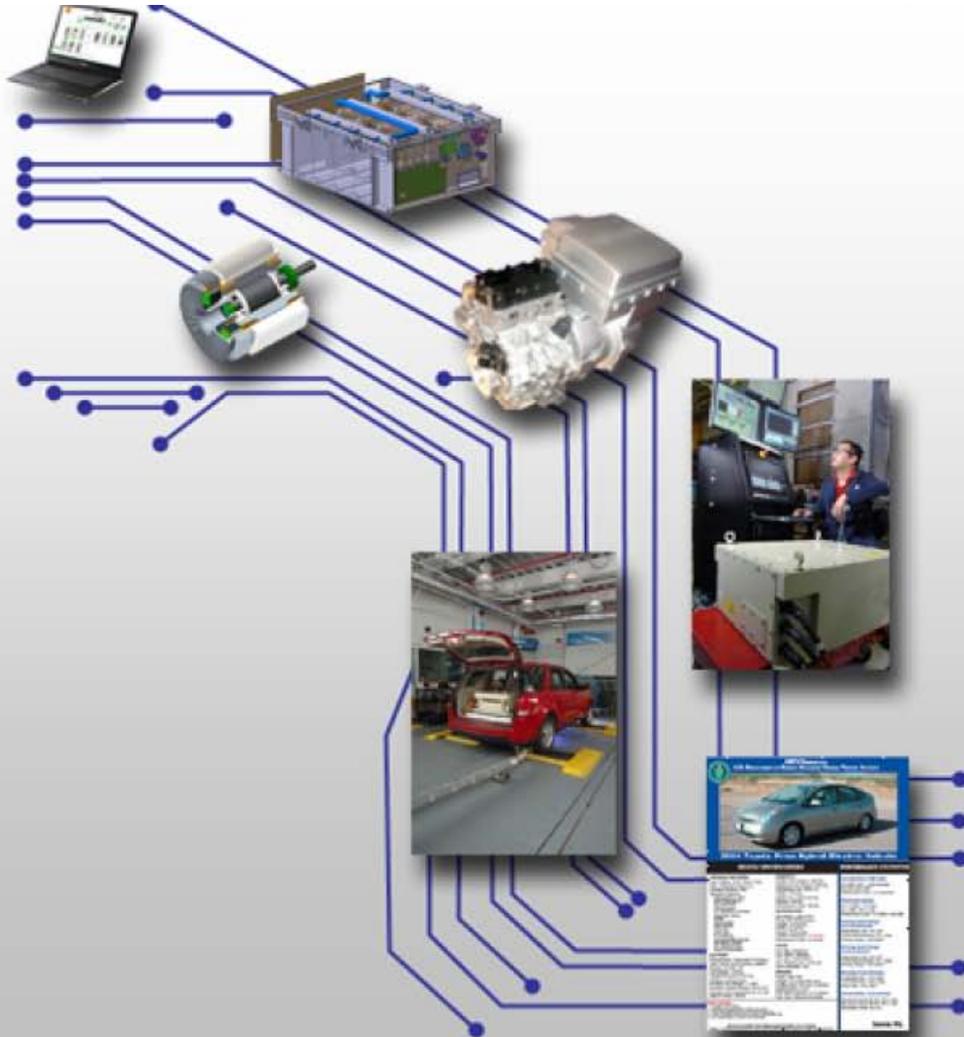




U.S. Department of Energy Energy Efficiency and Renewable Energy

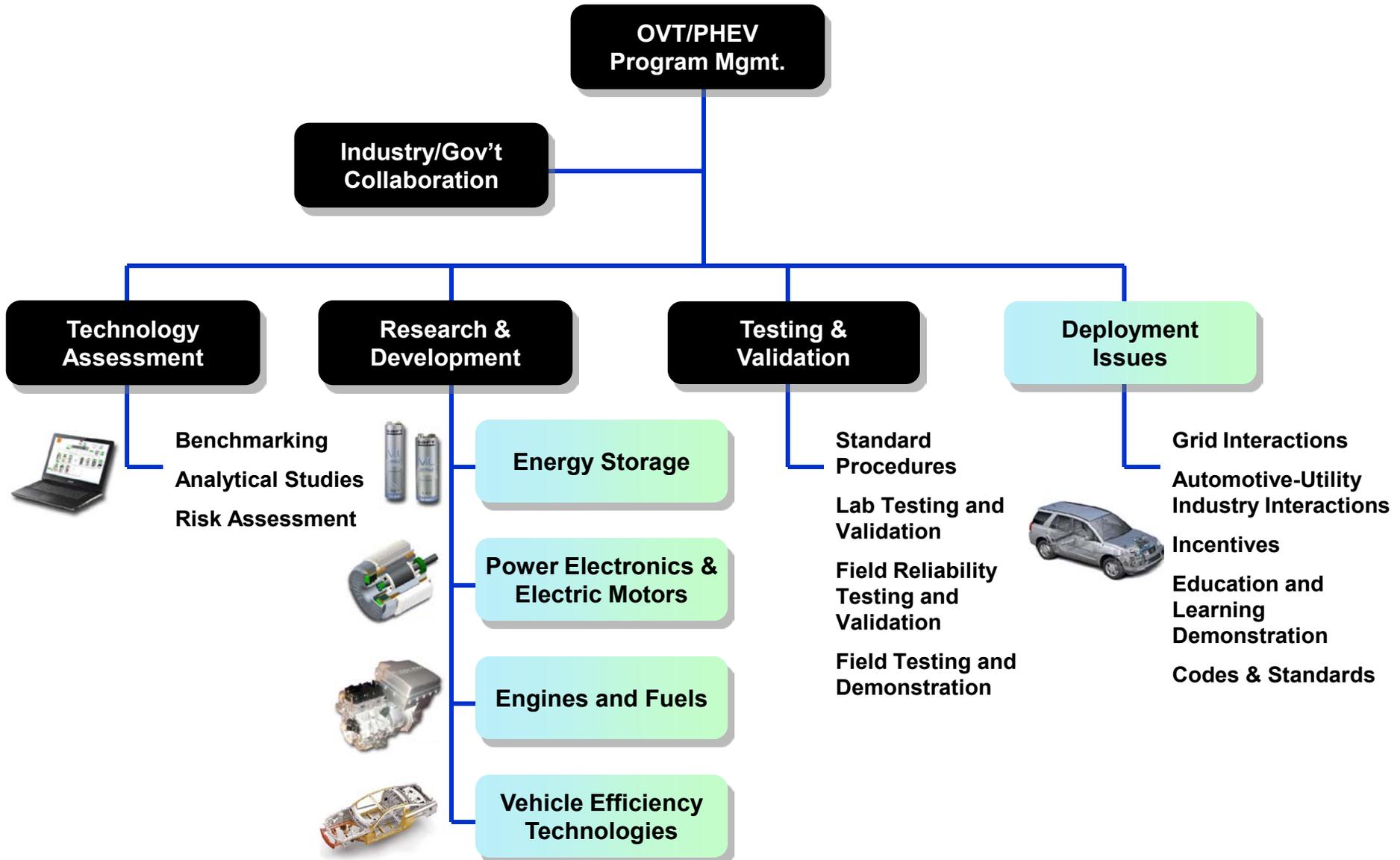
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Vehicle and Systems Simulation and Testing

Lee Slezak
US Department of Energy
Office of Vehicle Technologies







Analysis & Model Validation

- Policy
- Vehicle Design
 - Configurations
 - Control
 - Component requirements
 - Reference Vehicle Definition
 - Technology Verification
- PSAT/Autonomie



Validation in Vehicle Testing

- Advanced Vehicle Testing Activity
- Dynamometer Laboratory Testing
- On-Road Vehicle Performance Evaluation
- PHEV Technology Acceleration & and Deployment Activity)
- Fleet Data Collection
- Model Validation

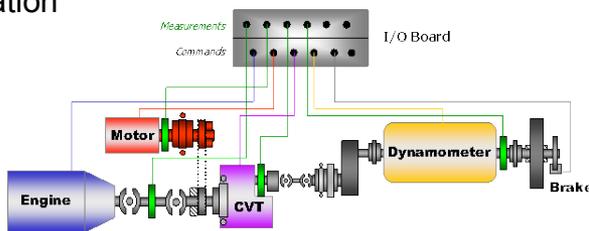


Definition
Verification

R&D

Development and Validation in Emulated Vehicles

- Hardware-In-the-Loop (HIL) & PSAT-PRO[®]
- HIL System Integration
- Technology Validation





Technology Assessment and Planning

Grid-connected vehicles with 40 to 100 mi (64 to 160 km) electric range to substantially displace petroleum in urban driving



Analysis

- Various configurations, electric ranges and control strategies
 - Component requirements
 - National benefits and impacts

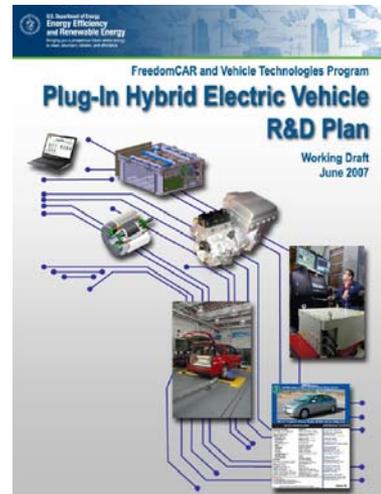
Testing

R&D Plan

Demonstration

- OEM Vehicles
- Utility partners
- Codes & Standards

- Lithium-ion batteries
- EVs and PHEVs
- Standard procedures



- Analysis
- Development
- System integration
- Testing & validation
- Commercialization



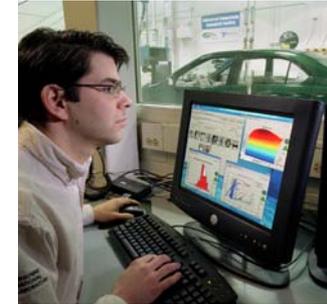


- Ties all of the hardware R&D together
- System-level simulations help specify the necessary performance characteristics of the hardware and predict the overall vehicle performance for a given configuration.
- Both simulation and testing activities can be used to evaluate the development and progress of individual components, and predict how well they will integrate with other components being developed.
- Tests and simulations also evaluate how well the program is approaching its whole-vehicle goals, and provide the technical inputs to models of future economic benefits.



Heavy Vehicle Systems Simulation and Validation

- PSAT/Autonomie modeling, component validation & benchmarking of emerging component and vehicle level technologies



Aerodynamic Drag Reduction

- CFD tools/simulation model development and assessment with wind tunnel testing and fleet demonstrations of drag reduction devices

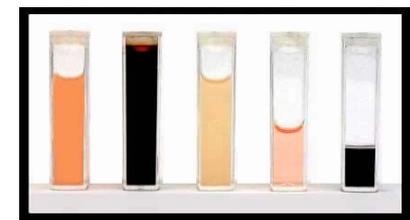


Friction and Wear Reduction

- Systems approach examining development and interaction of materials, lubricants and components focusing on boundary regime

Thermal Control

- Nanofluids and nucleated boiling analyses to optimize radiator performance, size, and pumping losses





(dollars in thousands)

	FY 2009 Appropriation	FY 2010 Current Appropriation	FY 2011 Request
Vehicle & Systems Simulation & Testing			
Simulation & Validation	6,000	5,525	5,660
HIL & Component Evaluations	4,120	2,350	2,000
Laboratory & Field Evaluations	7,700	27,215	26,715
Codes & Standards		2,225	3,160
Heavy Vehicle Systems Optimization	3,306	1,790	2,225
Total, Vehicle Systems	21,126	21,126	53,353
American Recovery and Reinvestment Act Funds			
Transportation Electrification	400,000	0	0
Electric Drive Technology Demonstration	360,000	0	0
Education & Outreach	40,000	0	0
Total, Hybrid & Electric Propulsion	59,240	0	0



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Thank you