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Plug-and-Play Powertrain Model Architecture

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GM

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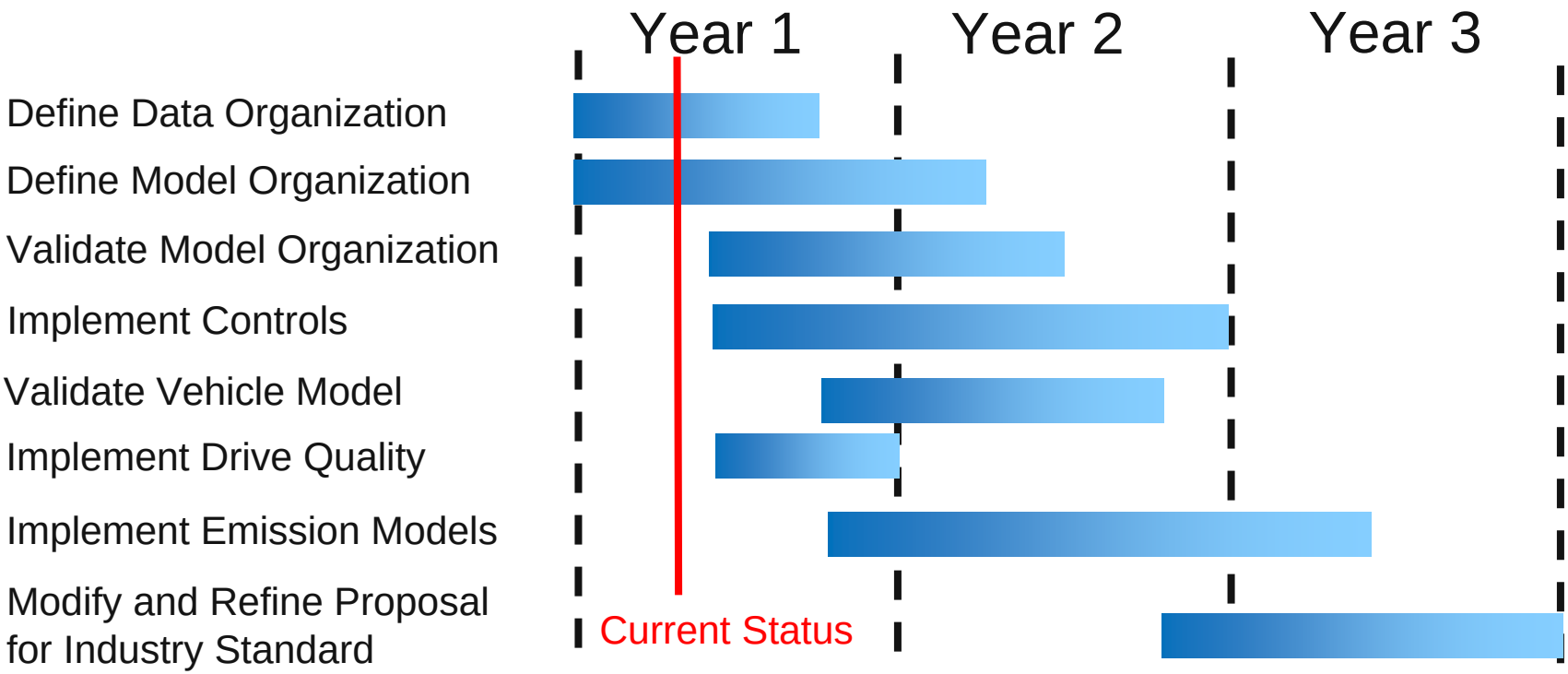
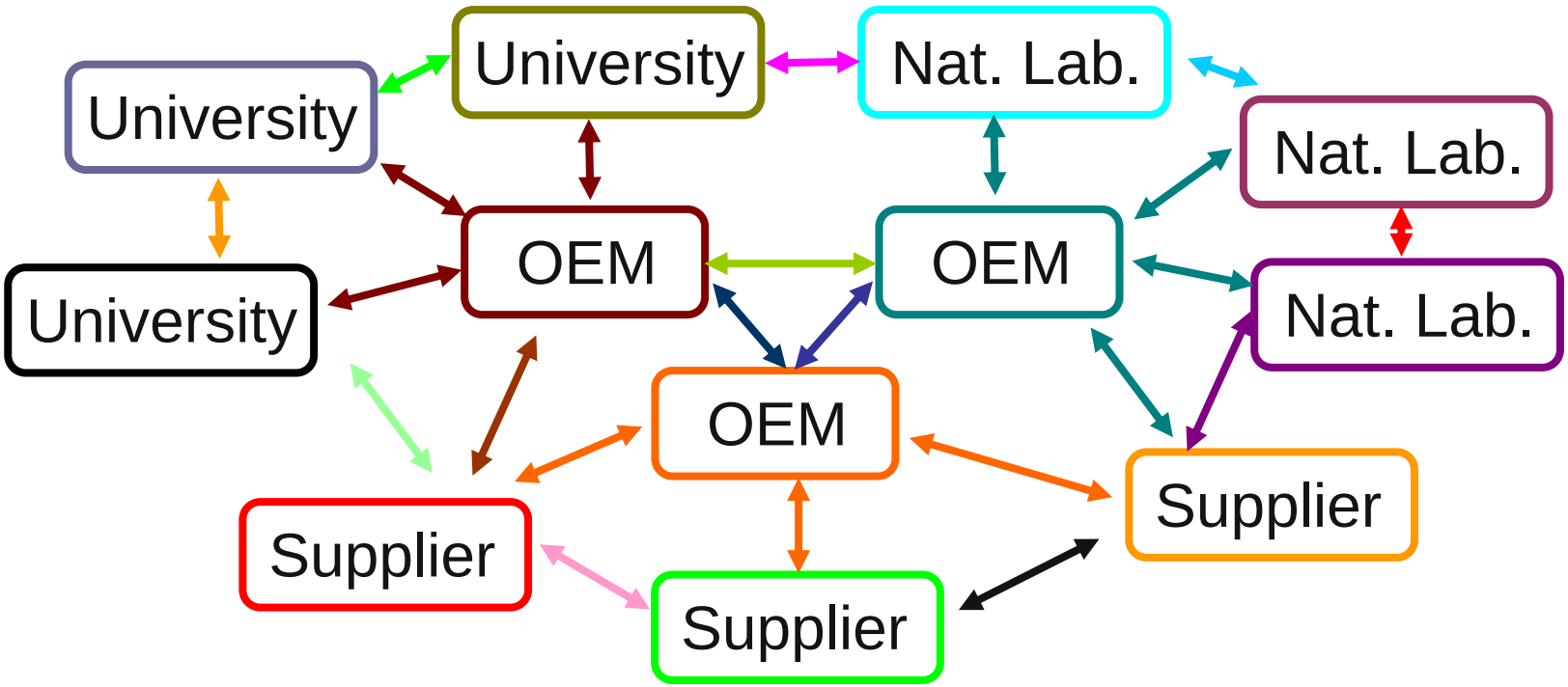
Develop Software Architecture to Plug-and-Play Hardware & Software Models

- Three Year Cooperative Research and Development Agreement (CRADA)
- Establish industry standard for architecture & model interfaces
- Bring technologies to the market faster to maximize fuel displacement



Common Model Architecture Enables Component Models Transfer

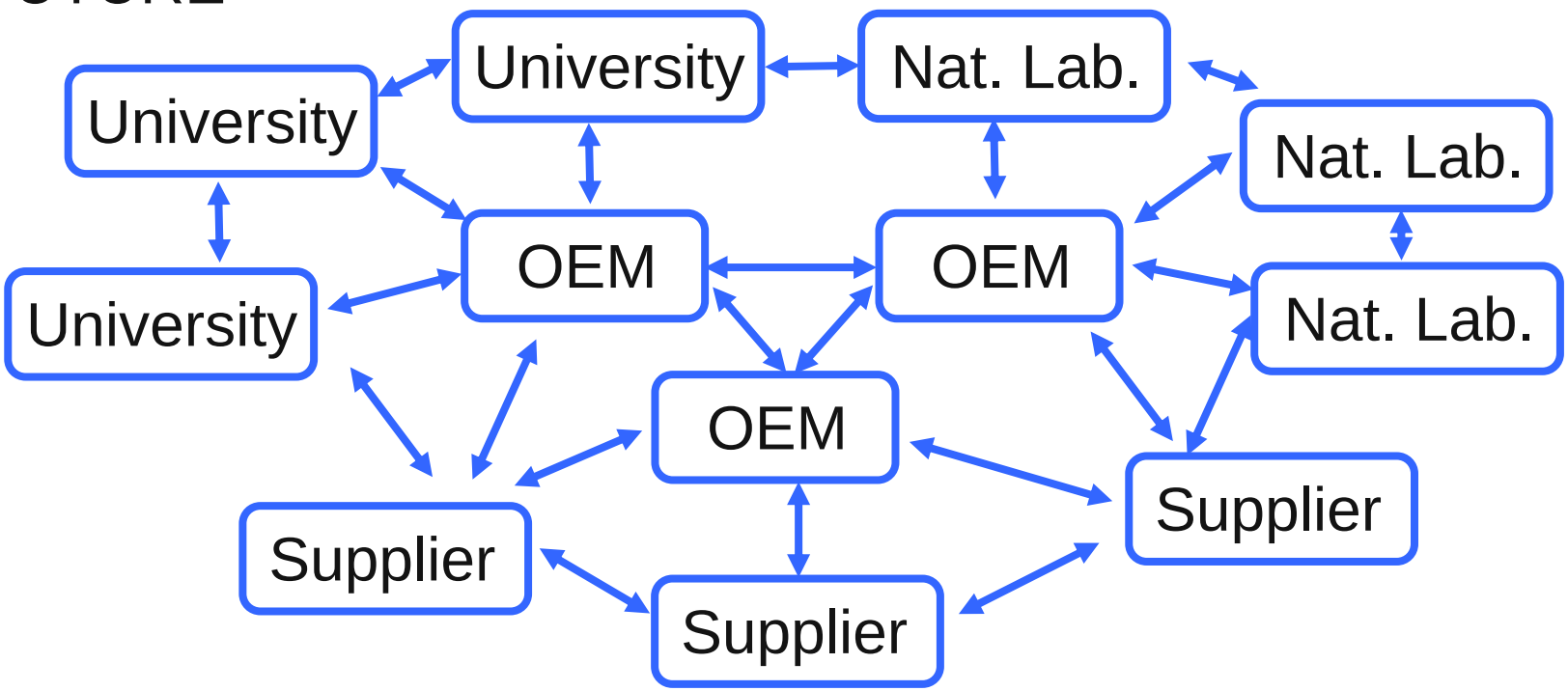
NOW



Numerous model organizations
Numerous nomenclatures

Common Model Architecture Enables Component Models Transfer

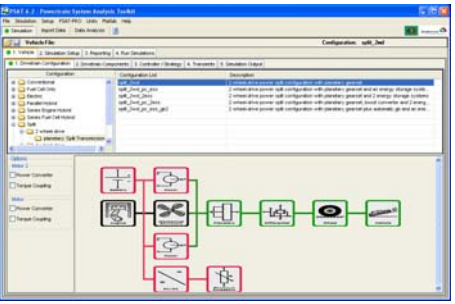
FUTURE



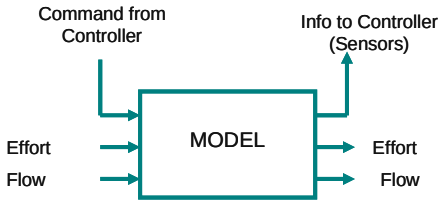
One model organization
One common nomenclature

Areas of Expertise Highlights Synergy

Graphical User Interface



Component Organization



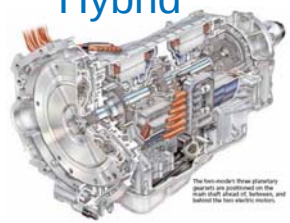
Hardware Modeling & Analysis Requirements

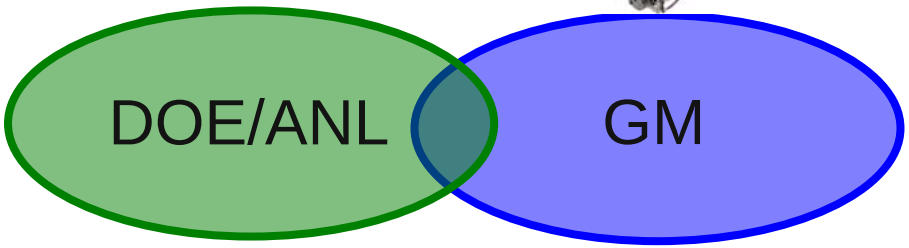
Engine

Transmission

Vehicle

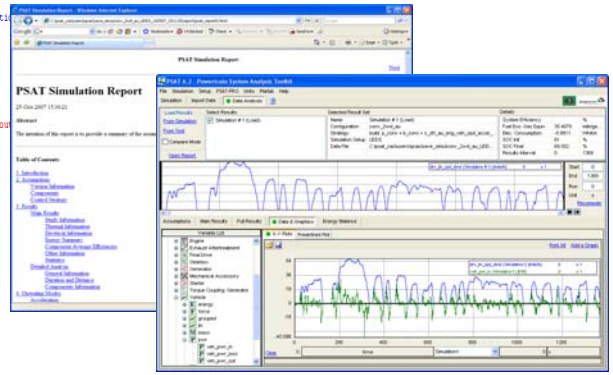
Hybrid





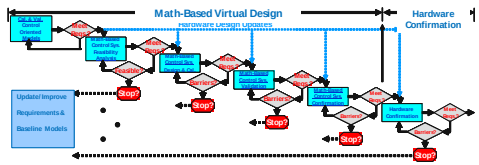
Data Organization

Post-processing Tools



Control Algorithm Design & Analysis Requirements

Process



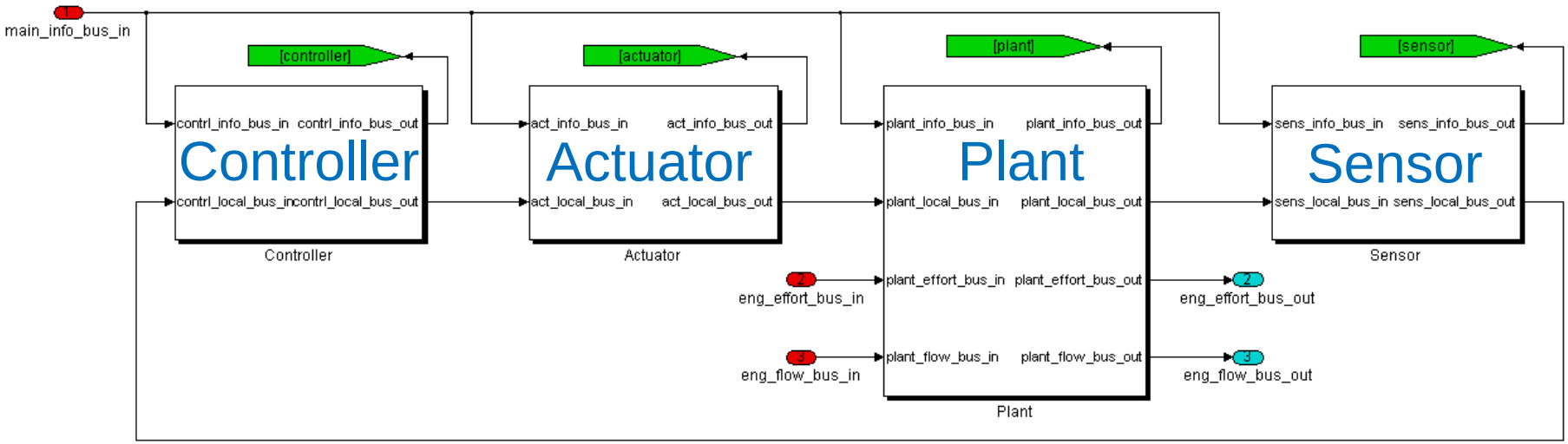
Control

Plug&Play Model Foundations Based on Existing PSAT Flexibility & Reusability

- Drivetrain configurations build automatically
- Proprietary data set, component models and control strategies implemented without code modification
- Intuitive Graphical User Interface
- Generic component model format
- Common Nomenclature

… But Includes Industry Specific Requirements

- Build systems (i.e., engine) and subsystems (i.e., engine rotational dynamics), not only vehicle powertrain
- Reorganize system controllers to be in a single location (for microcontroller)
- Combine different systems into a single one based on the level of modeling



Proposed Organization with All Controllers in Same Subsystem (e.g., engine, transmission…)

Bring Technologies to Market Faster to Maximize Fuel Displacement

- Evaluation of component technologies in a vehicle system context during early stage of development
- Use of a single tool from simulation to hardware through SIL, HIL and RCP
- Automotive industry, universities and national laboratories will benefit from this study as the main outcomes will be shared:
  - Model organization
  - Common nomenclature,
  - Processes (e.g., validation, tuning…),
  - Linkage with other tools

  (e.g., GTPower, AMESIM, ADAMS, AVL Drive…)