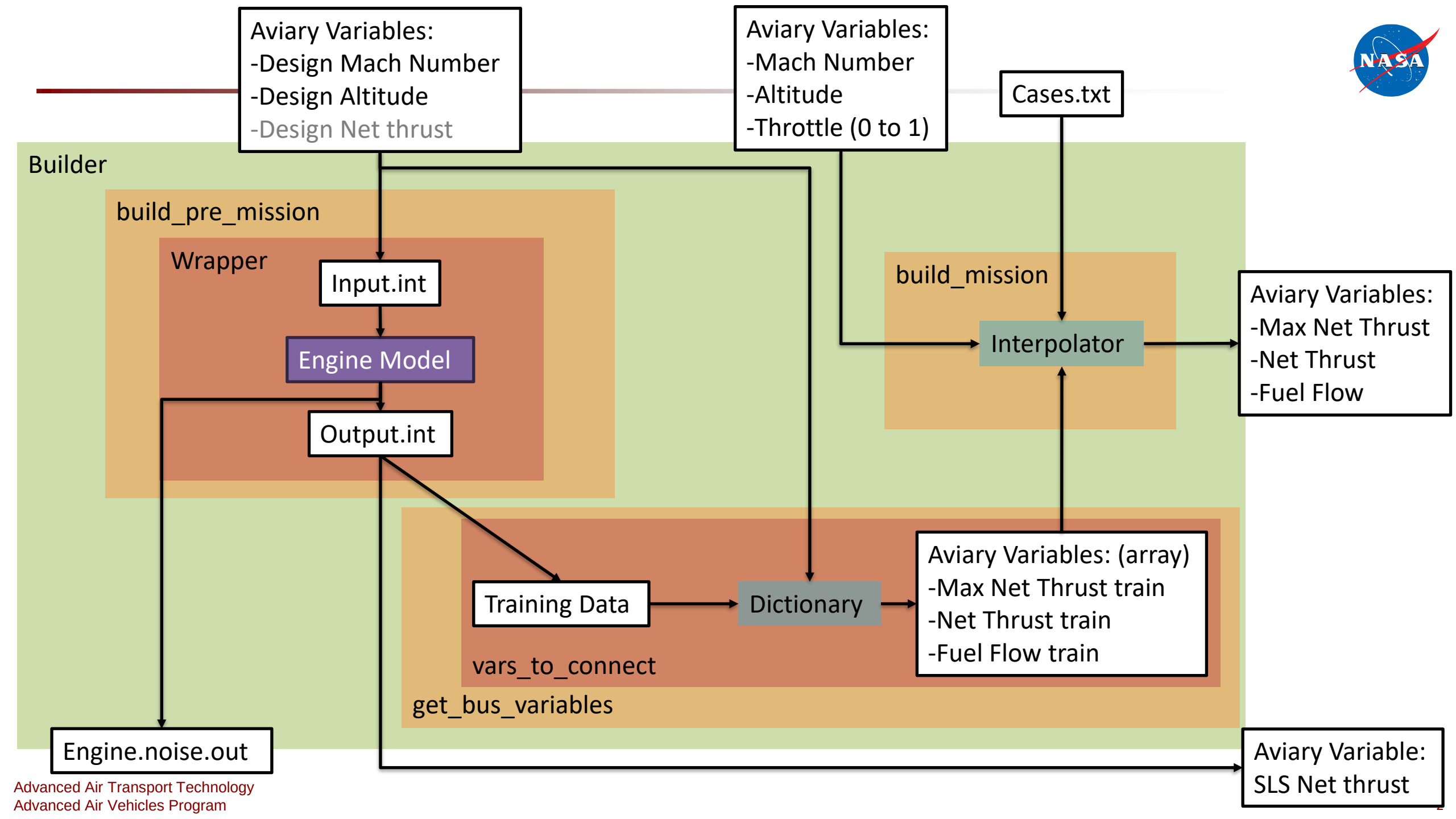
NPSS Software Integration

NASA MDAO and MBSA&E NRA Workshop

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Aviary Variables:
-Design Mach Number
-Design Altitude
-Design Net thrust
Aviary Variables:
-Mach Number
-Altitude
-Throttle (0 to 1)
Cases.txt
Builder
build_pre_mission
Wrapper
Input.int
Engine Model
Output.int
build_mission
Interpolator
Aviary Variables:
-Max Net Thrust
-Net Thrust
-Fuel Flow
Training Data
Dictionary
Aviary Variables: (array)
-Max Net Thrust train
-Net Thrust train
-Fuel Flow train
vars_to_connect
get_bus_variables
Engine.noise.out
Aviary Variable:
SLS Net thrust

NPSS Software Integration Definitions

- Engine Model: NPSS engine model that runs both design and off-design
  - Incorporates design changes from aviary through input.int file
  - Run a pre-decided fight envelope of cases
  - Outputs Engine.noise.out and Output.int files
- Wrapper: Runs the Engine model and exposes key information from the engine model to make connections to other systems (DesignEngineGroup.py)
  - Key information
    - Input.int: Design MN, design altitude, design net thrust
    - Output.int: SLS net thrust and training data (max net thrust, net thrust, fuel flow) for whole flight envelope
- Builder: Sets up engine model through the wrapper to work with aviary (table_engine_builder.py)
  - build_pre_mission: Executes the wrapper
  - get_bus_variables: Connects wrapper variables to aviary variables
  - build_mission: Uses training data to then interpolate what the desired values (max net thrust, net thrust, fuel flow) would be for the desired cases (MN, Alt, throttle)