Concept Presentation

Analyses related to
Fully Electrical Vehicles

Cost Estimation

Cost for a system, vehicle or product line is important for any assessment of a solution

Component count and cost analysis is done based on take rate constraint and the generic constraints piece cost and development cost.
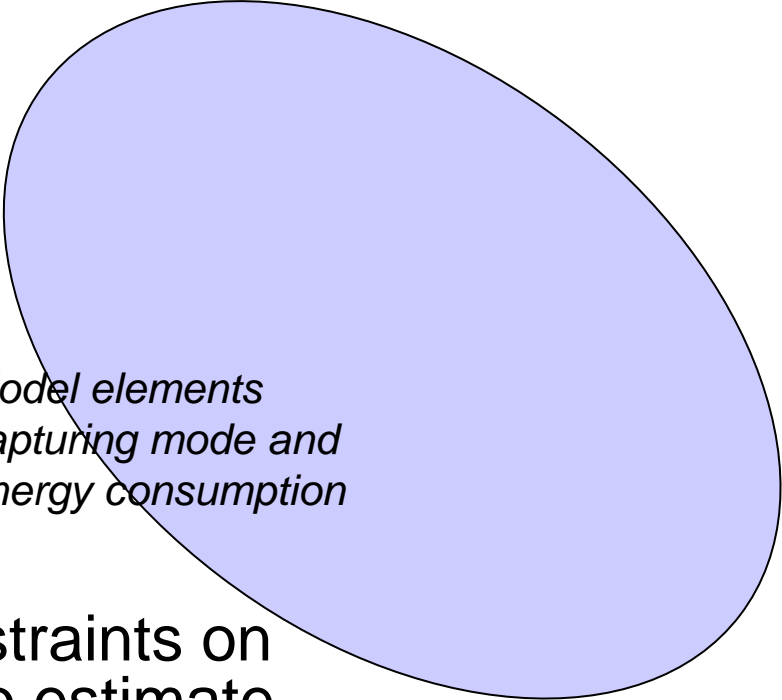
Total Cost = Sum of
Development Costs +
(Piece Cost x Piece Count)
for all components

Model elements capturing cost
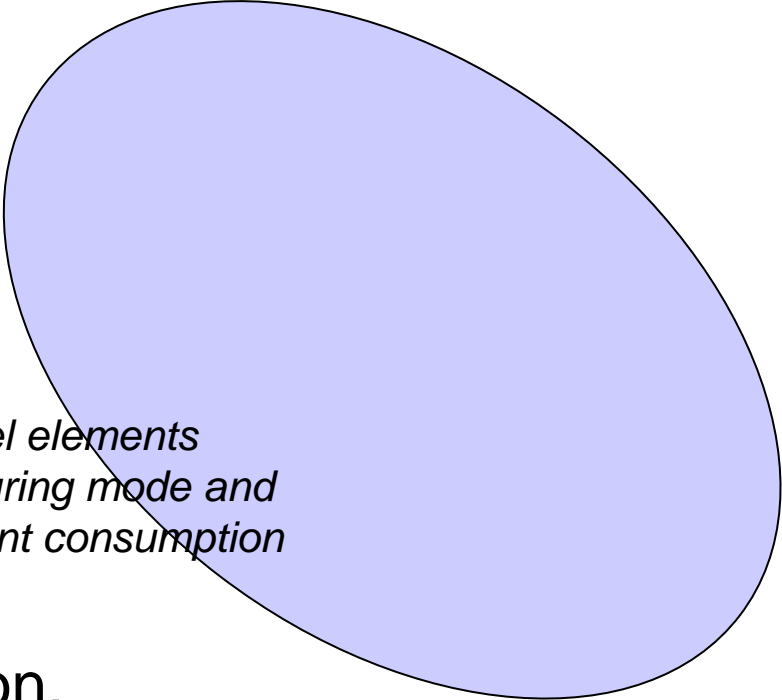
Energy Consumption

- Power Consumption is an important aspect of Electrical Vehicle Design
- Power Consumption can be estimated using powerConsumption constraints
- Combining with Behavioral constraints on how modes shift, it is possible to estimate energy consumption over time
- Alternatively, power consumption is linked to system signals, such as propulsion torque, cooling power, steering torque. Integration provides energy consumption over time.

Model elements capturing mode and energy consumption

Current Consumption

- Current assessment is used to check that cables are correctly dimensioned and that over-heating, EMI, etc. does not occur.

- Current consumption is assessed as Power Consumption, divided by voltage.

- As for Power, current can be assessed based on mode-dependent static constraints, or linked to system signals.

Model elements capturing mode and current consumption

Cable Length

- Cable Length is a static measure that can be established after resolving all variabiliy and then summing the cable length constraints of the HardwareDesignArchitecture
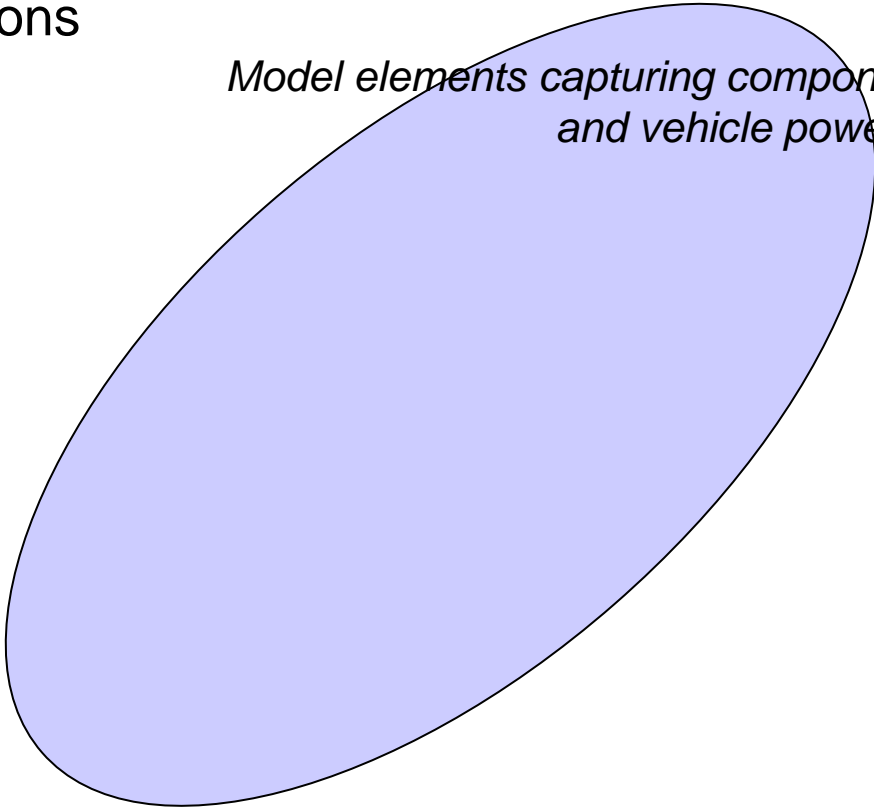
Model elements capturing cable length

Power Distribution Analysis

- Power distribution is critical as full-authority systems rely on electrical supply

- Features are Realized by functions allocated to HW. Analysing the power network makes it possible to assess which function is dependent on which power supply

Model elements capturing components and vehicle power net

Summary

- EAST-ADL supports model annotation for several aspects relevant for Electrical Vehicles
  - Cost
  - Cable length
  - Power
  - Current
  - Power distribution
- Analysis is generally based on simple arithmetics
- Variability resolution is an important step preparing analysis
- The proposed analyses are important ingredients in optimization