EAST-ADL

An Architecture Description Language for Automotive Software-Intensive Systems

Introduction

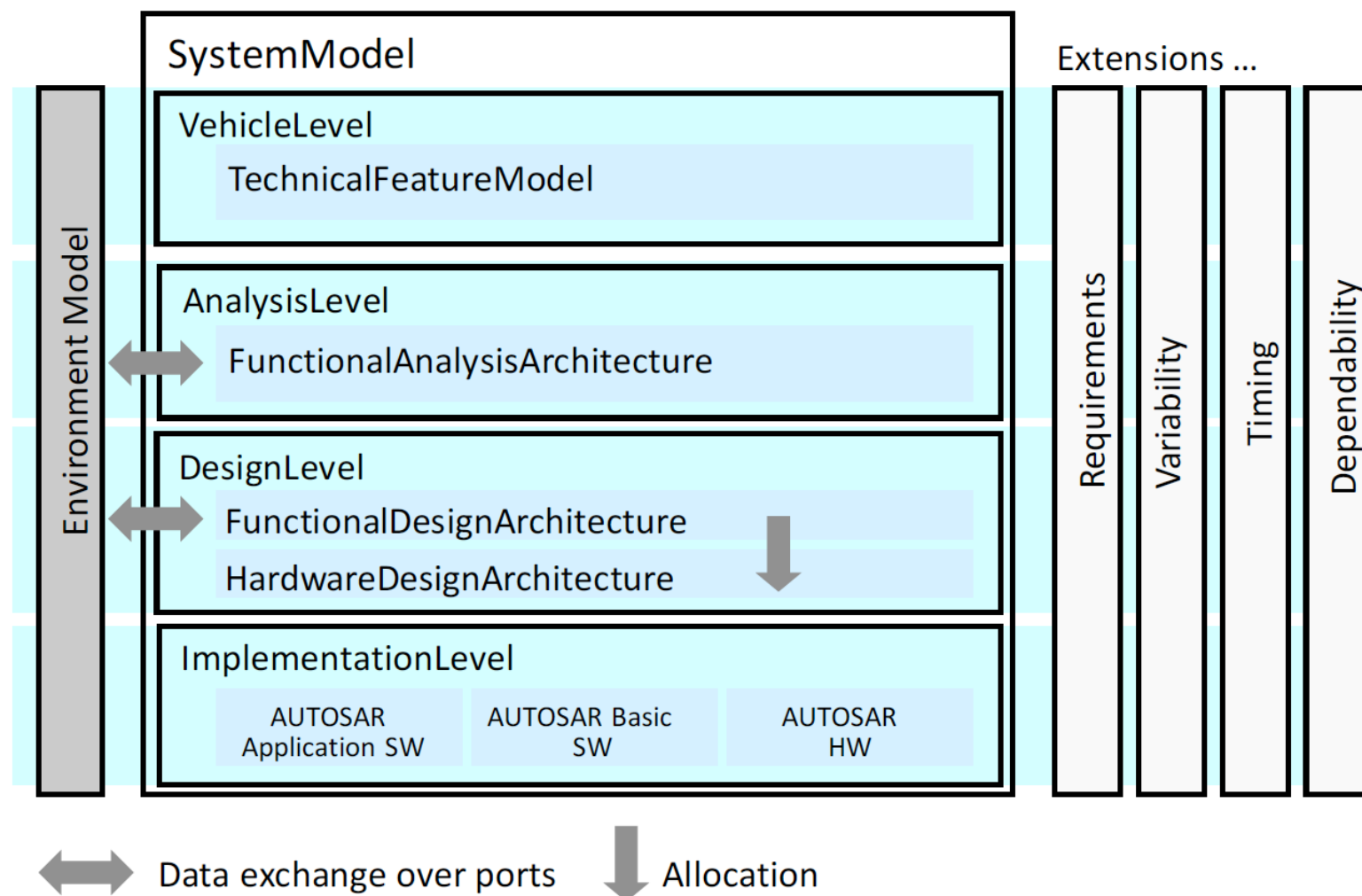- EAST-ADL represents an Architecture Description Language (ADL) to describe automotive systems

Figure 1: The EAST-ADL's breakdown in abstraction levels (vertically) and in core system model, environment and extensions (horizontally).

The four abstraction levels

- **Vehicle Level**

  Feature trees characterizing the vehicle content as it is perceived externally.

- **Analysis Level**

  An abstract functional architecture defining systems from a functional point of view.

- **Design Level**

  The detailed functional architecture allocated to a hardware architecture.

- **Implementation Level**

  The implementation of the embedded system represented using AUTOSAR elements

Example Model—BBW

- Brake By Wire System

- Brake-by-wire technology in the automotive industry is the ability to control brakes through electrical means. It can be designed to supplement ordinary service brakes or it can be a standalone brake system.

MetaEdit

- An editor to build EAST-ADL model.

- You will use this tool to build your model.
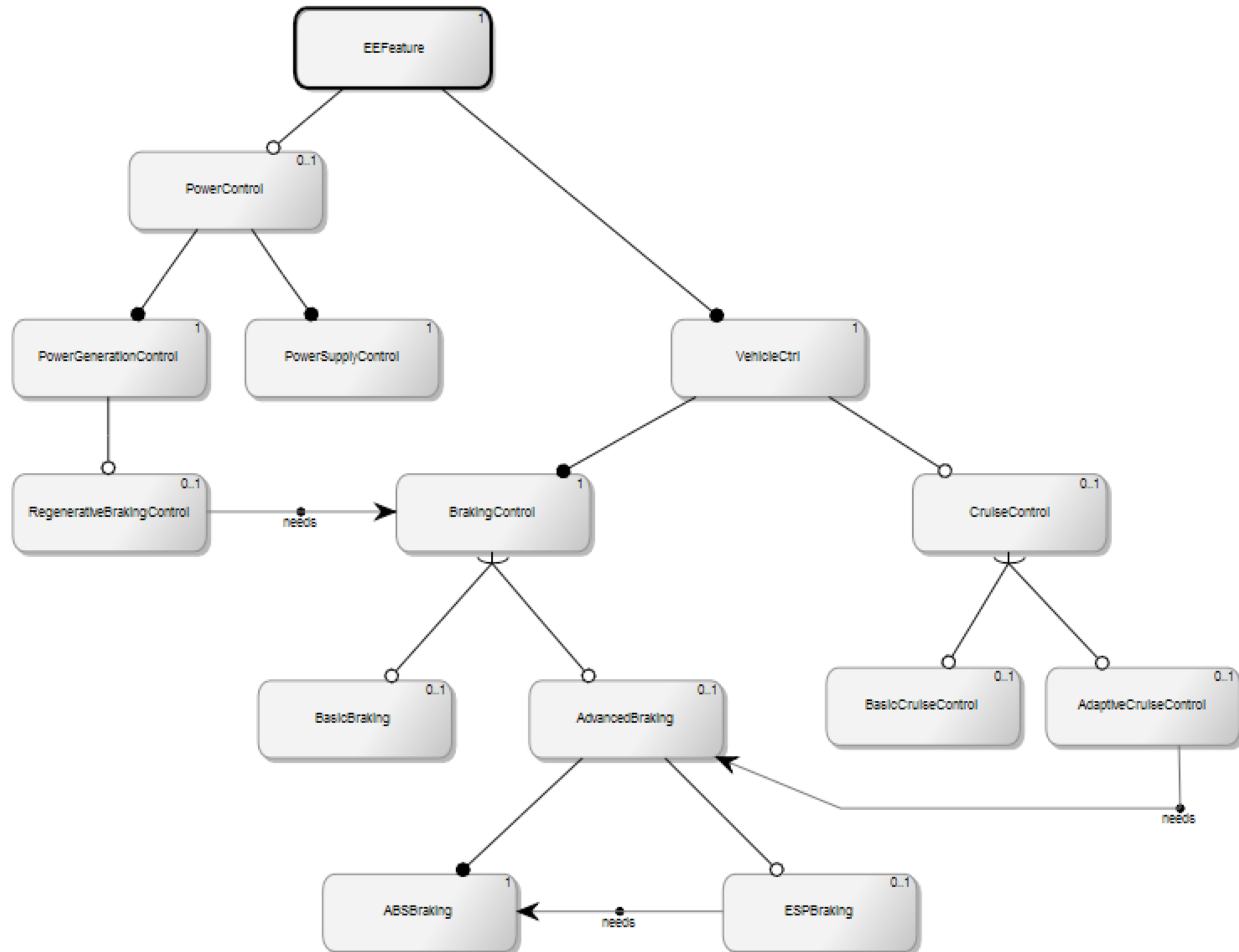
Vehicle Level
TechnicalFeatureModel \<FeatureModel\>

Analysis Level
BBWAL: BBW_FAA \<AnalysisFunction\>

Design Level
BBWDL: BBW_FDA \<DesignFunction\>

Design Level
BBWAllocation: AllocationMatrix

Design Level
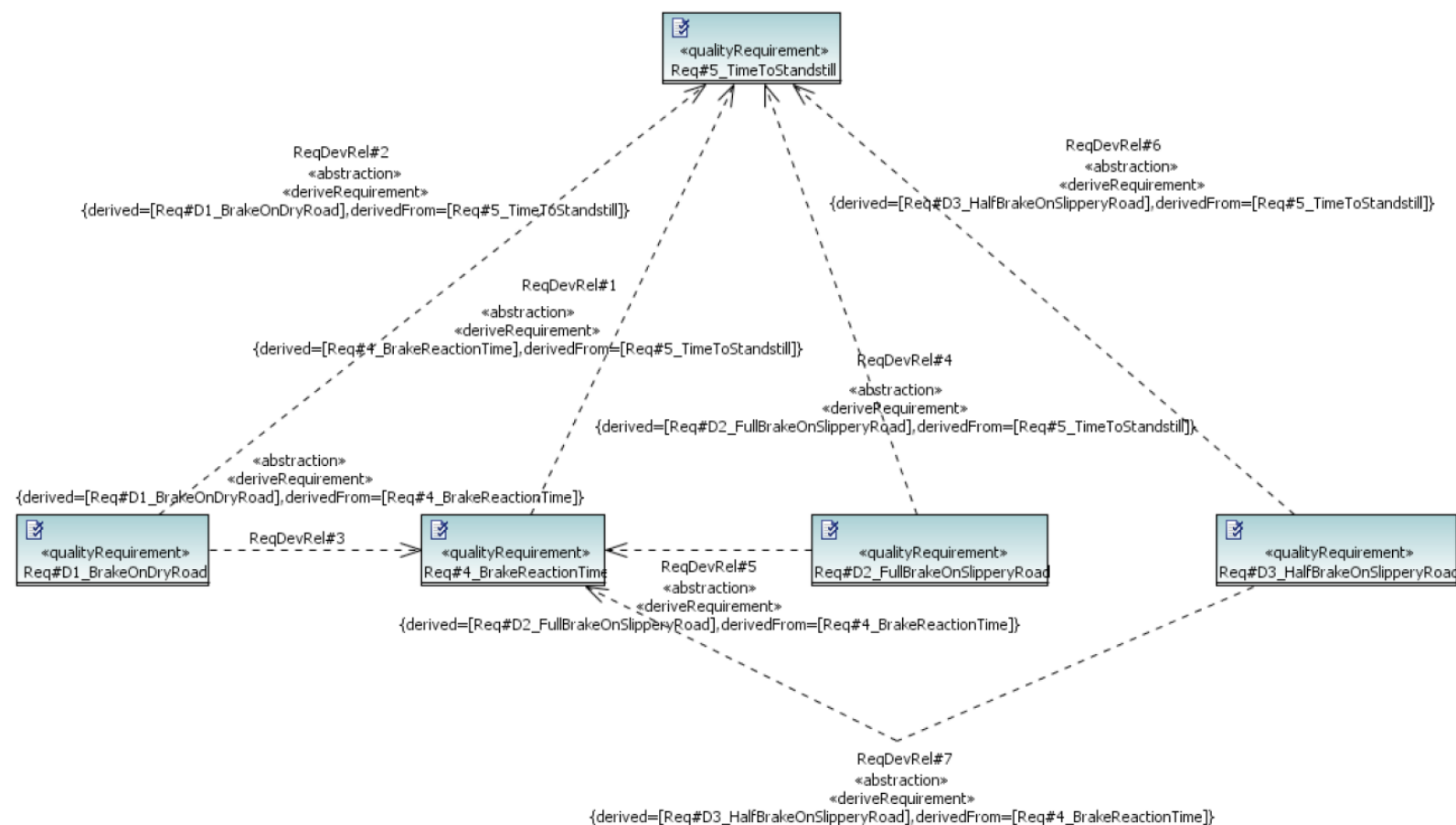**HW_BBW**: HDA \<HardwareComponent\>

Vehicle Level

Vehicle Level
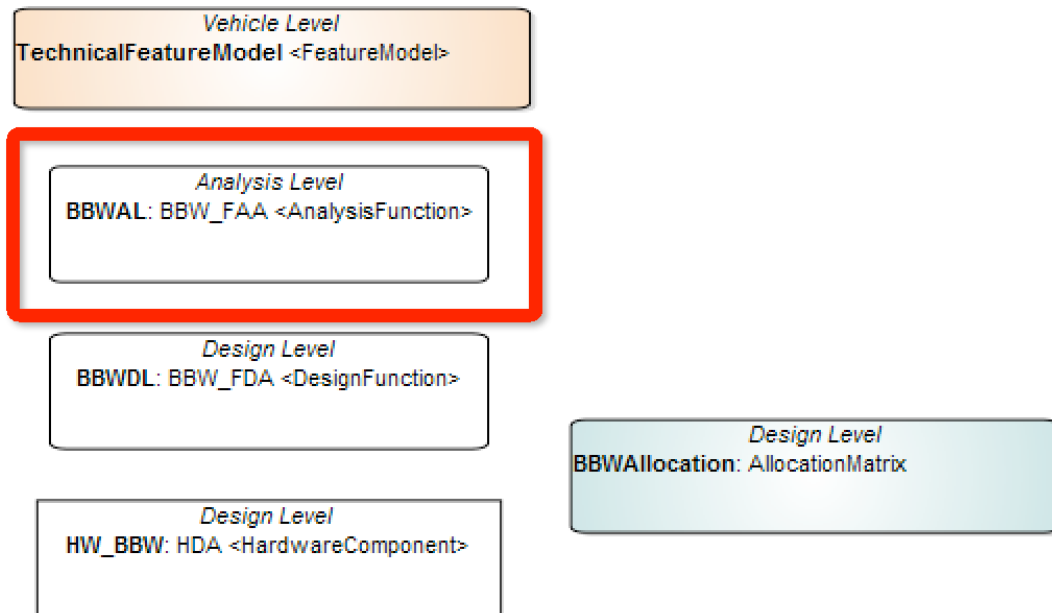
- The Technical Feature tree of the target braking system

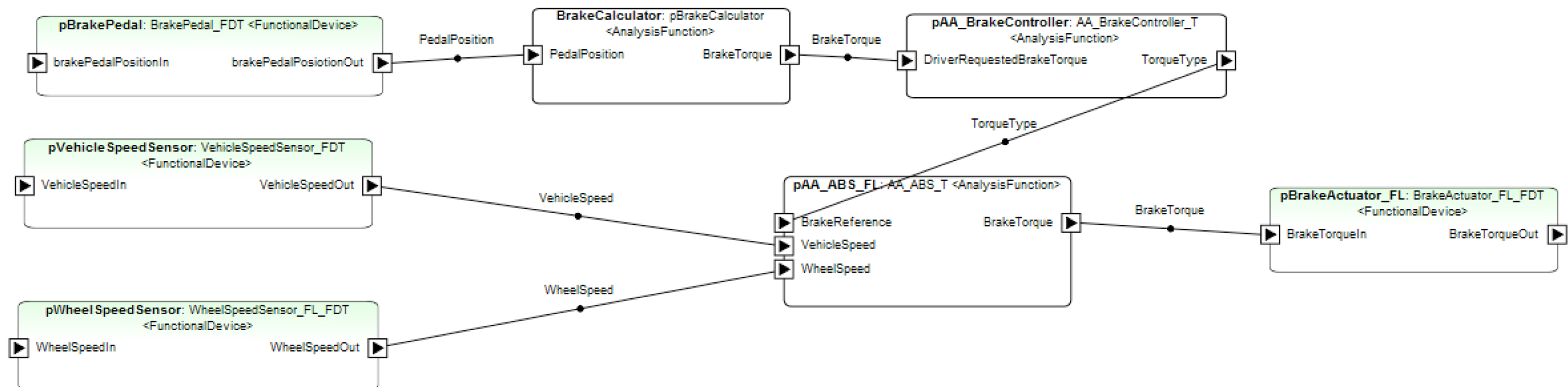- One Feature in Vehicle level has one or more requirements.

ID	Description
Req#1_BaseBraking	"The system shall provide a base brake functionality where the driver indicates that he/she wants to reduce speed and the braking system starts decelerating the vehicle"
Req#2_DriverBrakeRequest	"The driver shall be able to request braking"
Req#3_Anti-LockBraking	"The system shall be an anti-lock braking system (ABS) by preventing the wheels from locking while braking"
Req#4_BrakeReactionTime	"The time from the driver's brake request until the actual start of the deceleration shall be ≤ 300ms.(Value derived from expert judgment)"
Req#5_TimeToStandstill	"The time to stadstill shall follow the recommendations in EU braking systems Directive 71/320 EEC. The Swdish Road Administration claims that a factor of 3 (on braking distance) is acceptable for ice"
Req#6_OperationofBrakePedal	"The Operator shall be able to vary the desired braking force using the brake pedal. A fully pressed pedal means maximum brake force."
Req#7_BrakeRelease	"When the brake pedal is not pressed, the brake shall not be active."

Analysis Level

Vehicle Level
TechnicalFeatureModel <FeatureModel>

Analysis Level
BBWAL: BBW_FAA <AnalysisFunction>

Design Level
BBWDL: BBW_FDA <DesignFunction>

Design Level
BBWAllocation: AllocationMatrix
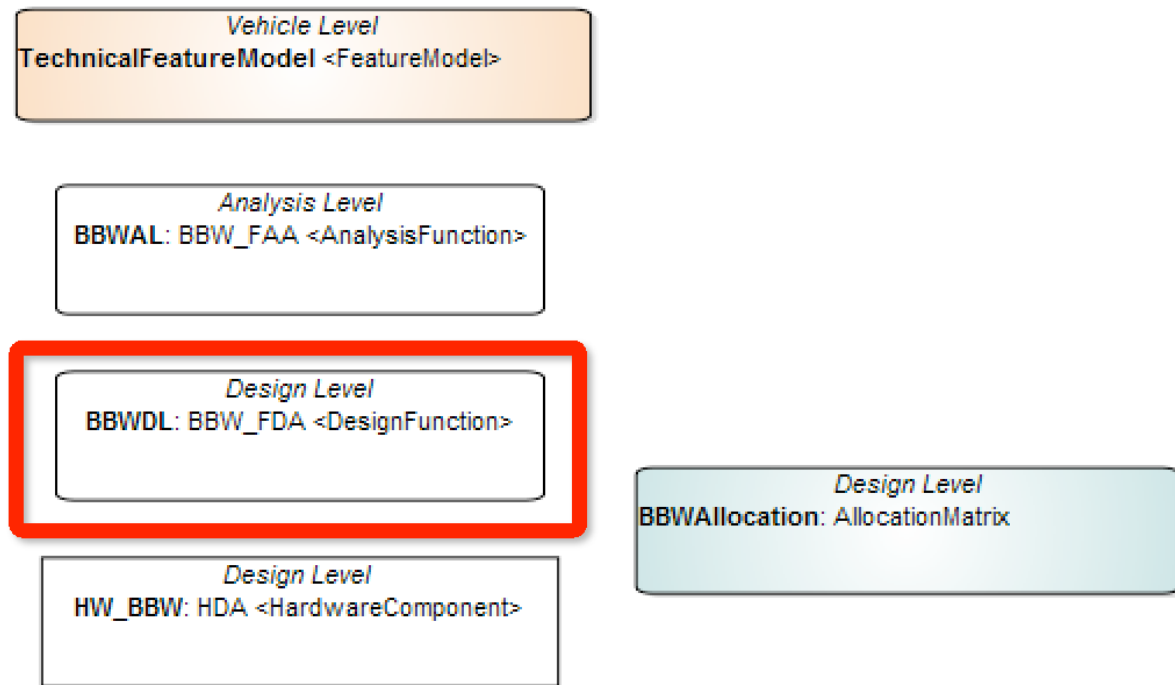
Design Level
HW_BBW: HDA <HardwareComponent>

- Functional Analysis Architecture (FAA)

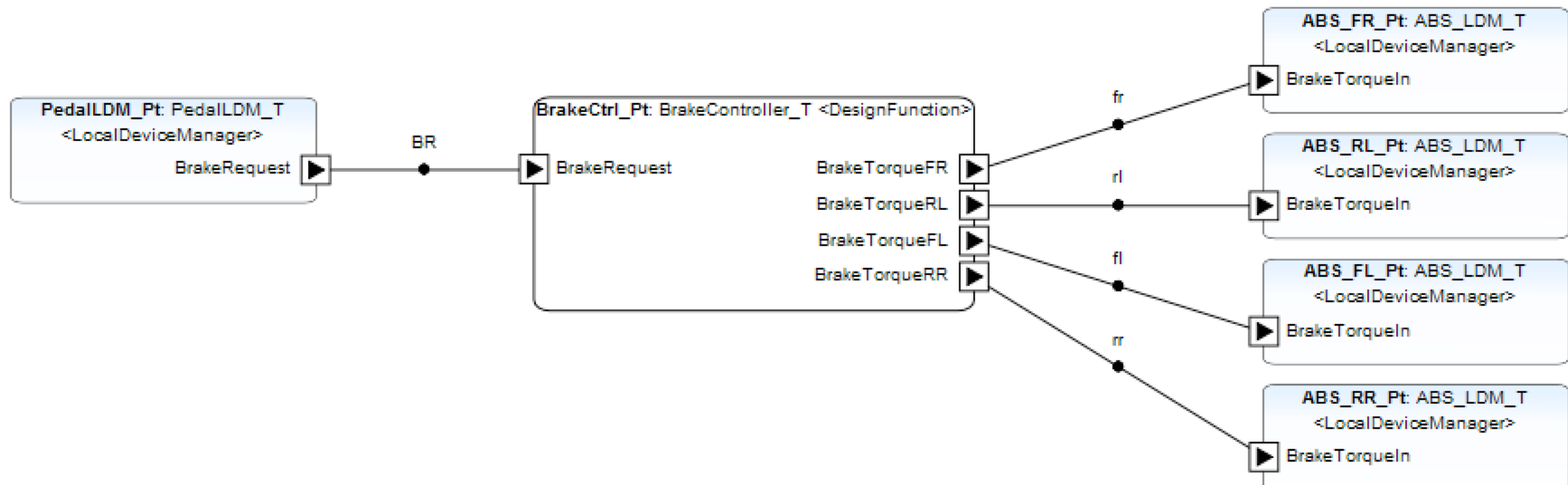# Analysis Level

- The Vehicle Level Features are realied by some interconnected abstract functions at the Analysis Level

- Functional Device: Sensor or Actuator. Through Functional Devices, an Analysis Function interacts with the physical environment.

- Analysis Functional Prototype: Calculation or Control Logic

Design Level

- Functional Design Architecture

Design Level

- The Design Level architecture further details the Analysis Level design by taking the software and hardware resources into consideration.

Implementation Level

- AUTOSAR model

- C\C++, Java Code