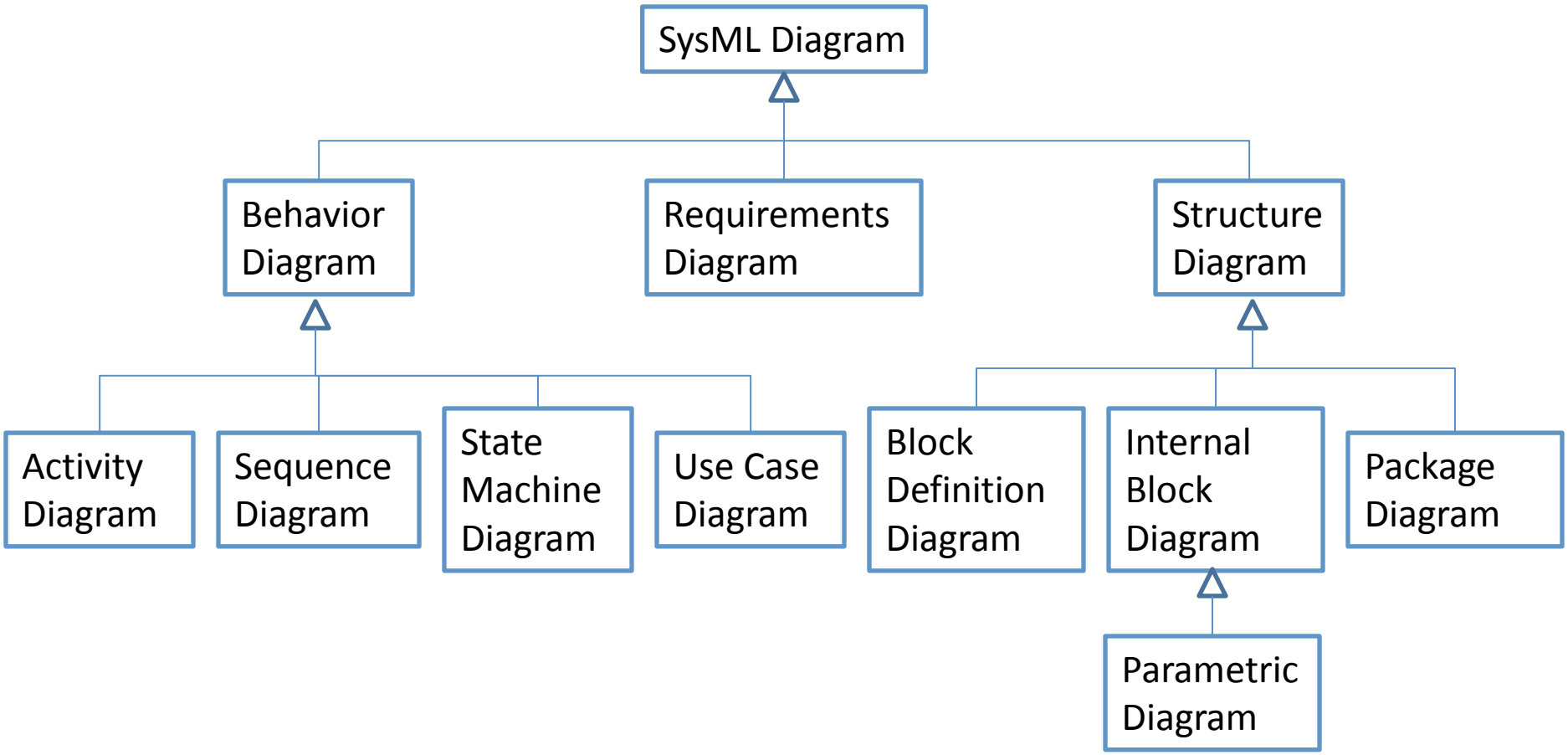
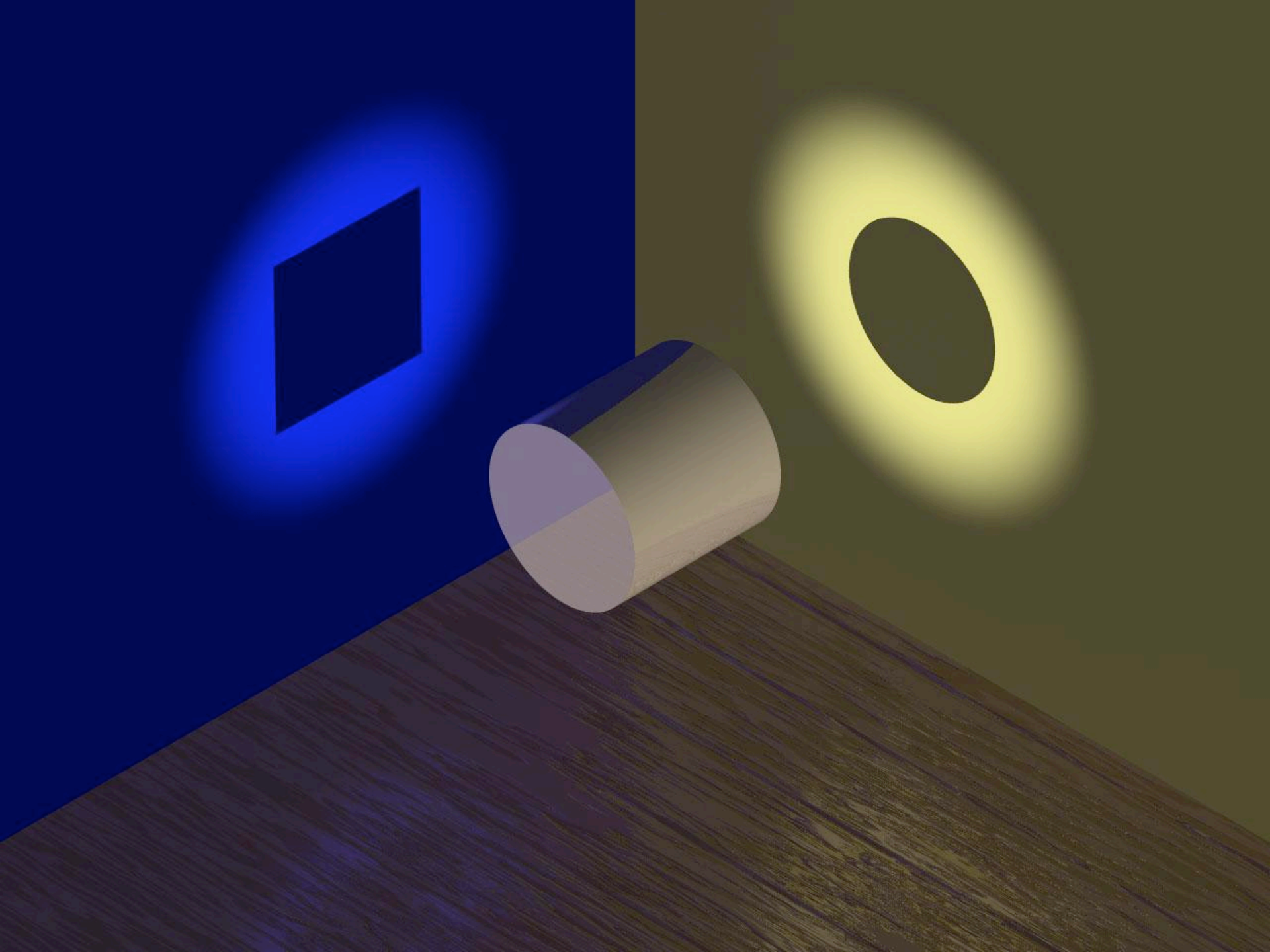
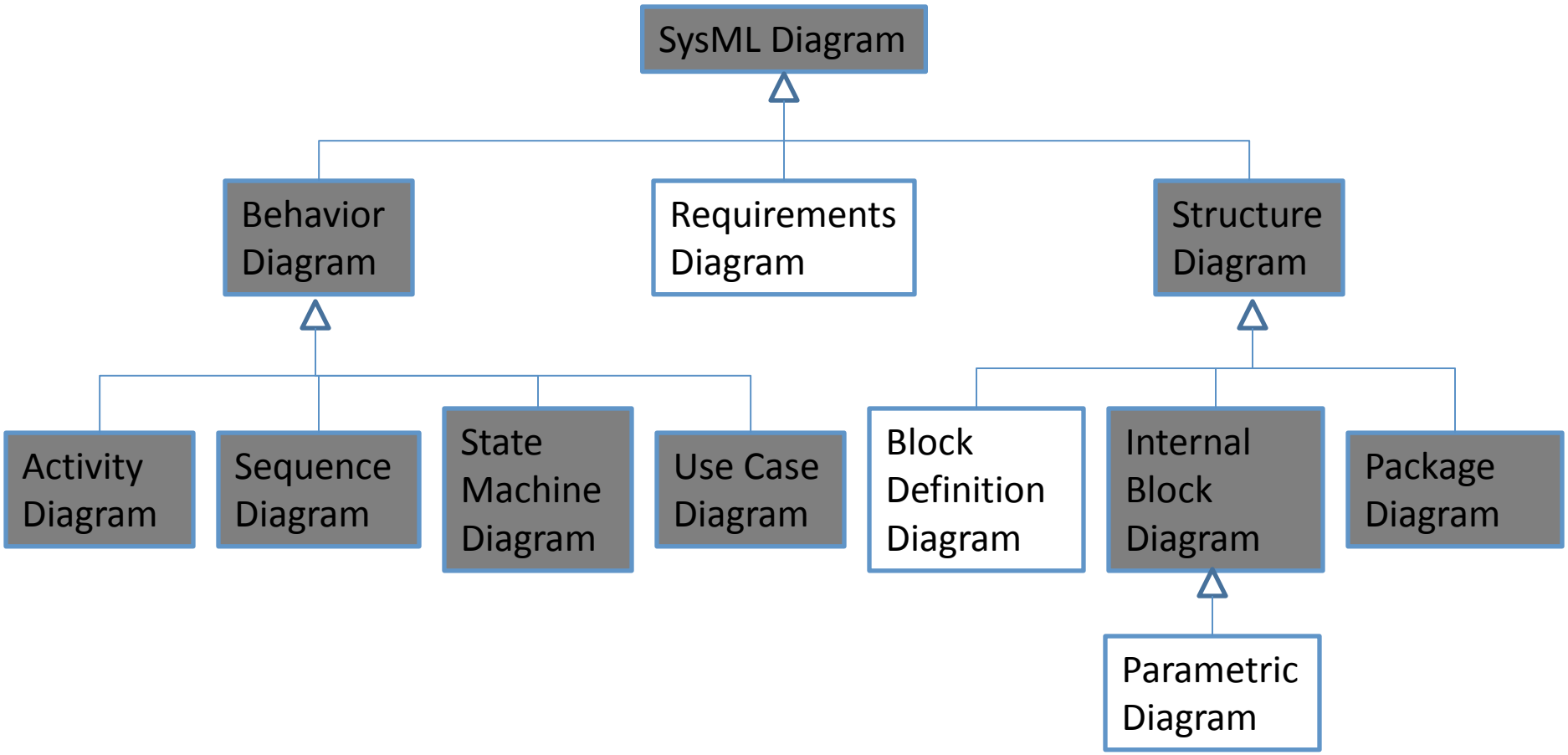

SysML Diagram
Behavior Diagram
Requirements Diagram
Structure Diagram
Activity Diagram
Sequence Diagram
State Machine Diagram
Use Case Diagram
Block Definition Diagram
Internal Block Diagram
Package Diagram
Parametric Diagram




SysML Diagram
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Package Diagram
Parametric Diagram

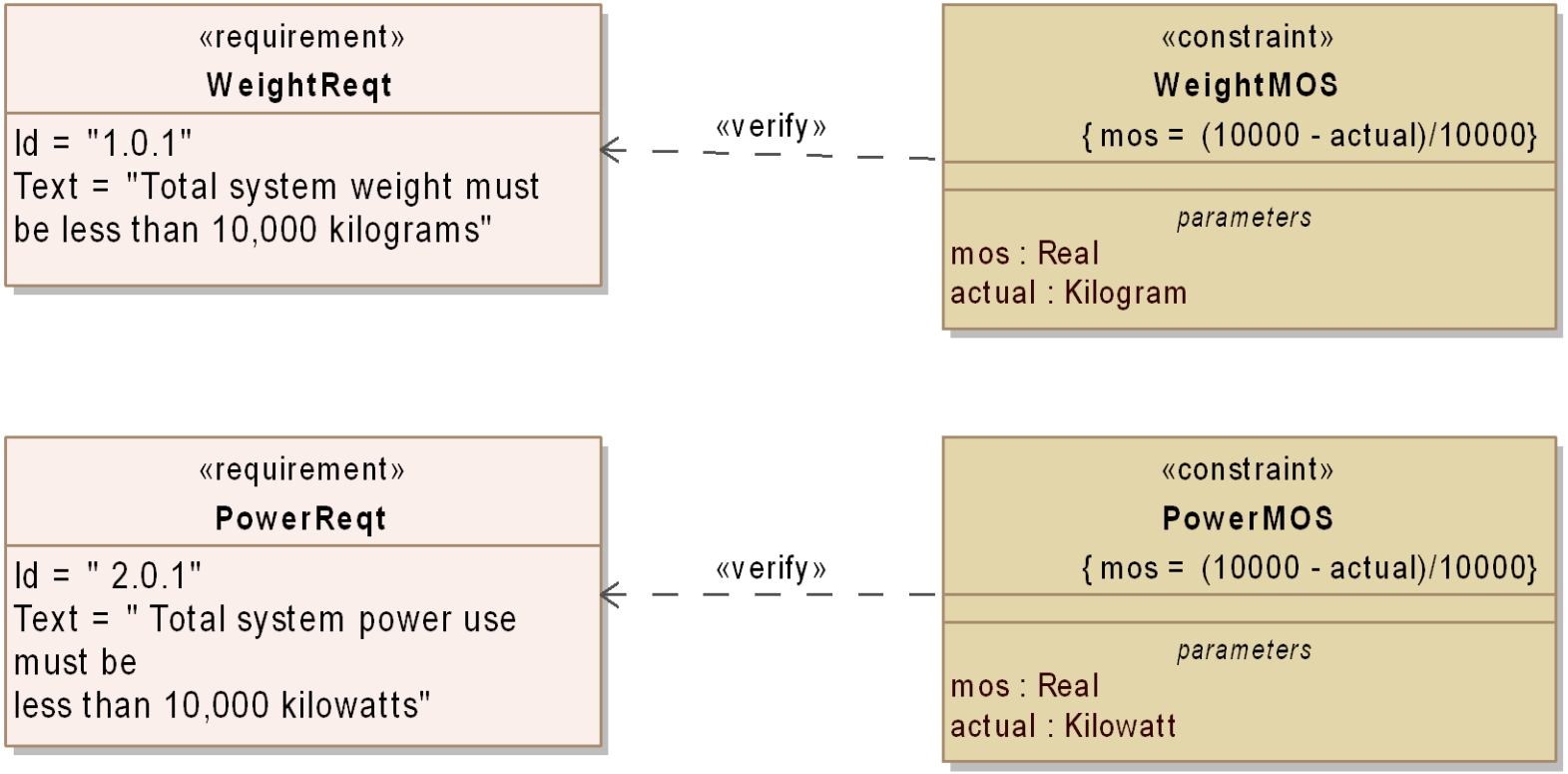
Requirements

- Where do they come from?

  - Customer supplied
  - Derived from other requirements
  - Imposed by limits on the capabilities of organization
  - Provided by an engineer
  - Negotiated through discussion with customer
  - Discovered during implementation
  - Discovered in actual deployment

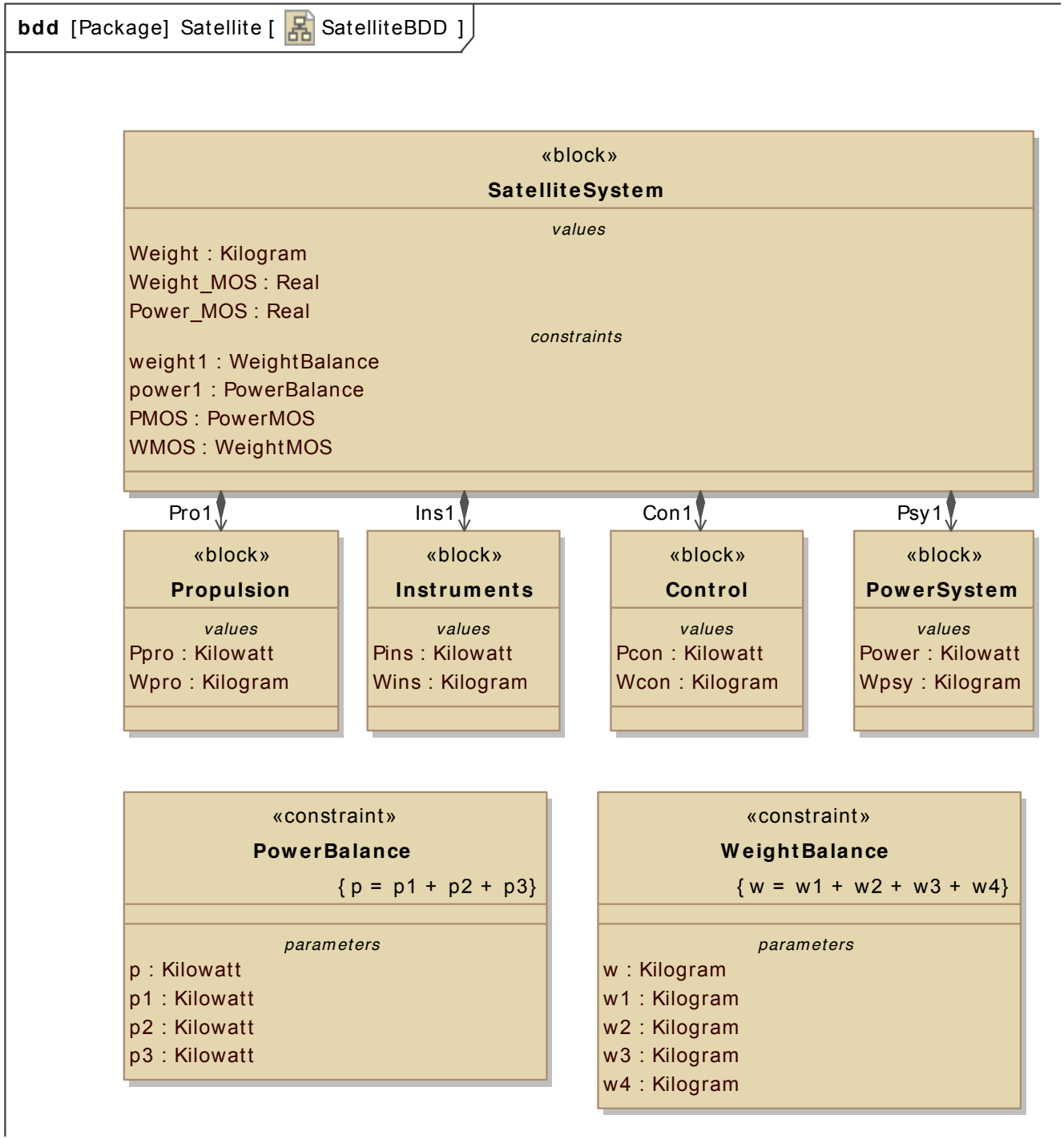
  - *Many* different places

req [Package] Satellite [SatelliteReqts]



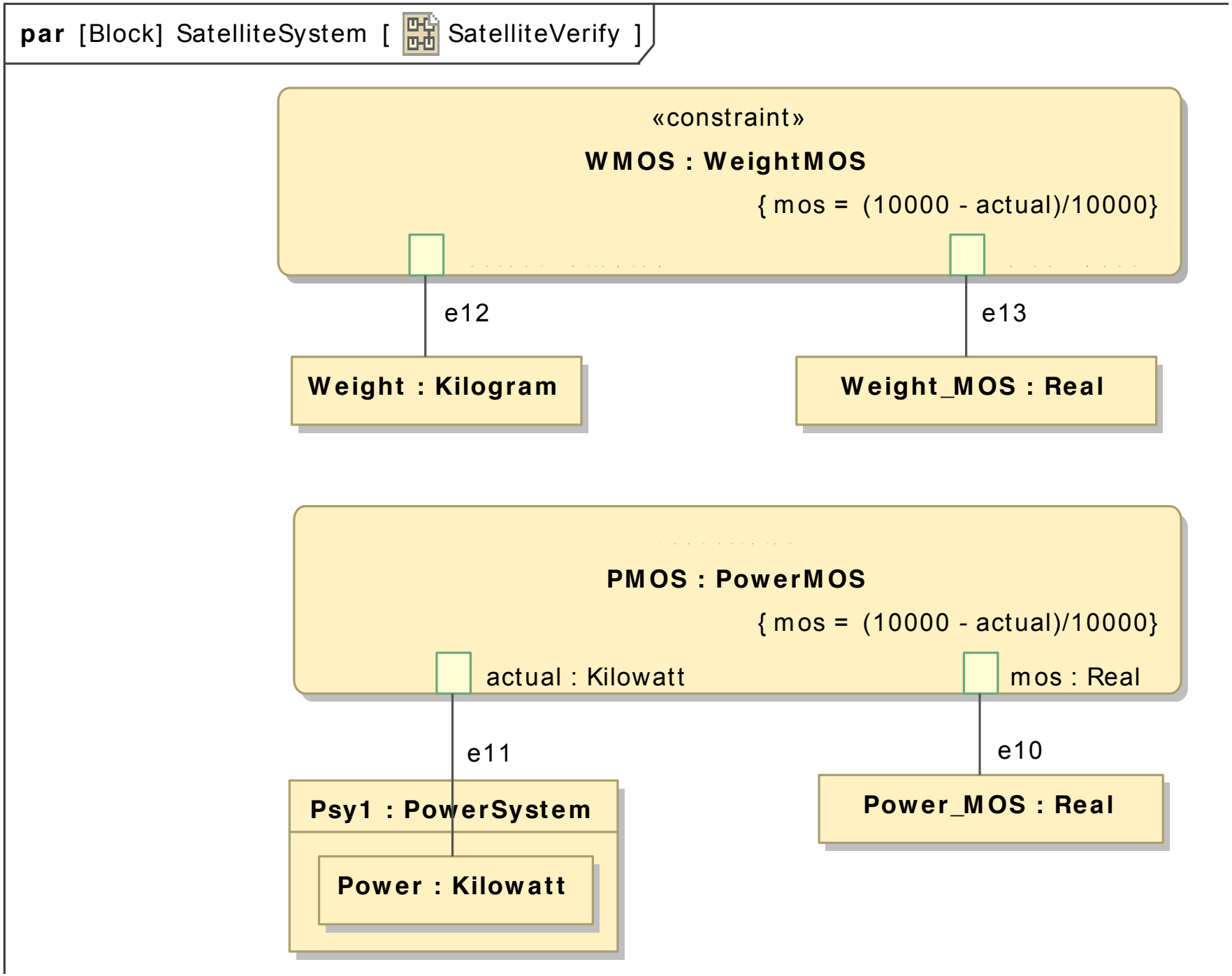
Block Diagrams

- Provide the structure of the system.
- Entities (types): Blocks generally represent types, that is any entity fitting the description.
- Relationships: Block diagrams also depict the relationships between entities.
- Constraints


bdd [Package] Satellite [SatelliteBDD]
«block»
SatelliteSystem
values
Weight : Kilogram
Weight_MOS : Real
Power_MOS : Real
constraints
weight1 : WeightBalance
power1 : PowerBalance
PMOS : PowerMOS
WMOS : WeightMOS
Pro1
Ins1
Con1
Psy1
«block»
Propulsion
values
Ppro : Kilowatt
Wpro : Kilogram
«block»
Instruments
values
Pins : Kilowatt
Wins : Kilogram
«block»
Control
values
Pcon : Kilowatt
Wcon : Kilogram
«block»
PowerSystem
values
Power : Kilowatt
Wpsy : Kilogram
«constraint»
PowerBalance
{p = p1 + p2 + p3}
parameters
p : Kilowatt
p1 : Kilowatt
p2 : Kilowatt
p3 : Kilowatt
«constraint»
WeightBalance
{w = w1 + w2 + w3 + w4}
parameters
w : Kilogram
w1 : Kilogram
w2 : Kilogram
w3 : Kilogram
w4 : Kilogram

Parametric Diagrams

- Provides a mapping between variables existing in constraints and variables existing in instances (block diagrams).


par [Block] SatelliteSystem [SatelliteVerify]
«constraint»
WMOS : WeightMOS
{ mos = (10000 - actual)/10000}
e12
e13
Weight : Kilogram
Weight_MOS : Real
PMOS : PowerMOS
{ mos = (10000 - actual)/10000}
actual : Kilowatt
mos : Real
e11
e10
Psy1 : PowerSystem
Power : Kilowatt
Power_MOS : Real

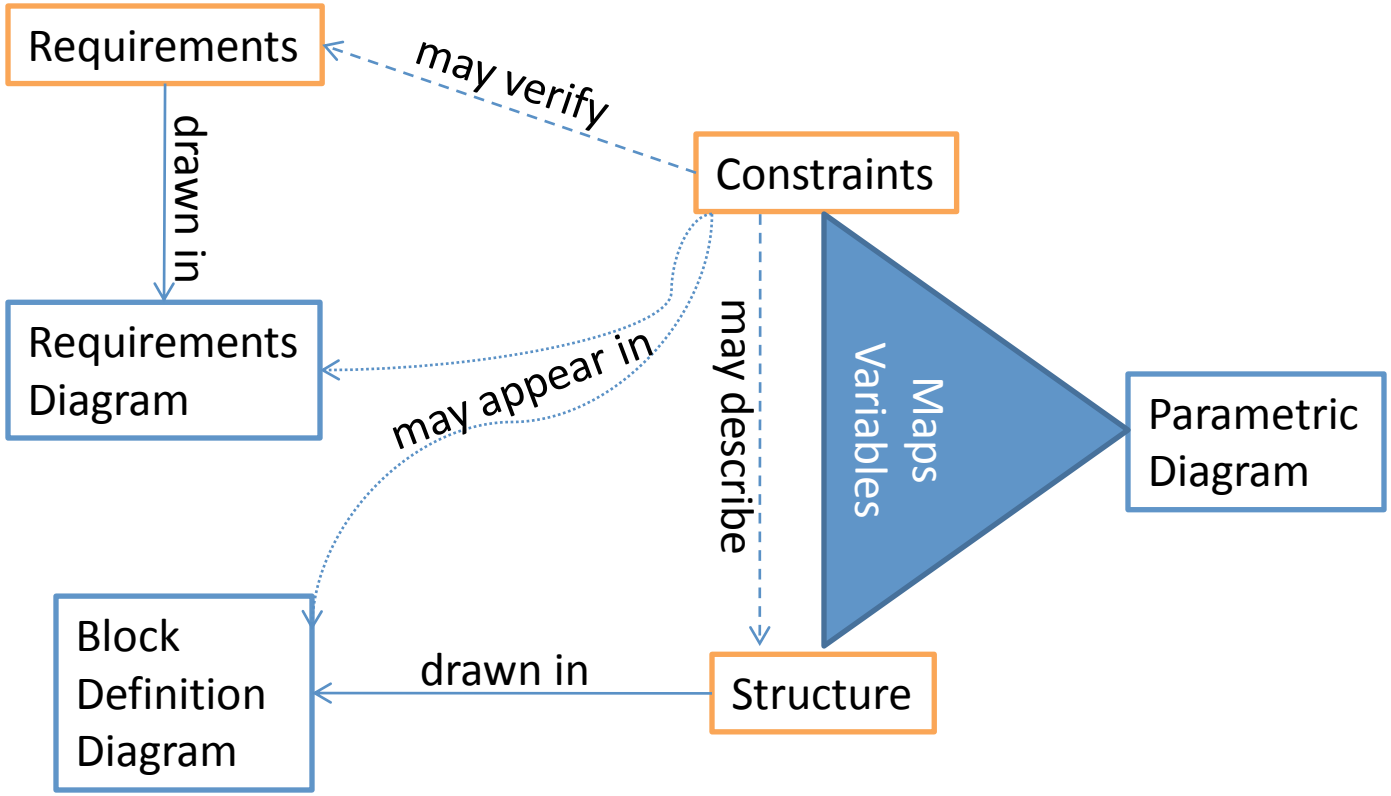
Where do Constraints come from?

- Some constraints are given by the physics of the system in question.
  - The weight and power being sums.

- Some constraints are artifacts arising from the need to test the system.
  - The variables and constraints associated with the margins of safety expressions are artificial, but useful modeling tools.

Is a Constraint Behavior or Structure?

$$x(t) = \frac{1}{2} a t^2 + v t + x_0$$


Requirements
may verify
Constraints
drawn in
Requirements Diagram
may appear in
may describe
Maps Variables
Parametric Diagram
Block Definition Diagram
drawn in
Structure