

Modeling Context and Dynamic Adaptations with Feature Models

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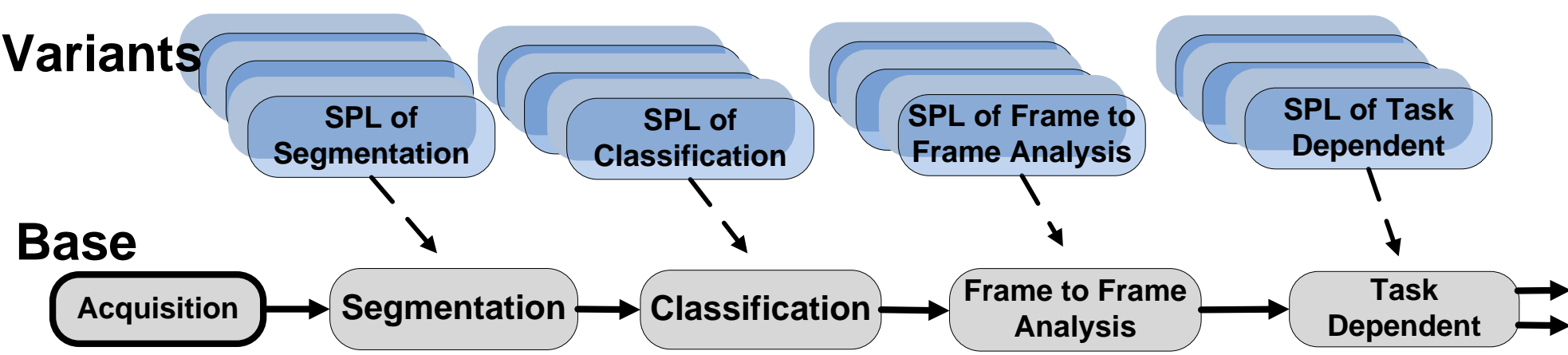


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Problem Statement

- Dynamic Adaptive Systems (DAS) are software systems which have to dynamically adapt their behavior in order to cope with a changing environment.
- Issues:
 - Large number of software configurations
 - Large number of contexts

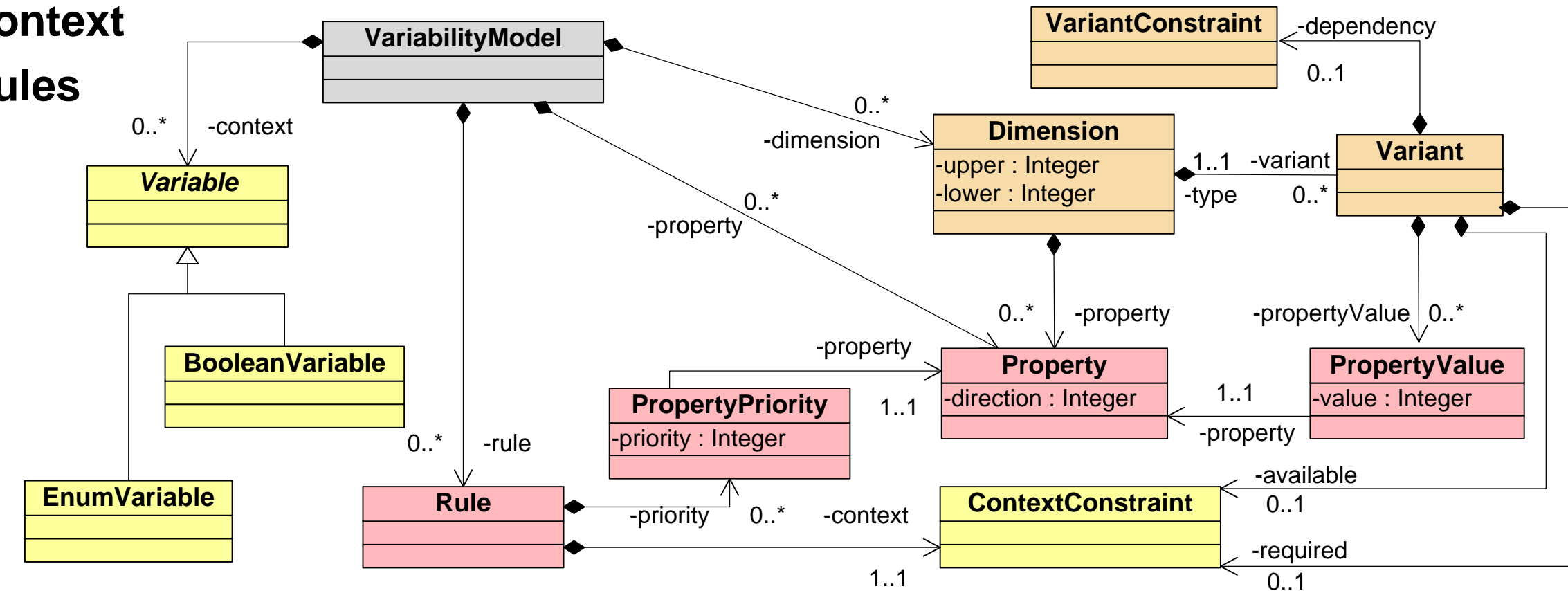
Video Surveillance Case Study



DSML Approach

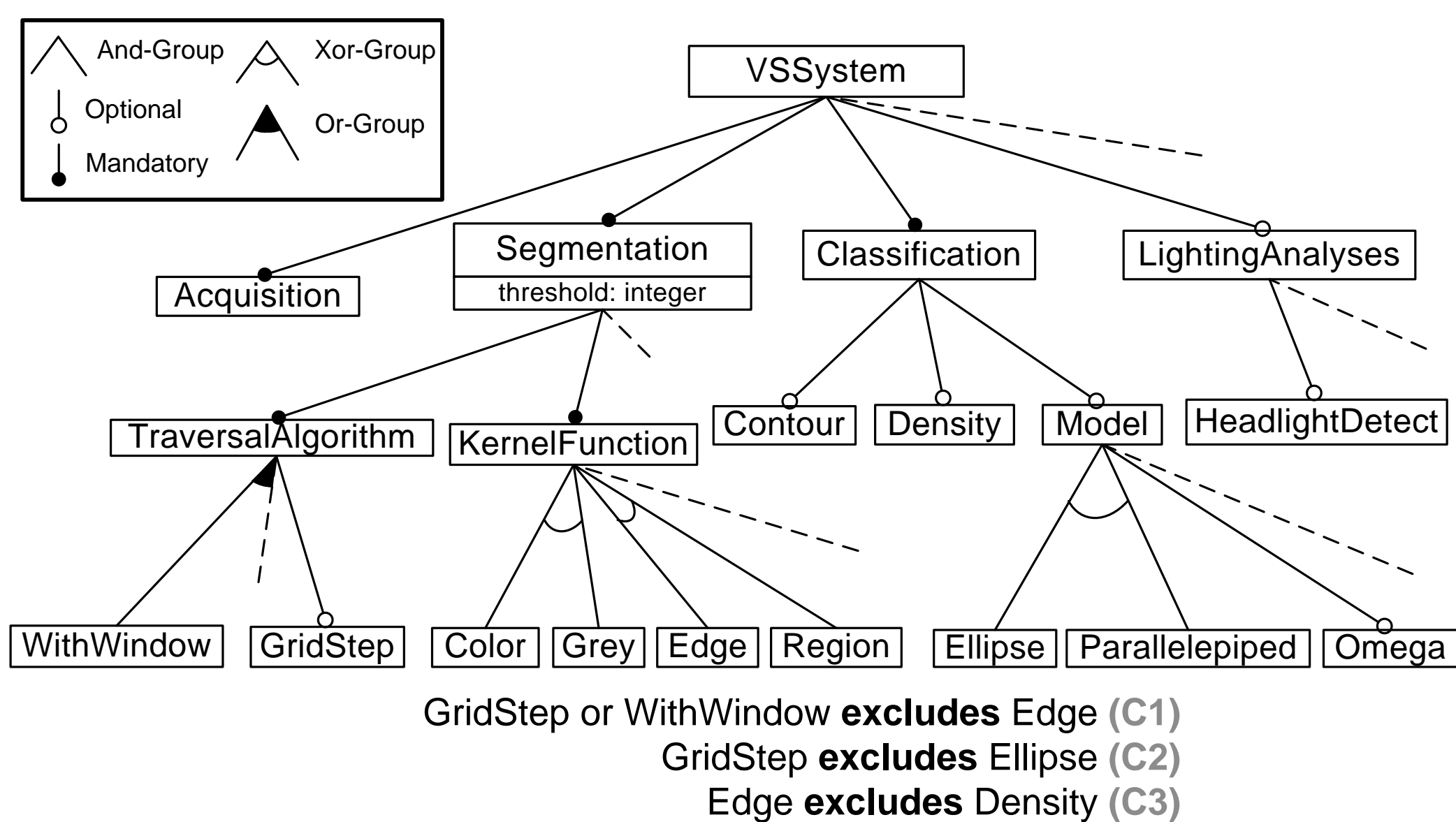
- Consider DAS as a **Software Product Line (SPL)**
From common assets, different programs of a domain can be assembled
- Model also the context as an SPL

- Variants**
- Constraints**
- Context**
- Rules**

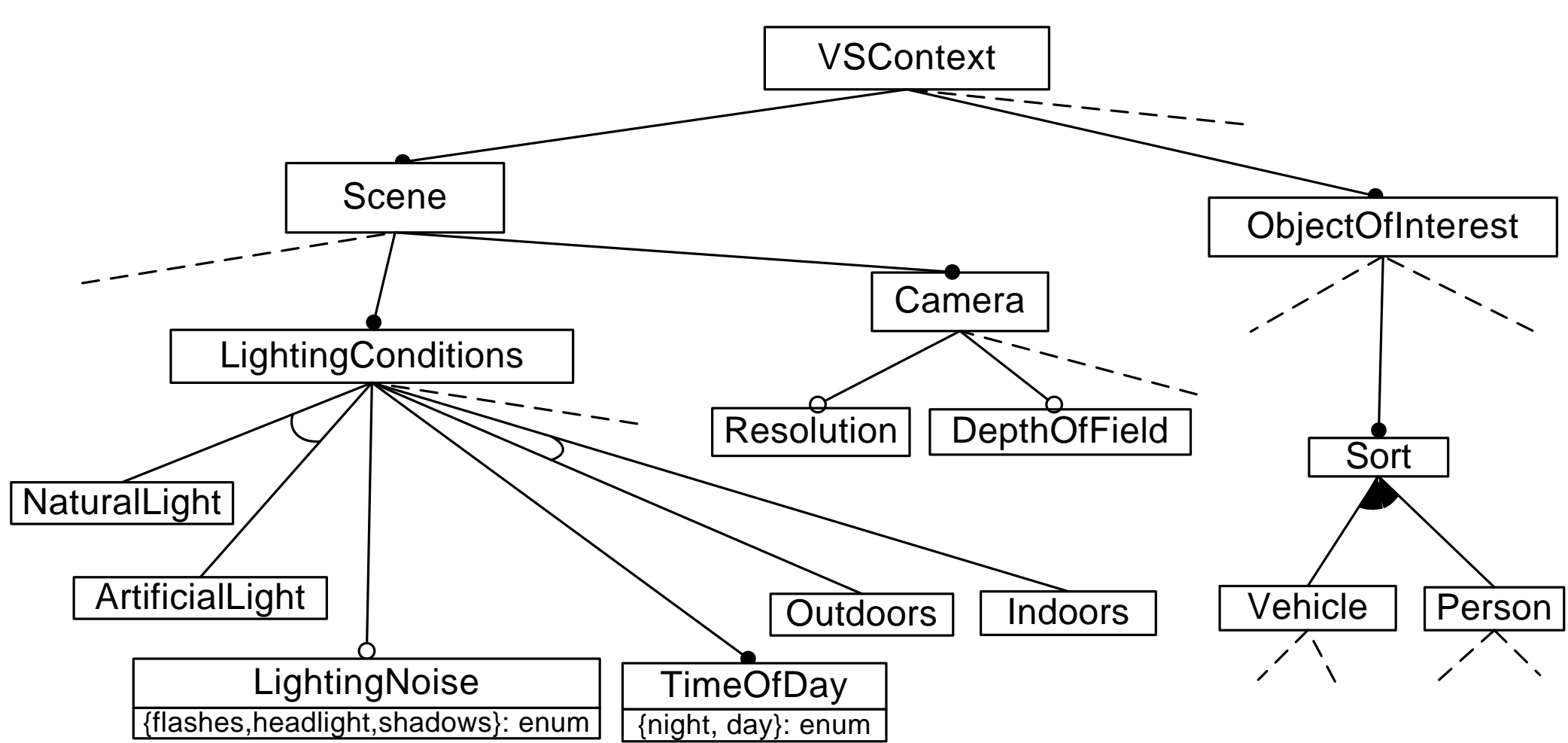


Revisiting the Approach with Feature Models

Modeling Software Variants



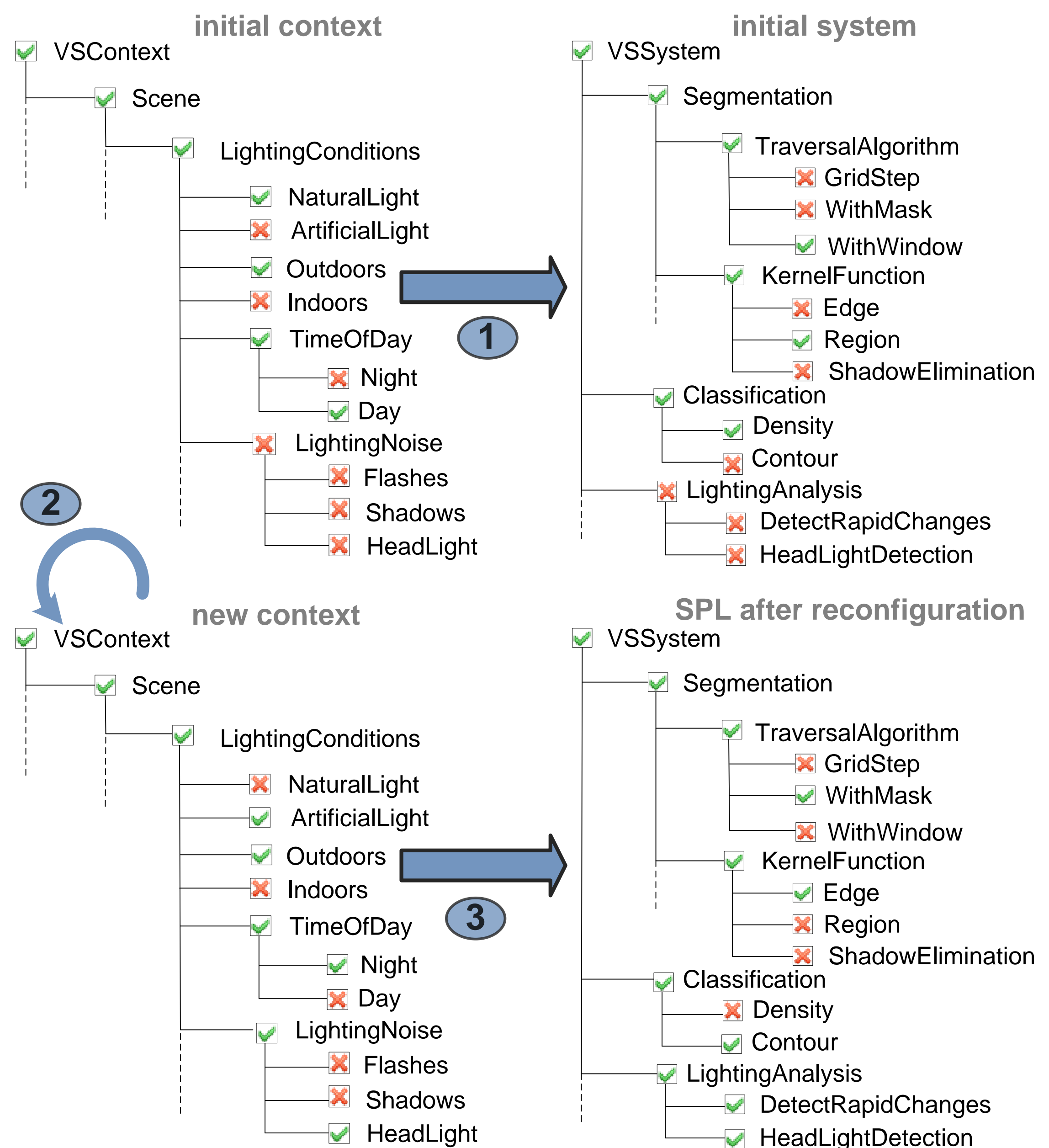
Modeling Context



Modeling Adaptation

- Night and HeadLight **implies** HeadLightDetection (AR0)
- not LightingNoise **implies** Region (AR1)
- LightingNoise **implies** Edge (AR2)
- ArtificialLight **implies** DetectRapidChanges (AR3)
- Flashes or HeadLight **implies** Contour (AR4)

Configurations@run.time



- Initial deployment: configuration of the system from the context
- Dynamic update of the context happens
- Dynamic reconfiguration of the system from the updated context

Results

- The concept of **configuration** is naturally present and defined by the **semantics** of FM.
- Uniform** representation of the context model and the software system makes possible to express relations between the two models.
- DSML and FM-based approaches can **complement** each other.

Future Work

- Leverage the **expressiveness** of FMs (e.g. attributes).
- Achieve an automatic **translation** between DSML and FMs.
- Update automatically contextual information.
- Connect state-of-the-art **adaptation engines** to our models.