Towards Modular Verification of Stabilisation in Self-Adaptive Embedded Systems

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- Brief Announcement -
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TECHNISCHE UNIVERSITÄT KAISERSLAUTERN

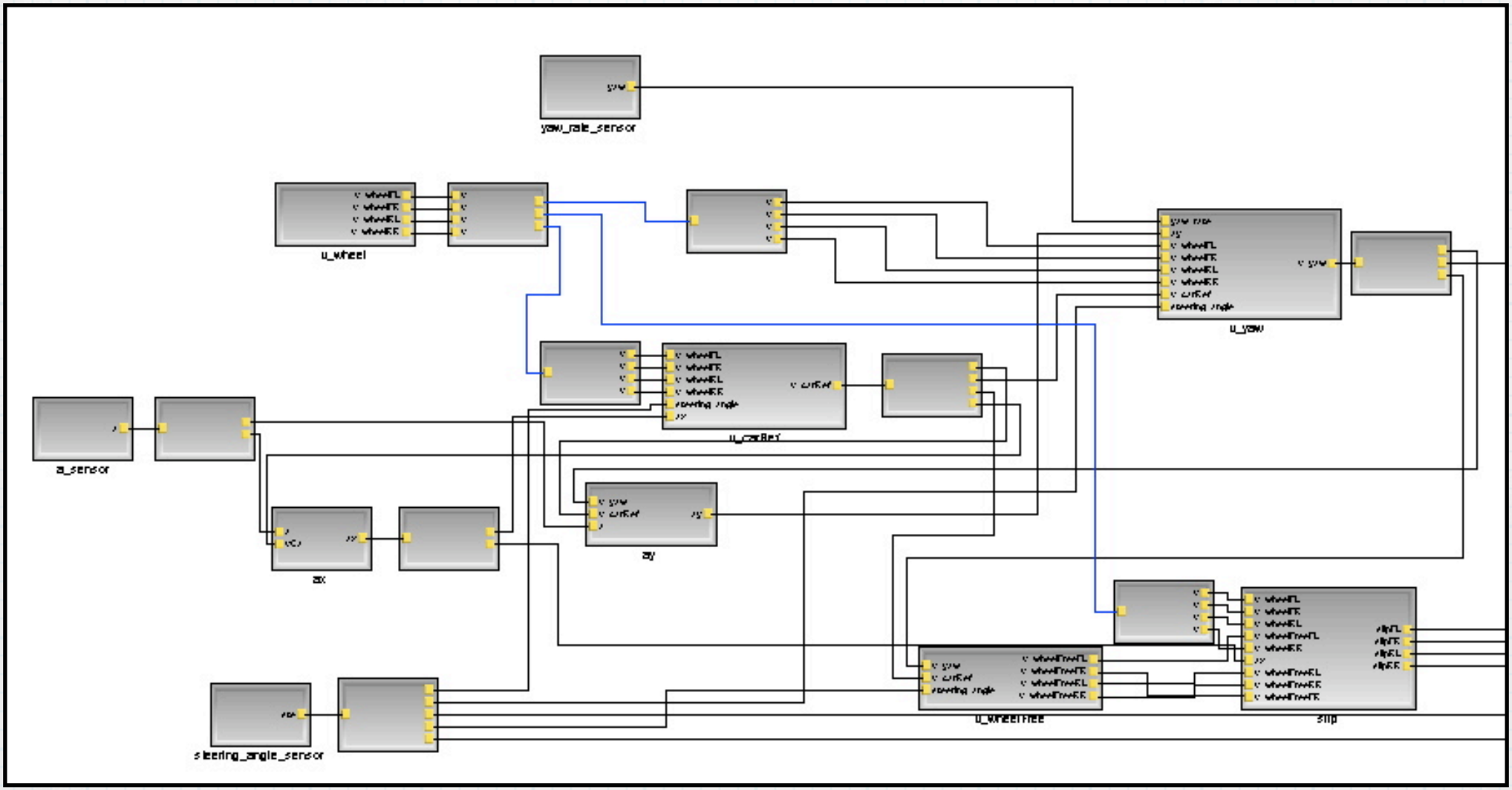
DASMOD

FACHBEREICH INFORMATIK

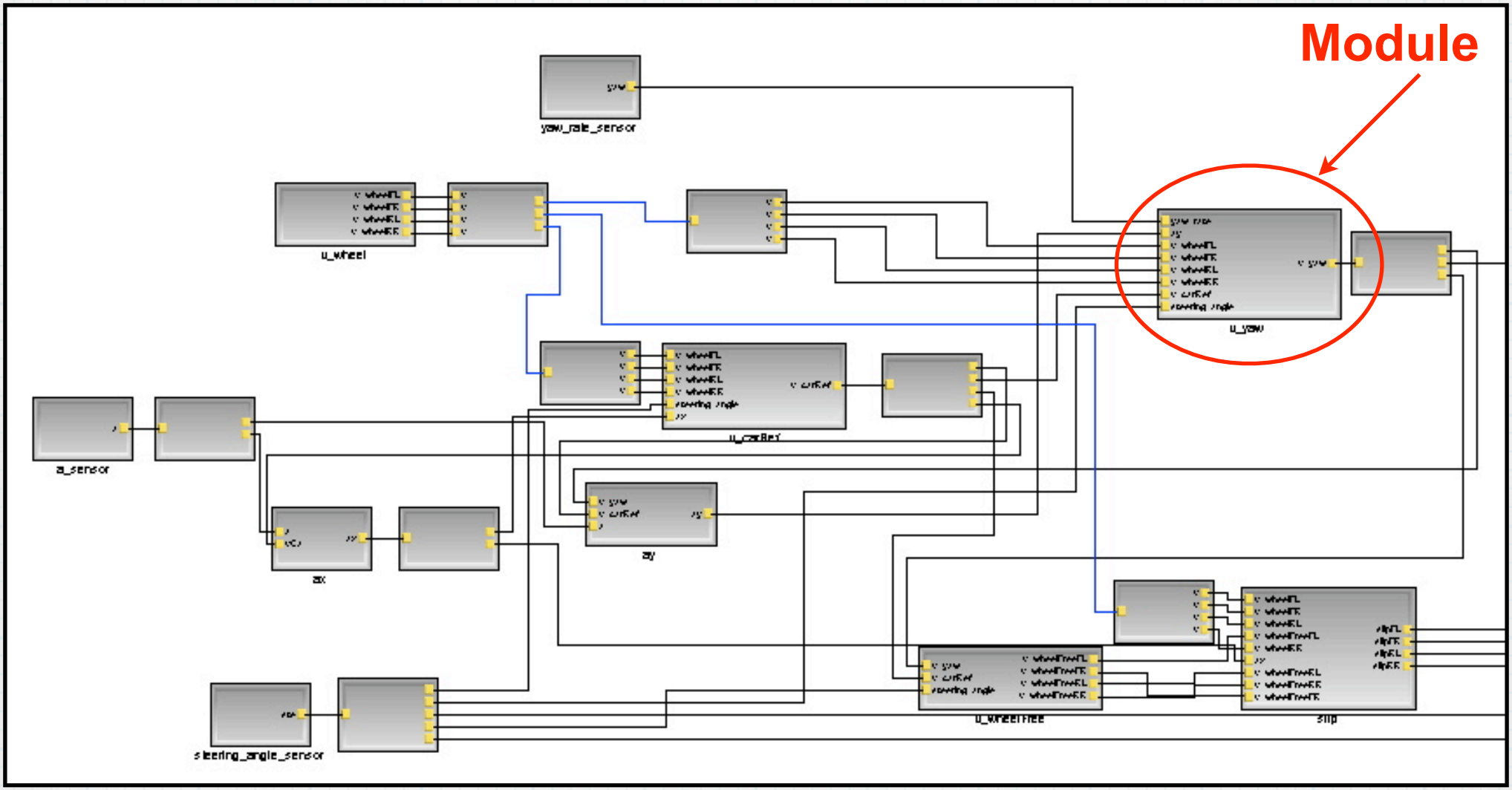
Self-Adaptive Systems

- Adaptation of Behaviour according to Environment
- System Design is highly complex
- Modelling and Verification Support necessary

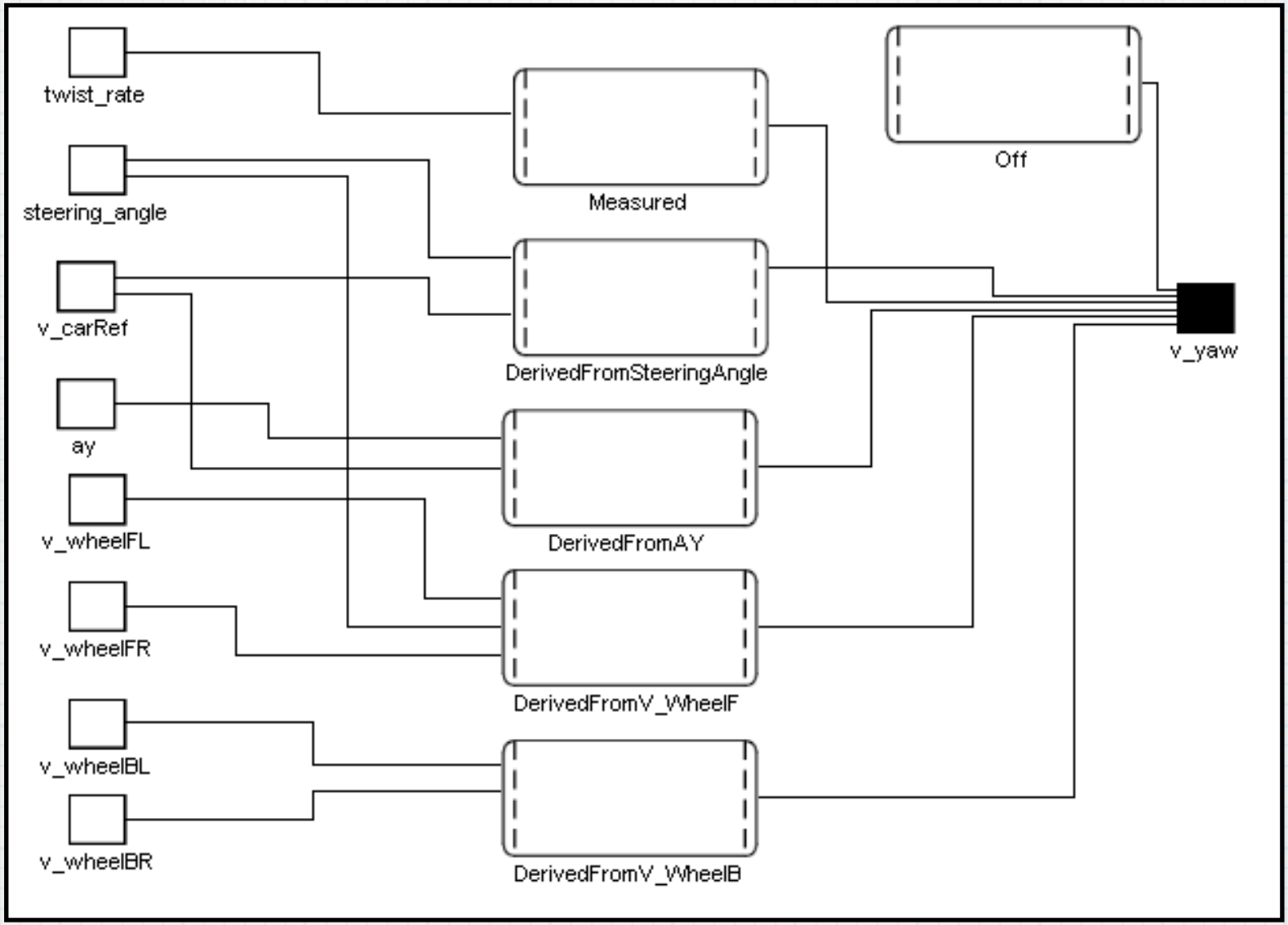
System Structure



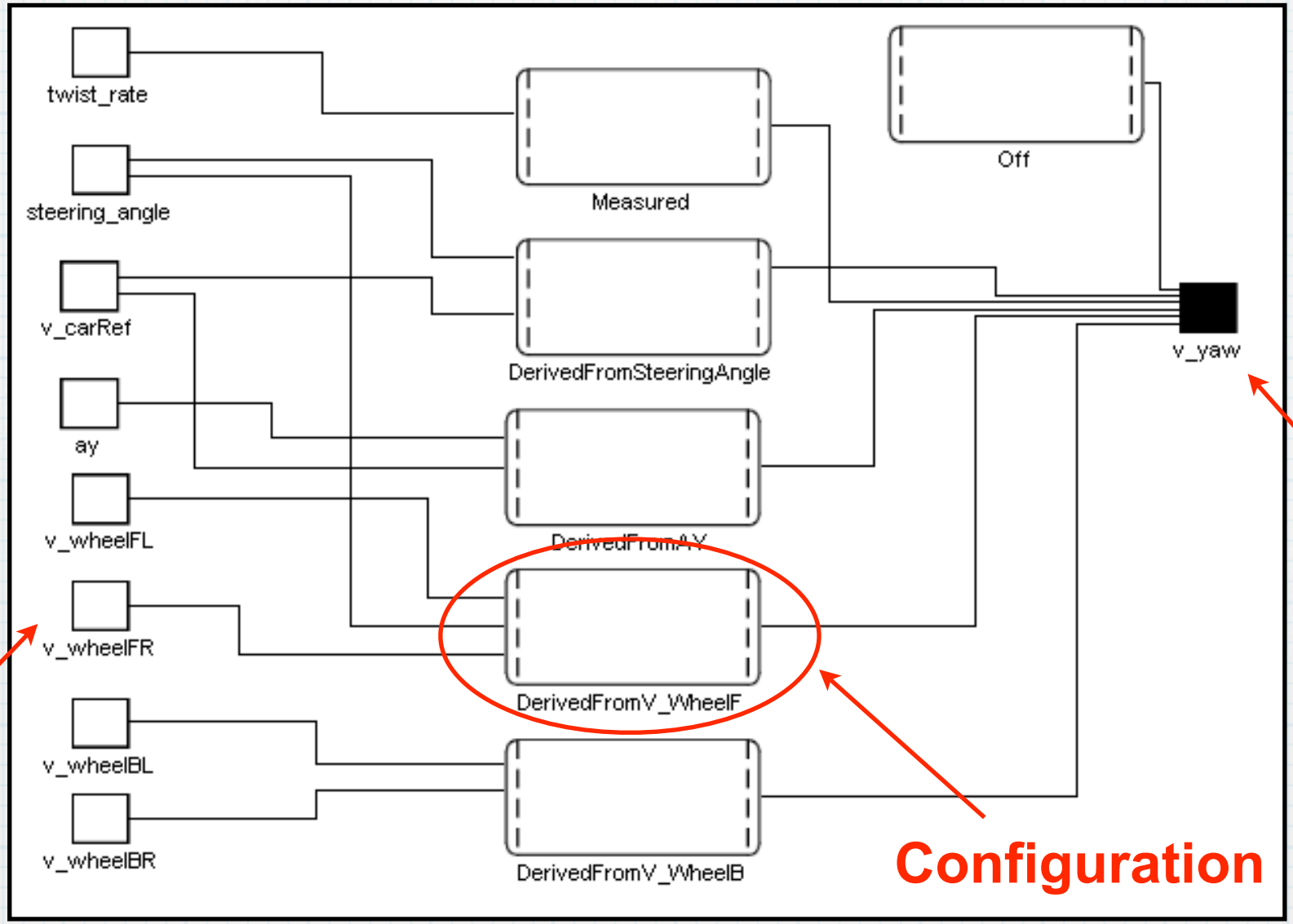
System Structure



Modules


twist_rate
steering_angle
v_carRef
ay
v_wheelFL
v_wheelFR
v_wheelBL
v_wheelBR
Measured
Off
DerivedFromSteeringAngle
DerivedFromAY
DerivedFromV_WheelF
DerivedFromV_WheelB
v_yaw

Modules


twist_rate
steering_angle
v_carRef
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v_wheelFR
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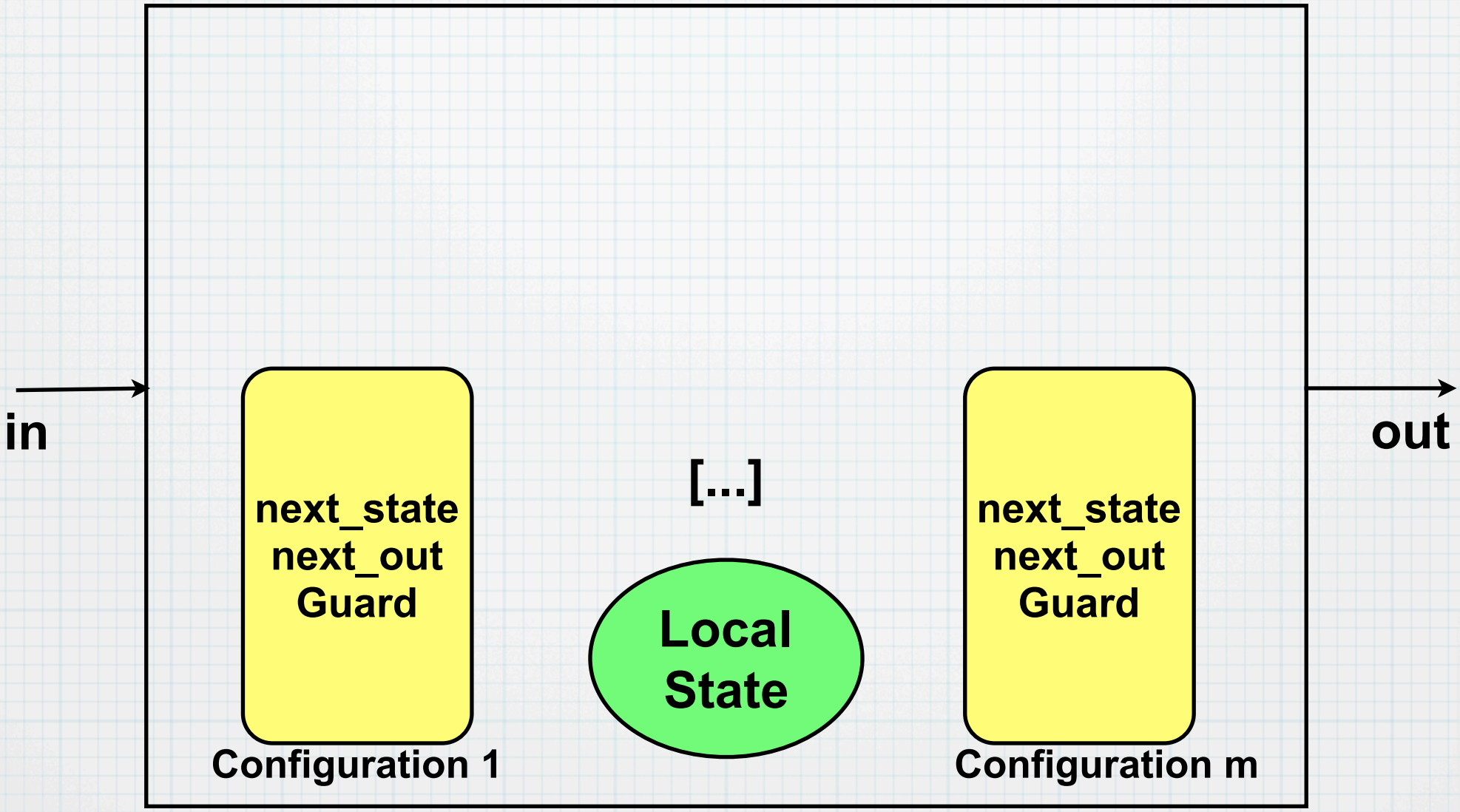
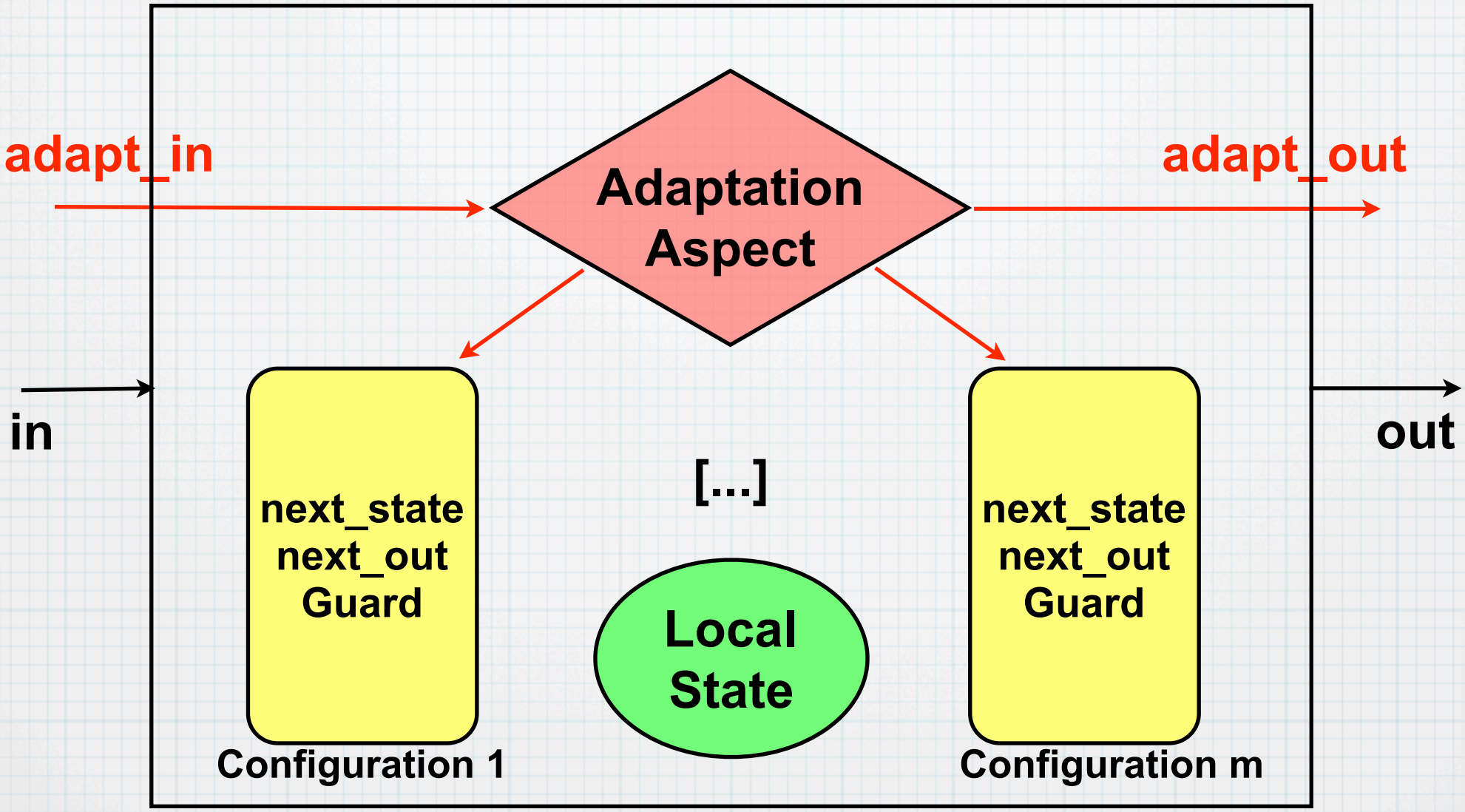
v_wheelBR
Measured
Off
DerivedFromSteeringAngle
DerivedFromV_WheelF
DerivedFromV_WheelB
v_yaw
Input
Output
Configuration

System Model

System Model

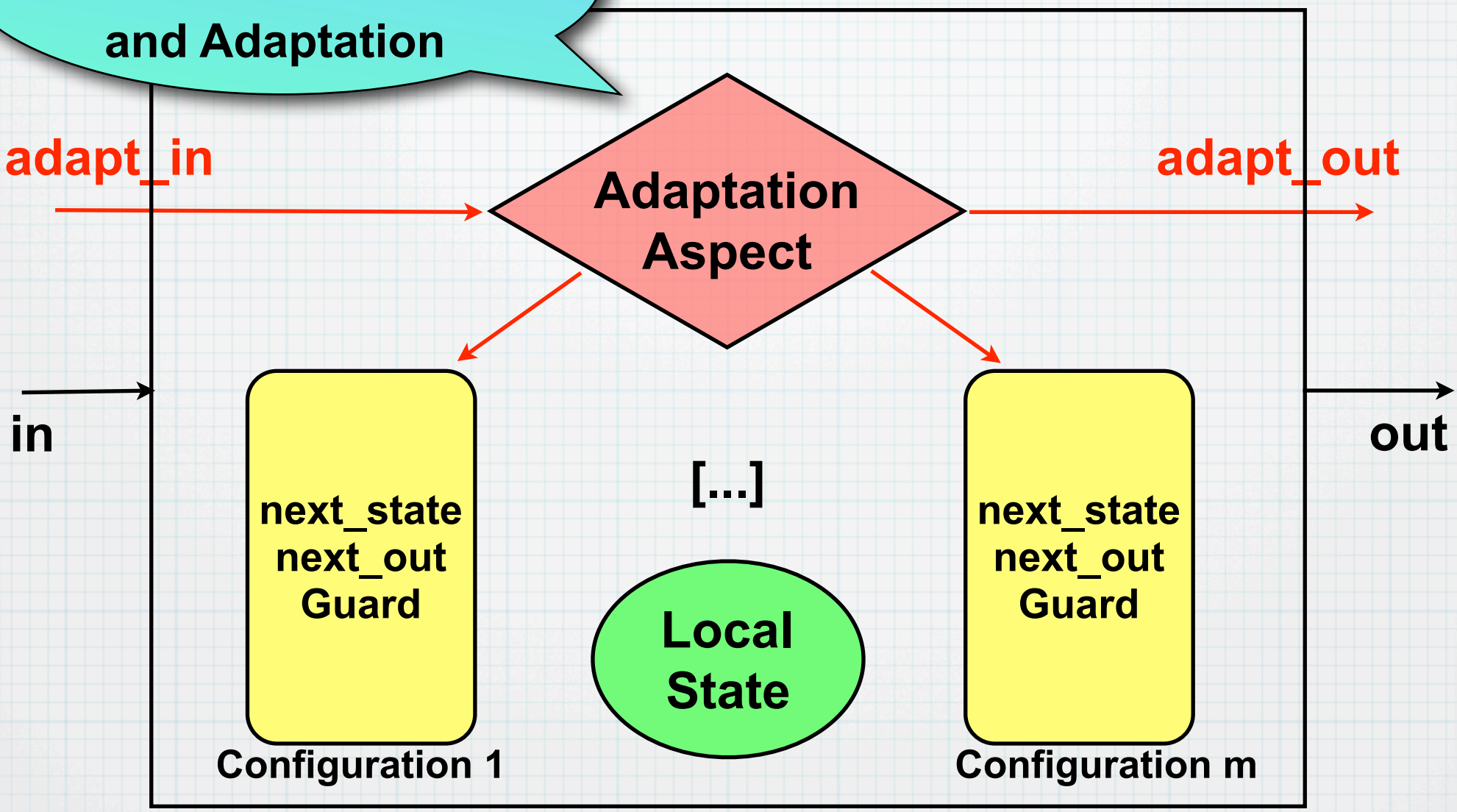


System Model



tem Model

Independent Modelling of Functionality and Adaptation



Stabilisation of Adaptation

If input is unchanged, configurations will stabilize.

$$\mathsf{G}\,(\varphi \rightarrow \mathsf{F}\;\mathsf{G}\;\psi)$$

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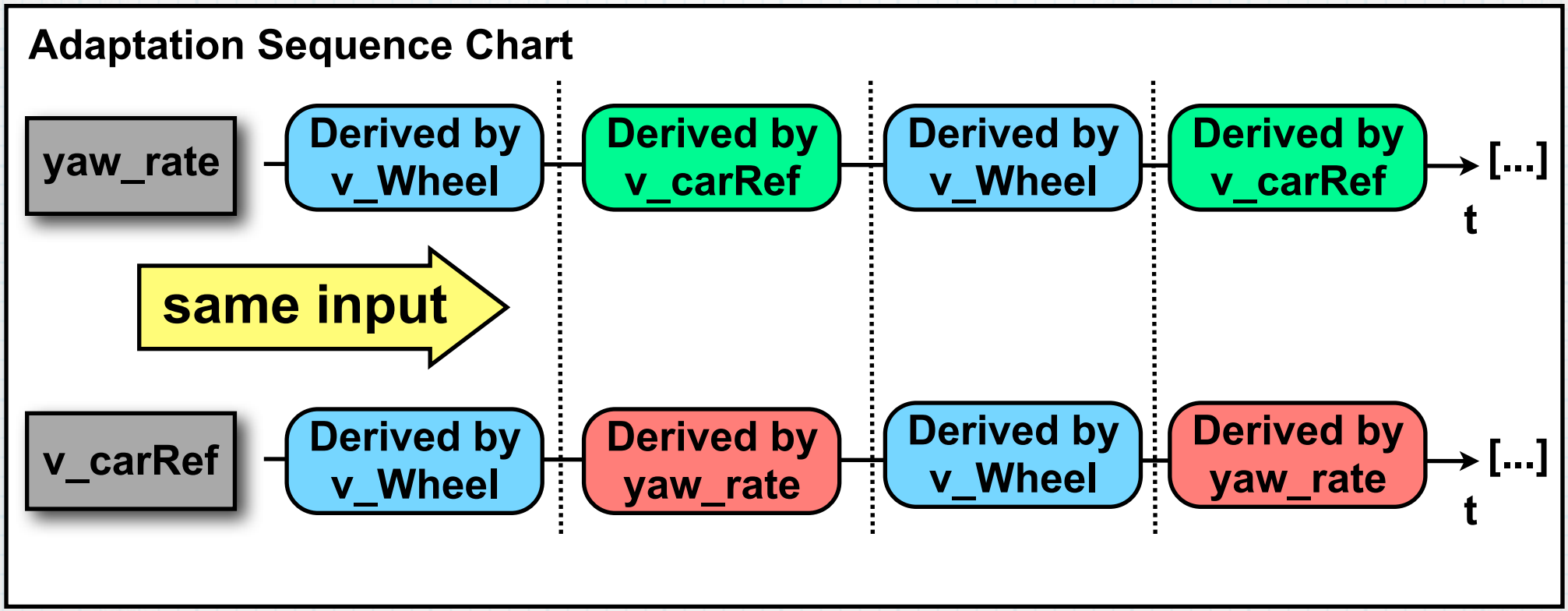


Verification Framework

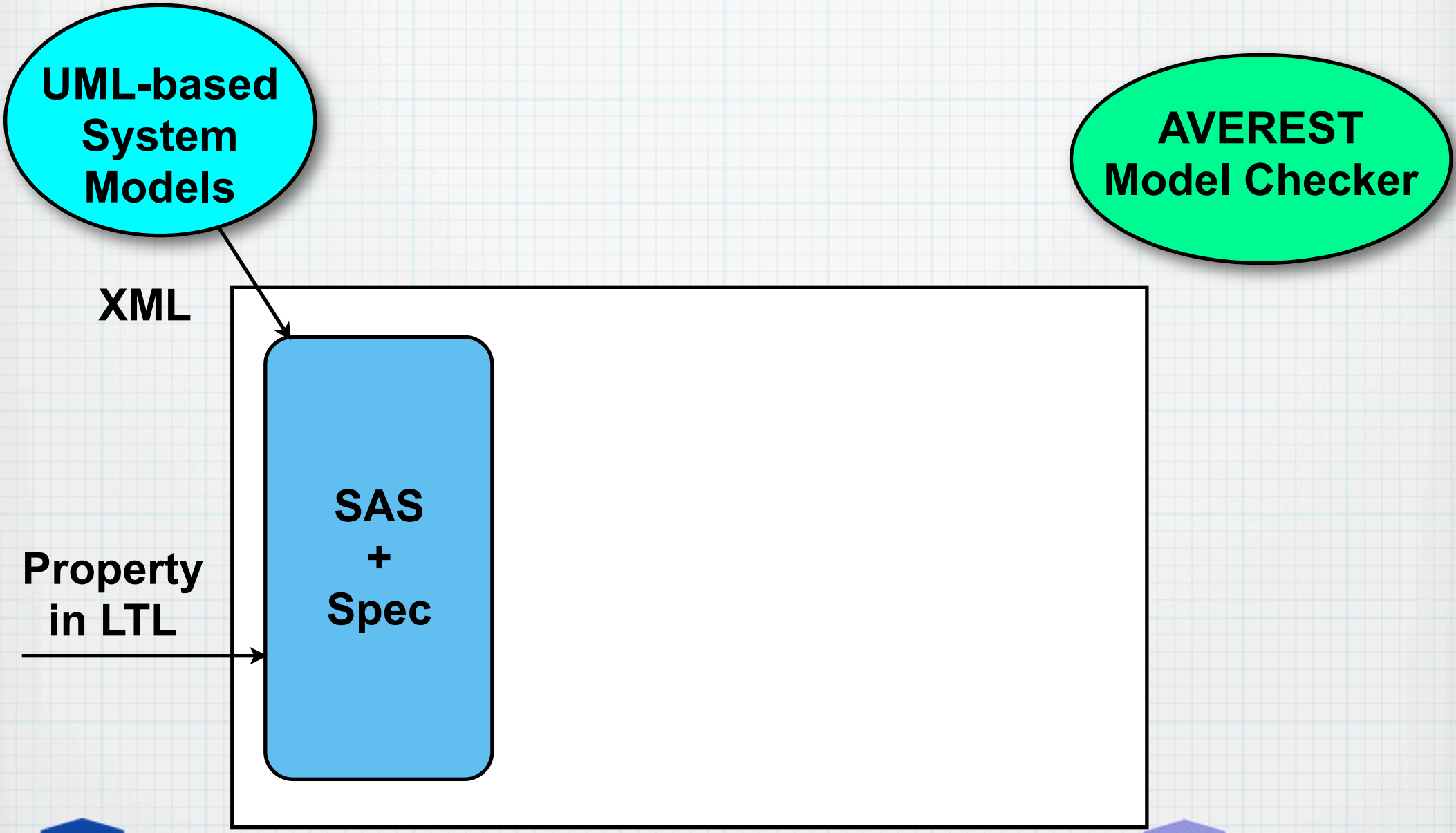
Verification Framework

UML-based System Models

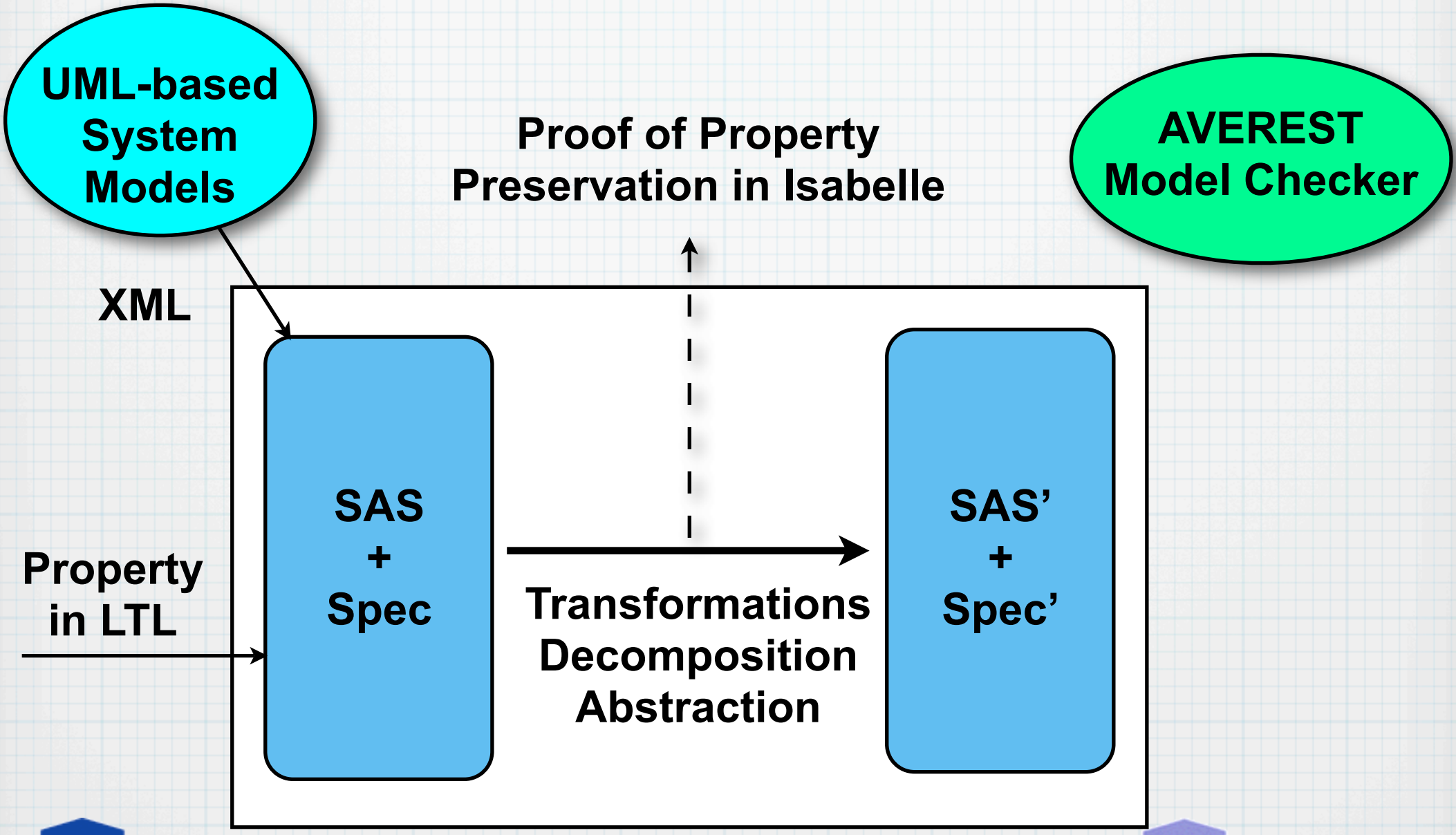
AVEREST Model Checker

Property in LTL

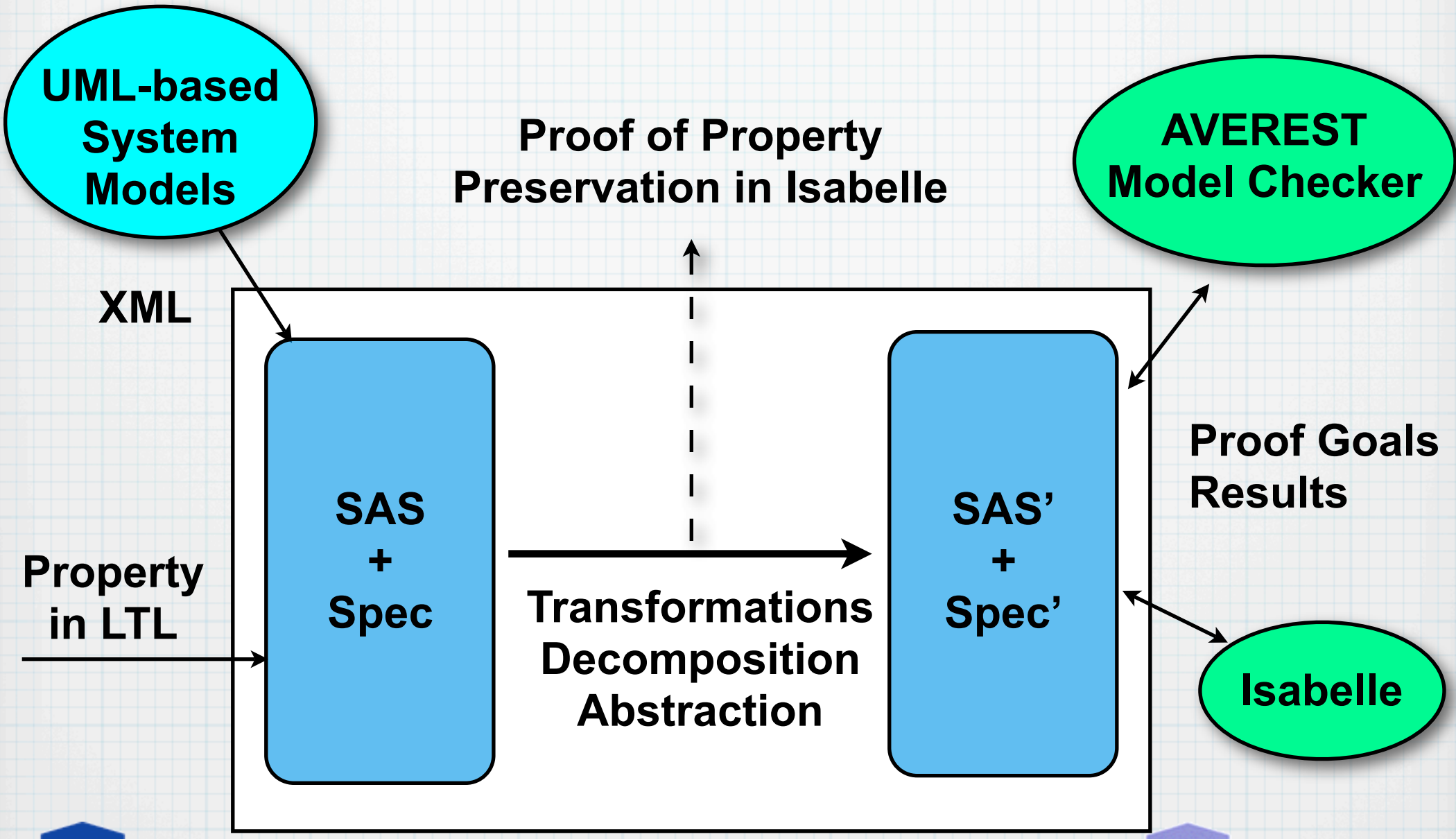
Verification Framework



Verification Framework



Verification Framework



More Information

My Website:
http://softech.informatik.uni-kl.de/~schaefer

EVAS Project Website:
http://www.dasmod.de/~EVAS

Long Version of this Paper:
Ina Schaefer, Arnd Poetzsch-Heffter:
Using Abstraction in Modular Verification of Synchronous Adaptive Systems.
In: Proceedings of "Workshop on Trustworthy Software", Saarbrücken,
May 18-19, 2006.

available at: http://drops.dagstuhl.de/opus/frontdoor.php?source_opus=699