

INI.FAU

Combination of MaTeLo test model and Matlab/Simulink system models

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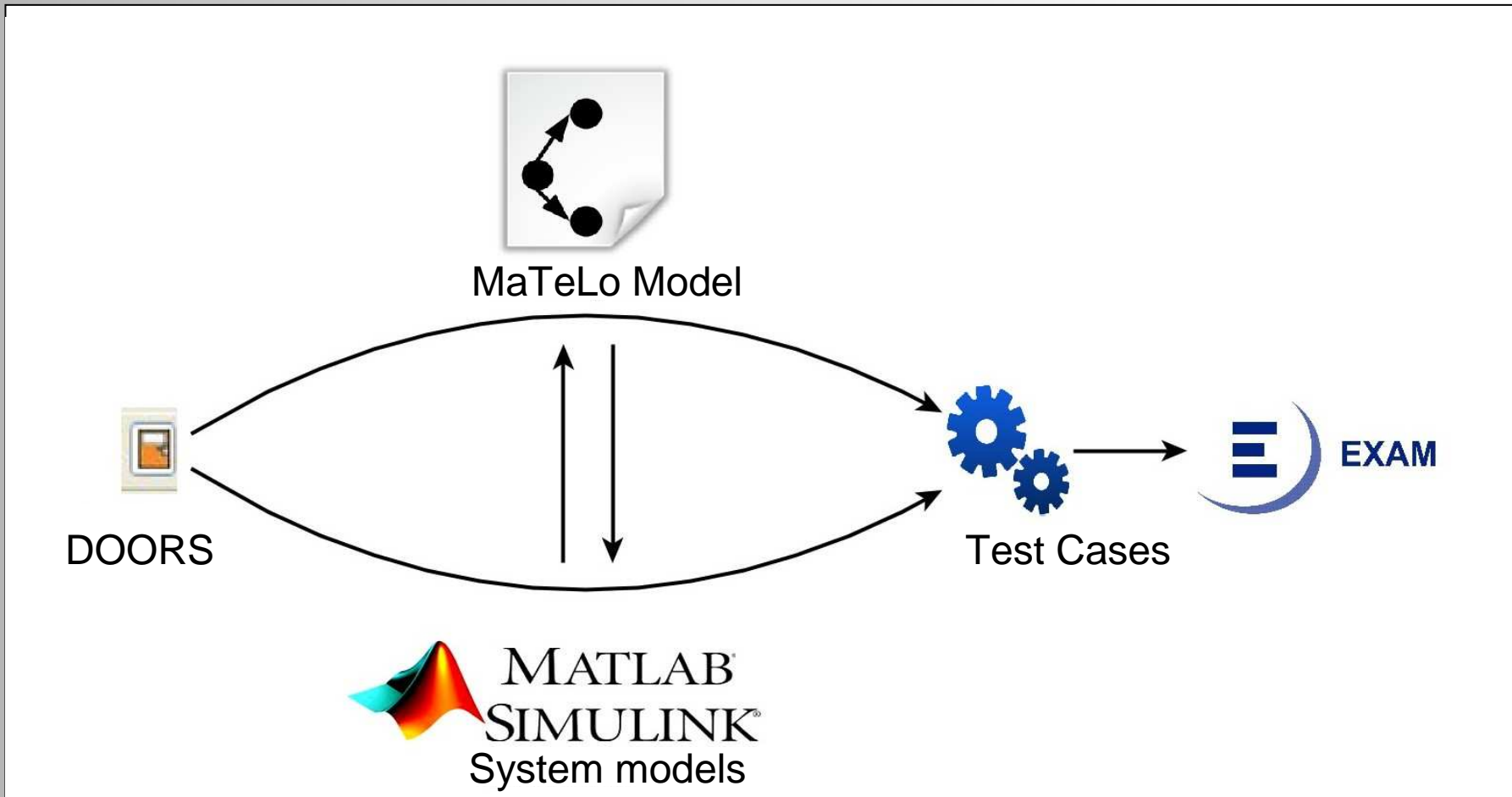


- Automobile turn into complex hybrid systems
 - Discrete
 - Continuous
 - One Stimulus: Complex reaction
 - Test evaluation and test verdict is complex
 - Test model can not include this knowledge
 - Requirement level point of view
- ➔ Combine test model with reference models in Matlab/Simulink



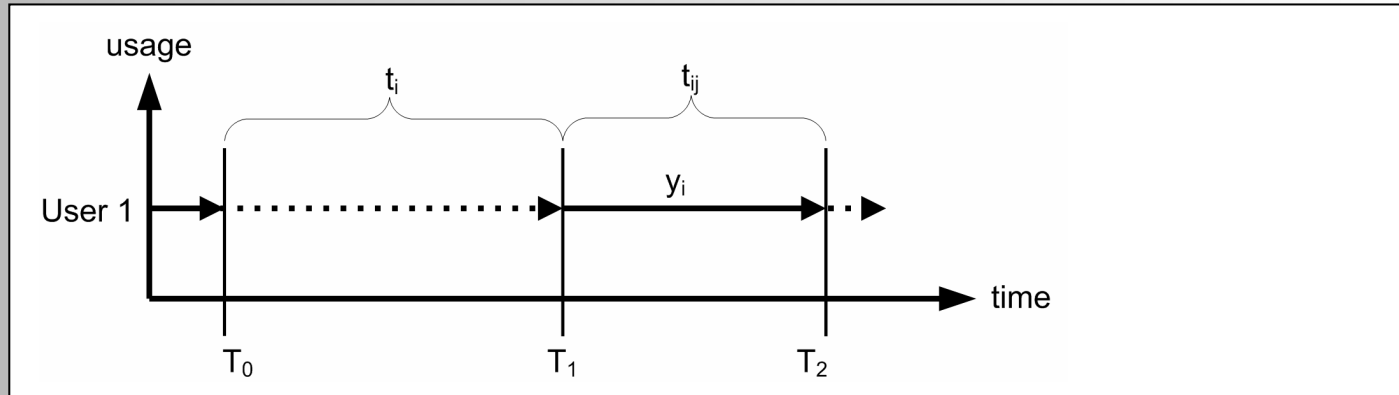
- Motivation
- **Combination of test model and system models**
 - **MaTeLo and Matlab Simulink**
- Example Projects at Audi
 - Comfort
 - Energy Management
- Outlook

Combination of test models and system models

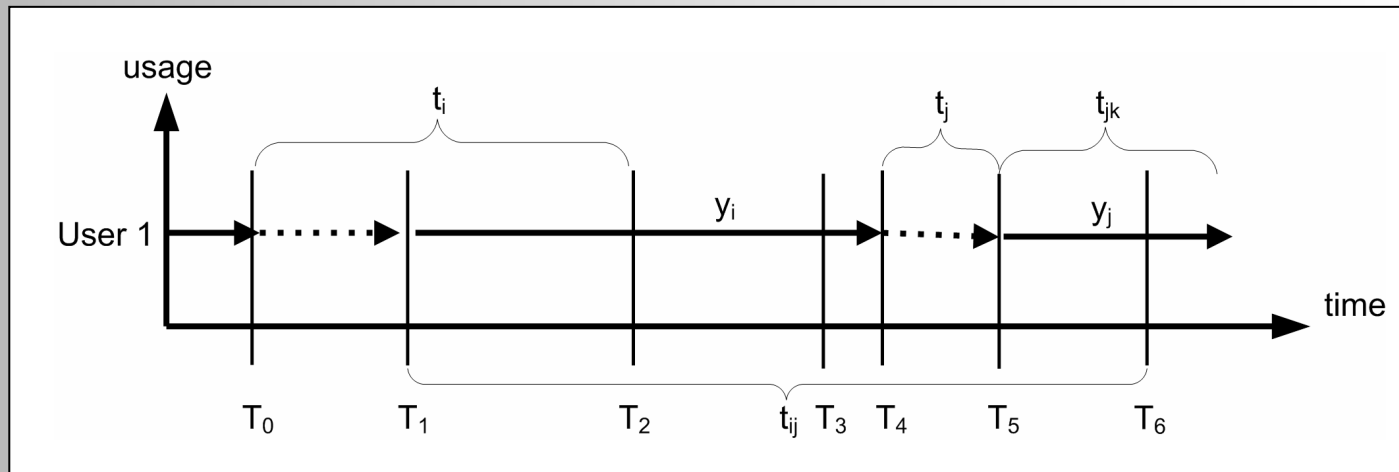


Timing Dependencies

- Fix Times



- Variable Times

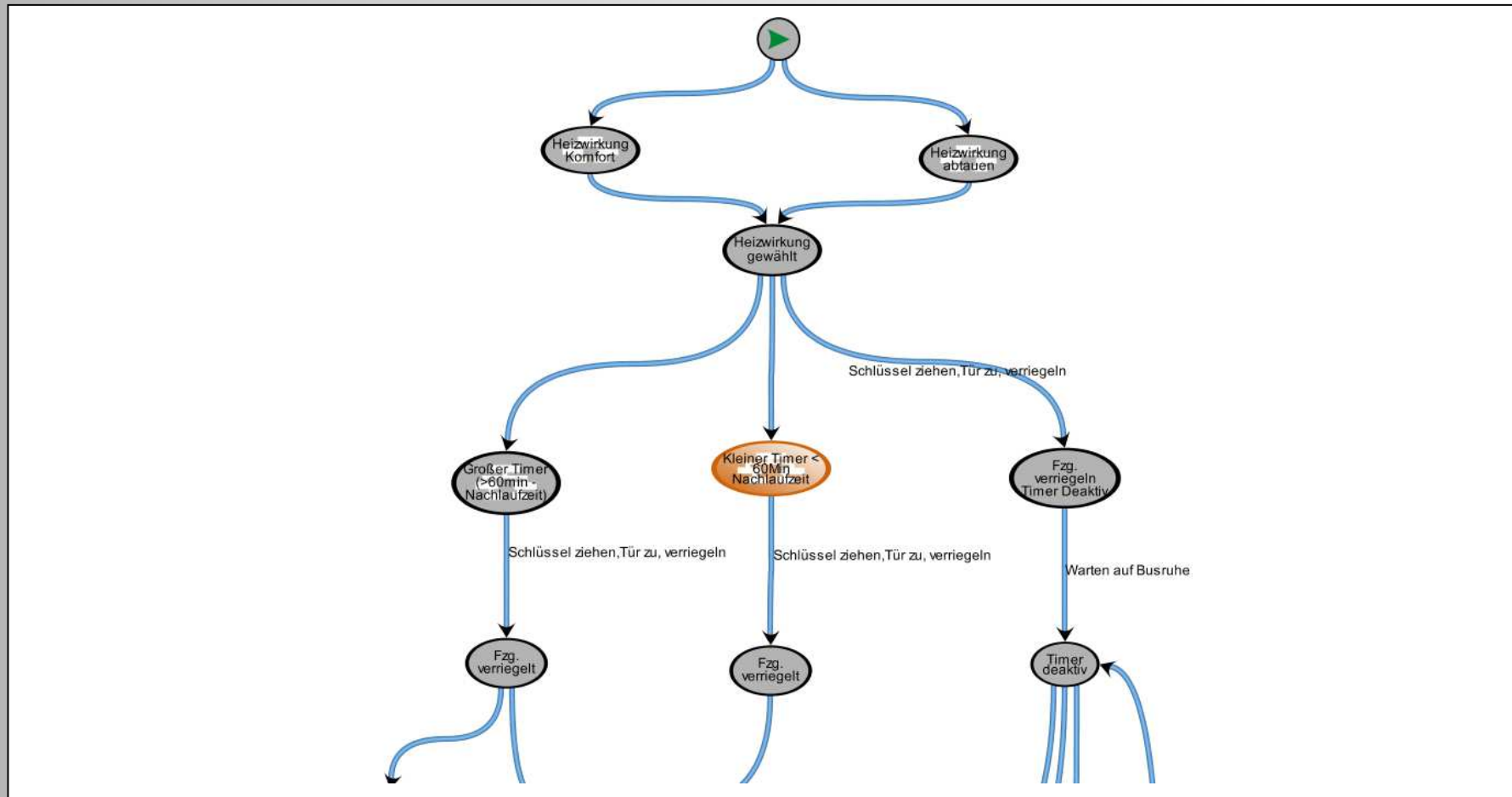


Sebastian Siegl, Combination of test model and system models

- Motivation
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Comfort Additional Heating

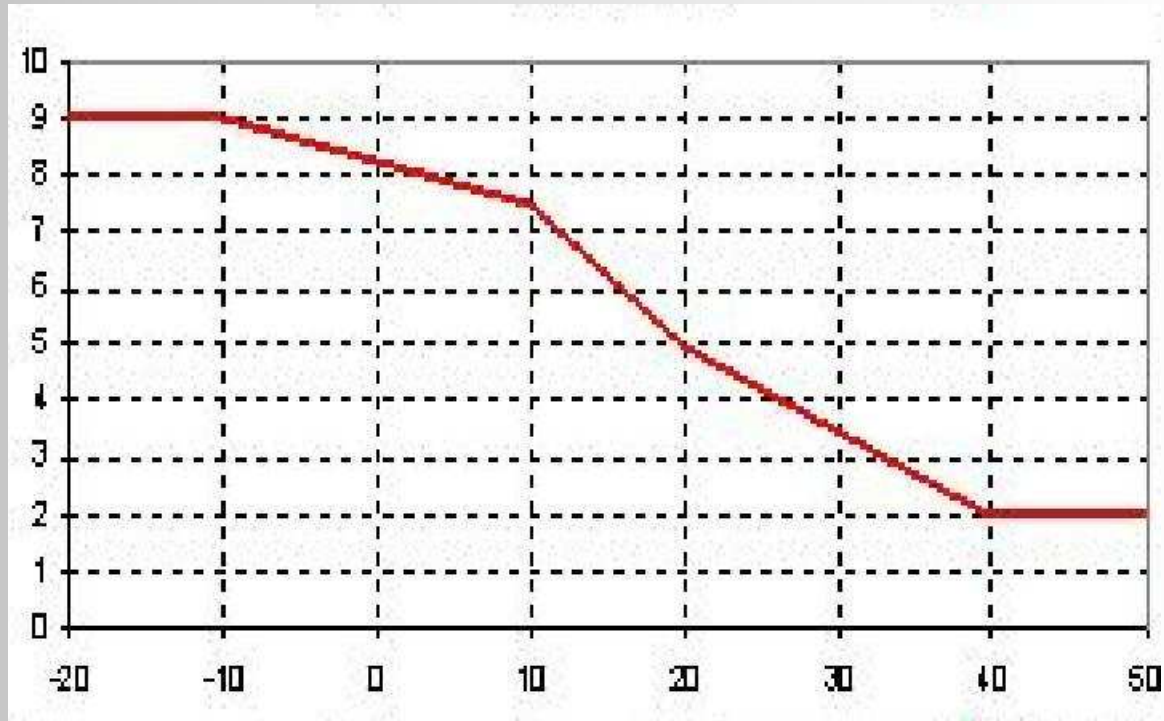
- Test model



Comfort Additional Heating

- Requirement for possible usage scenarios
- Input partitioning into classes of equivalences

Expected Results:



Inputs:
Temperature

$I < -10^\circ$

$-10^\circ \leq I < 10^\circ$

$10^\circ \leq I < 20^\circ$

$20^\circ \leq I < 40^\circ$

$I \geq 40^\circ$

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Comfort Additional Heating

Input

Name : Temperature Requirements

Comment : Attributes

Type : myInteger

Profile : Profile1

Delay before : 0 ms

myInteger
integer

rectangular gaussian fixed A/R

resolution : 1

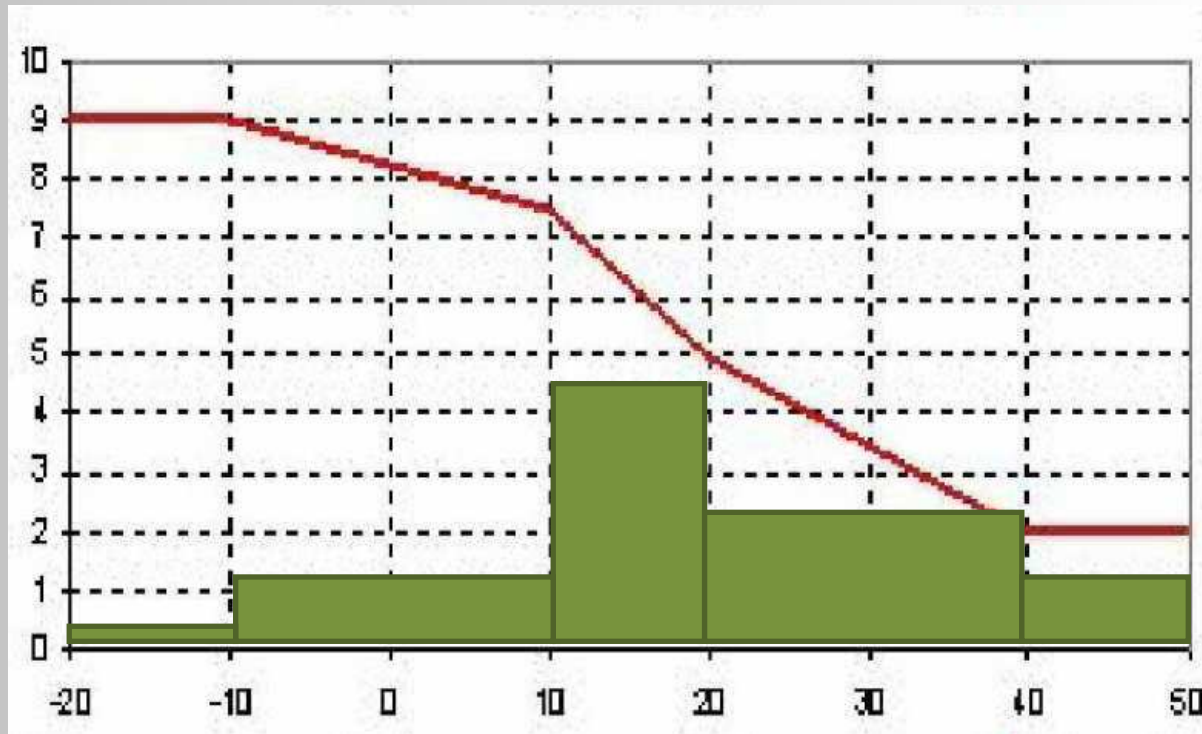
Lower	Upper	Usage	Proba	Re...	Att...
-20	-9	Rarely (/10)	0.0243	-	-
-10	9	Sometimes (/2)	0.1219	-	-
10	19	Often(X2)	0.488	-	-
20	39	Normal (Ref)	0.2439	-	-
40	50	Sometimes (/2)	0.1219	-	-

Add Del Save

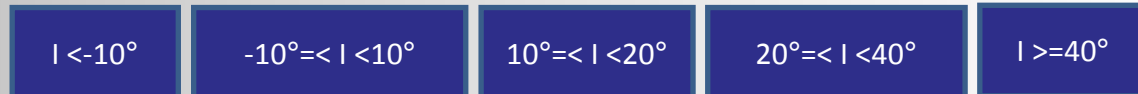
Ok Cancel

Comfort Additional Heating

- Usage probability by Class of Equivalence



Inputs:
Temperature



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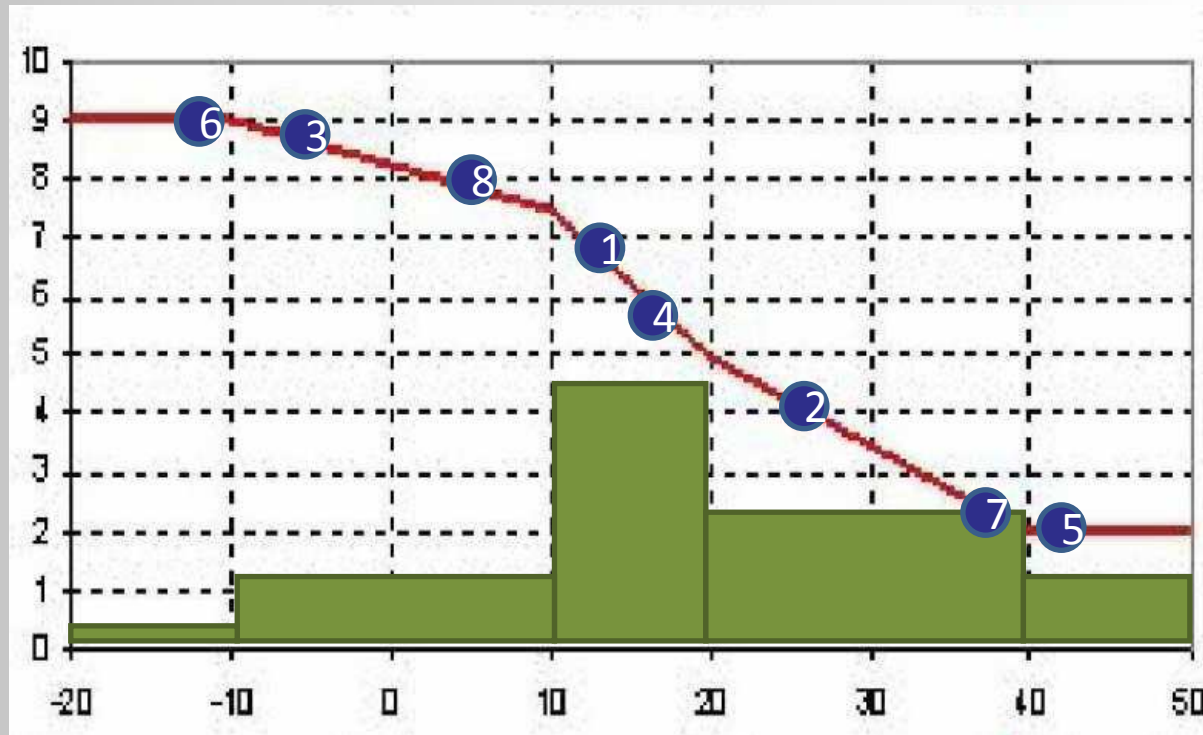


Comfort Additional Heating

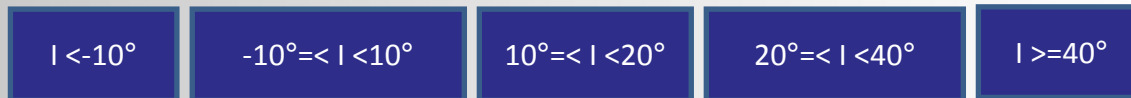
- Test Case Generation

⊗ Functional point choose in the test cases number X

Expected Results:

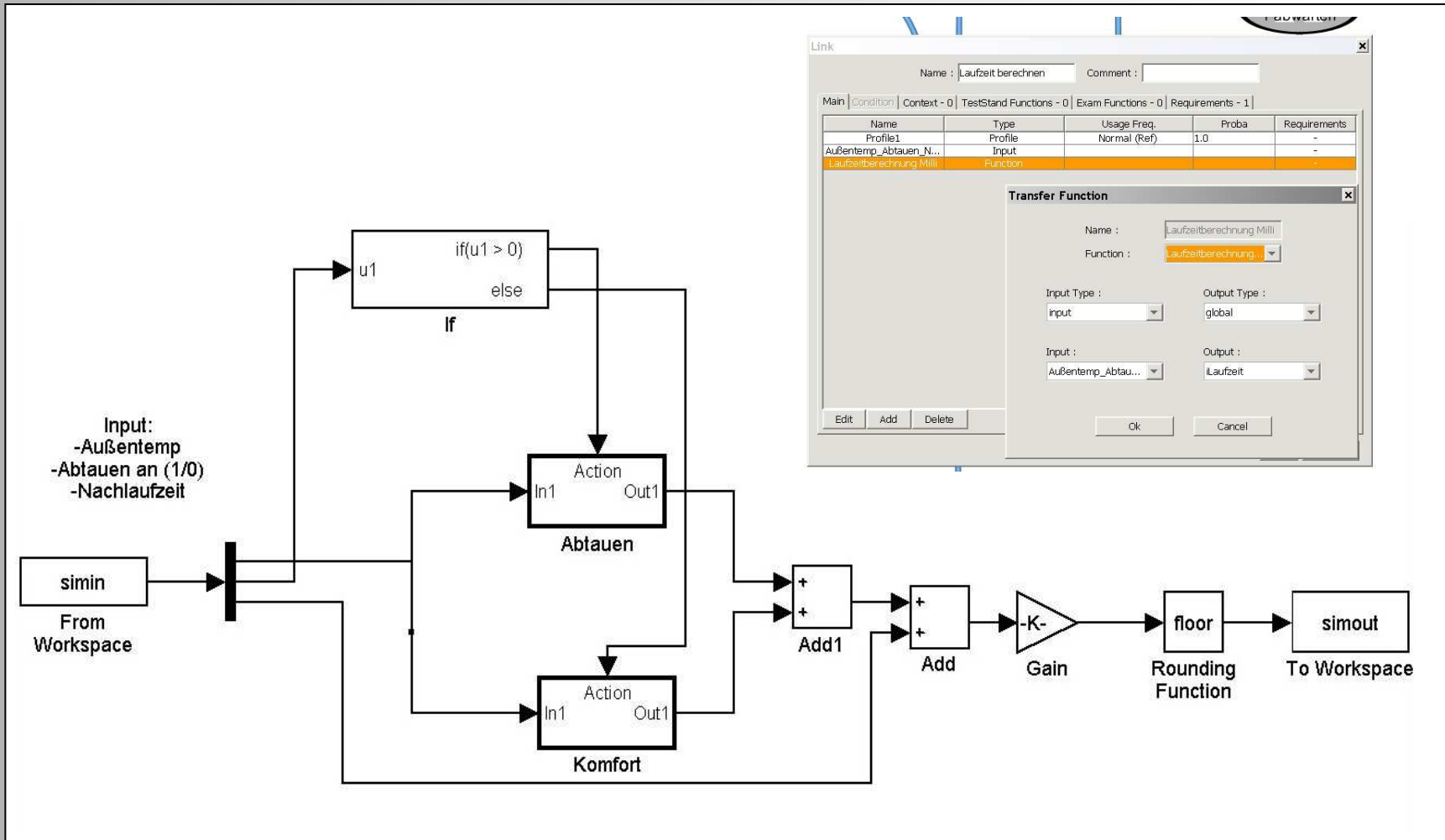


Inputs:
Temperature



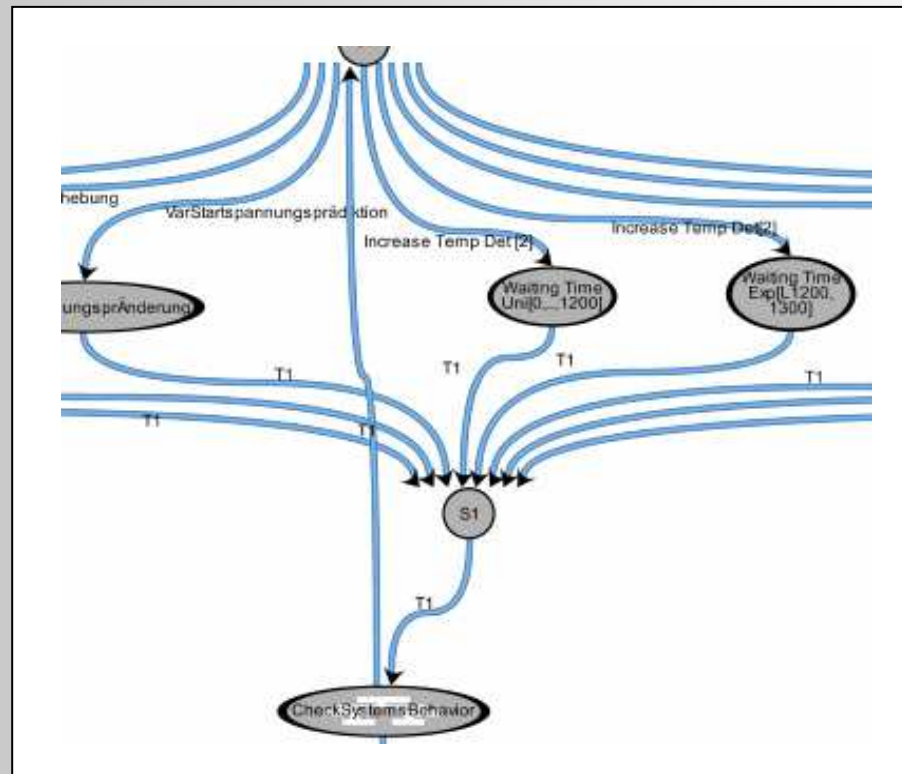
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Comfort Additional Heating



Energy Management

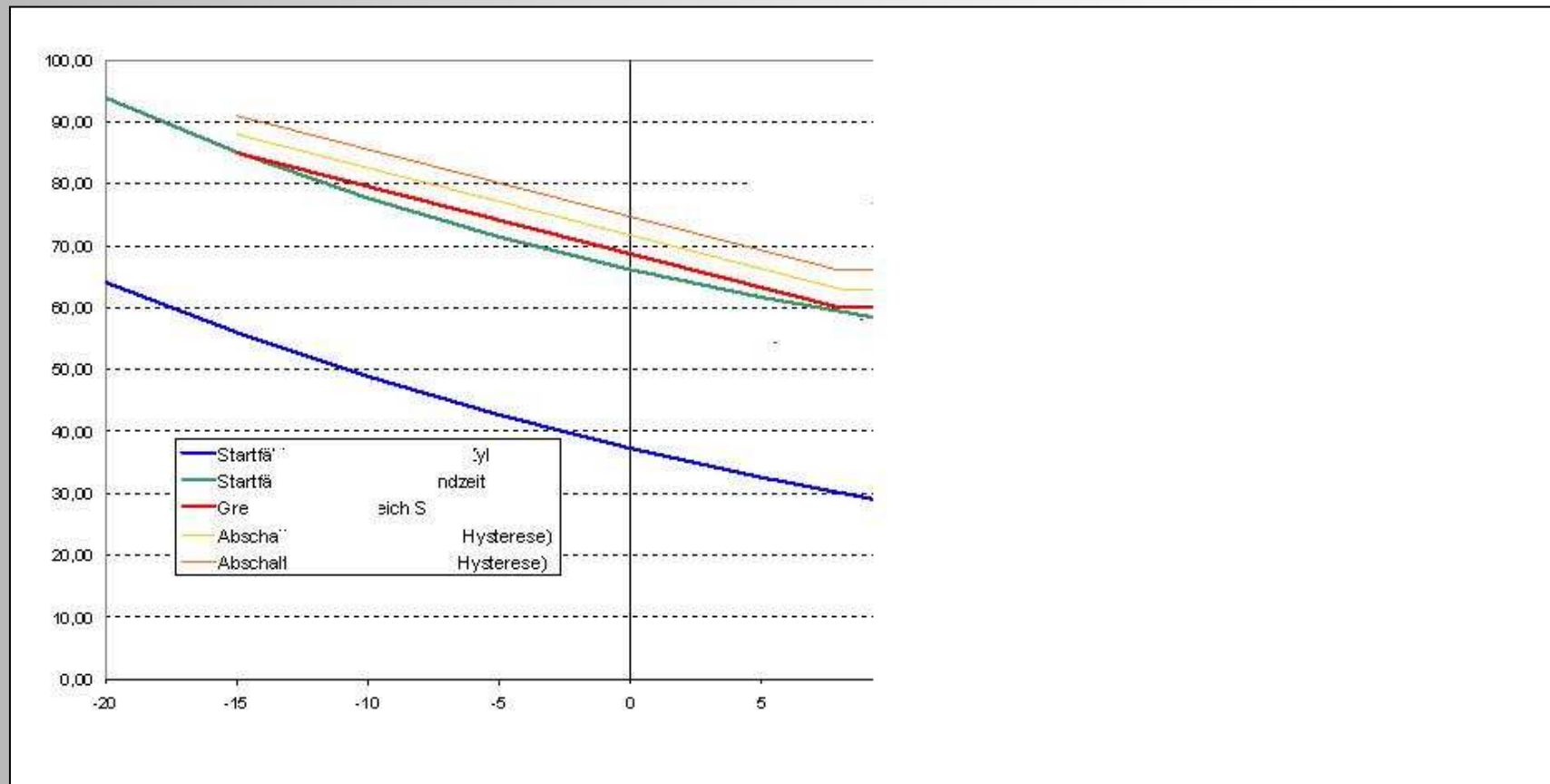
- System reaction depends heavily on
 - Timing
 - History



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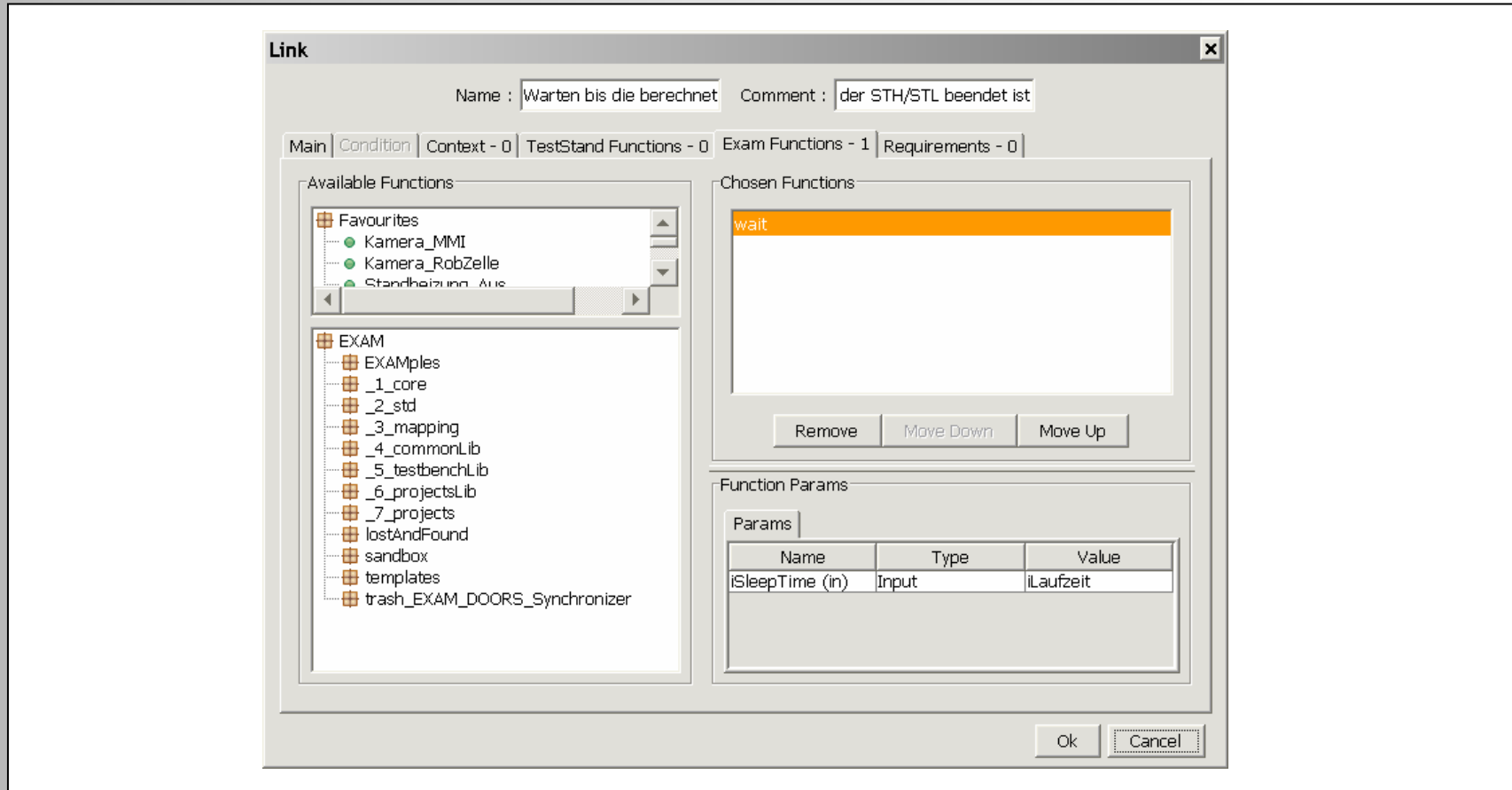
Energy Management

- Requirement Specification Continuous Functions with Hysteresis



Evaluation Check

- Passing to EXAM



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Outlook

- Next Projects on HIL
 - Energy Management
 - Distributed Energy Management of Comfort Components
 - Comfort
- Next Project on MIL/SIL and HIL
 - Integral Safety

Thank you!