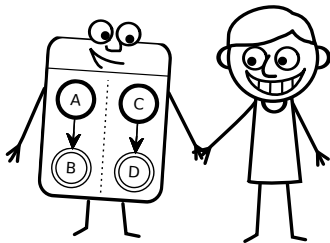


Taming Graphical Modeling

Reinhard von Hanxleden
Hauke Fuhrmann

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www.informatik.uni-kiel.de/rtsys

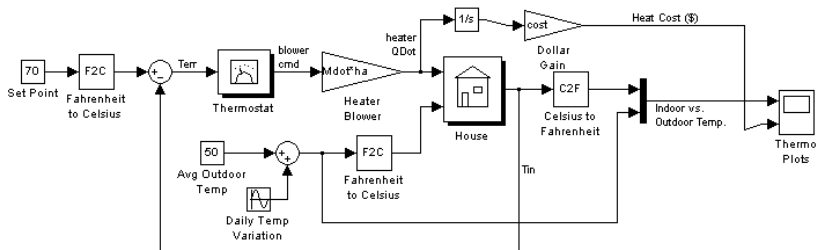
SYNCHRON 2010, Frejus



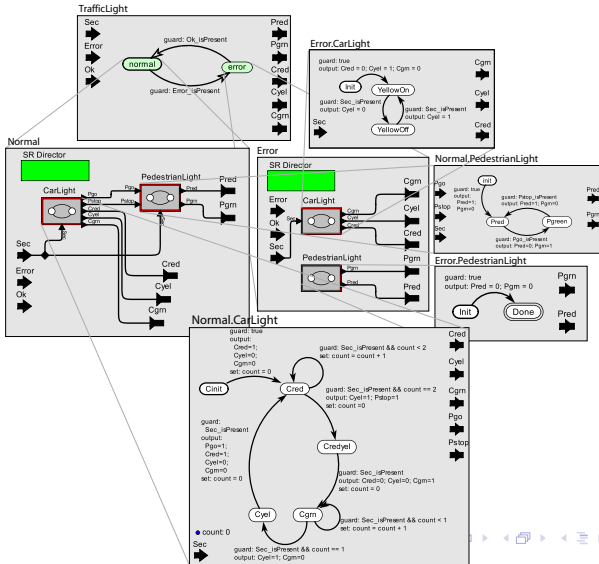
- 1 Problems of Graphical Modeling
- 2 Approach: KIELER
- 3 Evaluation

Examples 1

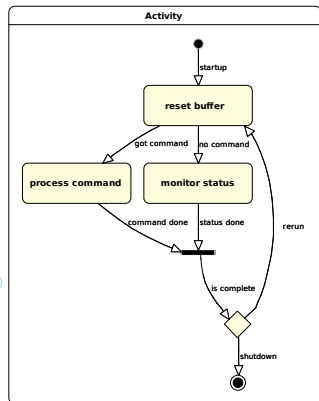
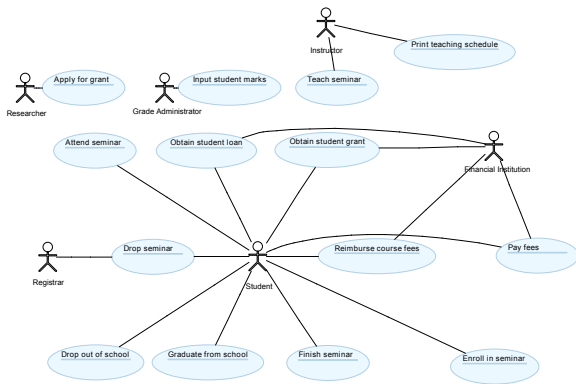
Mathworks' Simulink



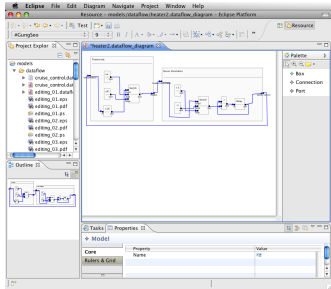
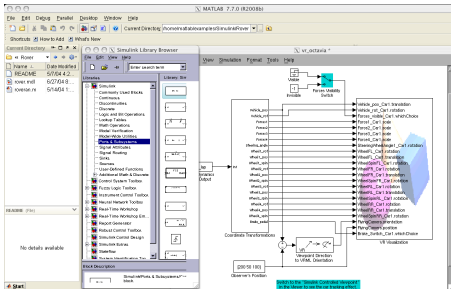
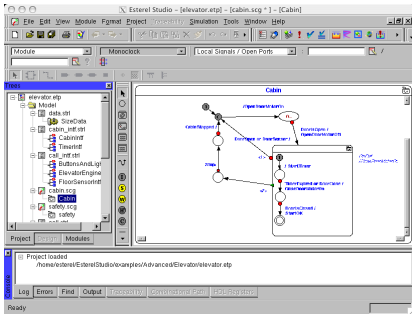
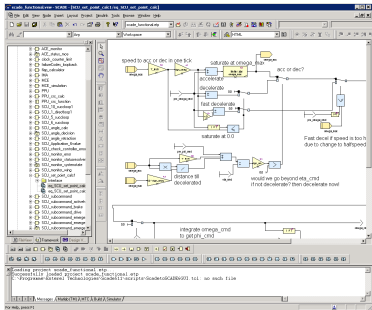
Examples 2



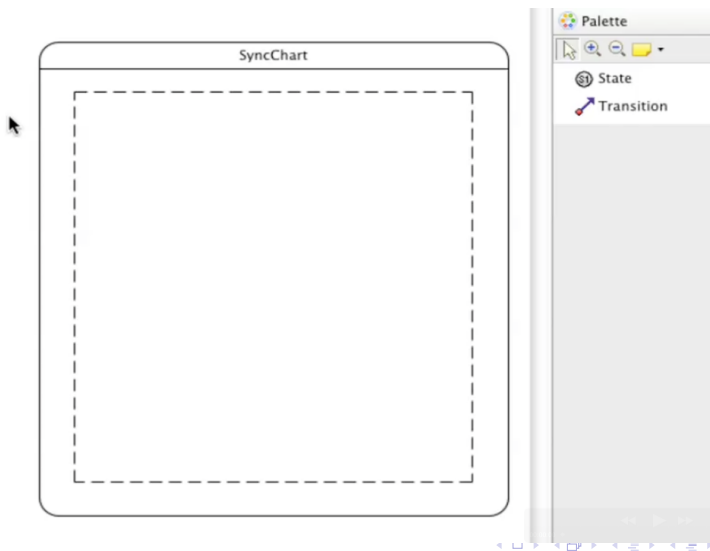
Examples 3



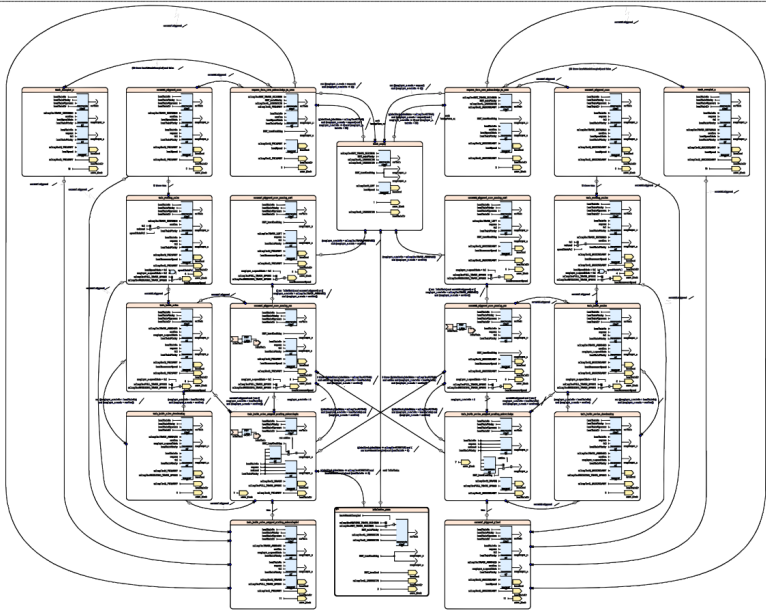
Editors



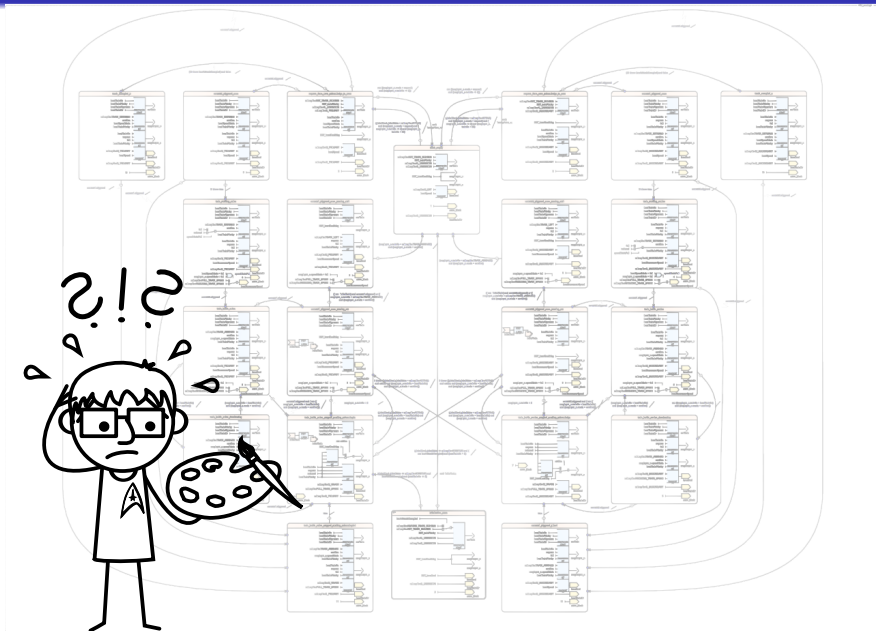
WYSIWYG Drag-n-Drop Freehand Editing

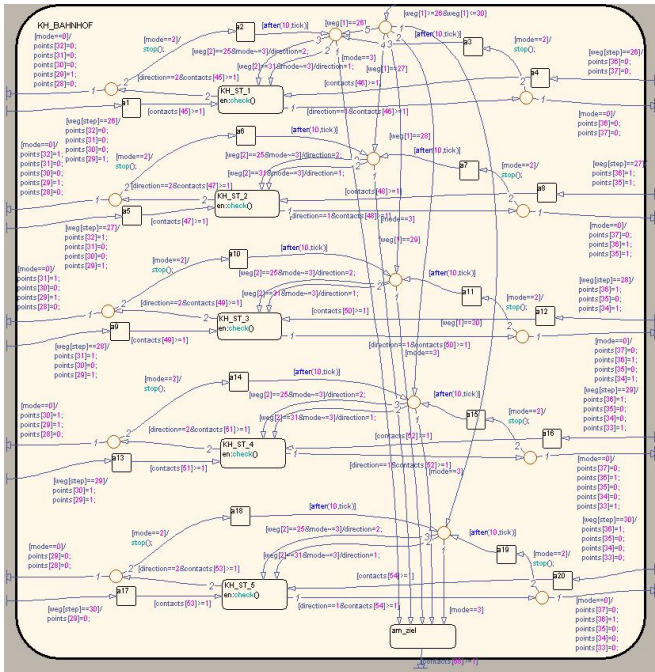


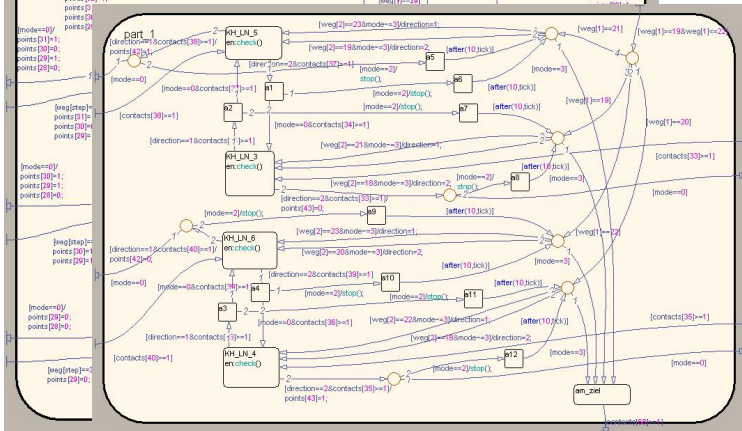
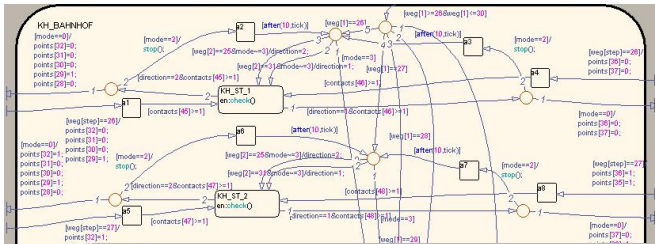
Complex Diagrams

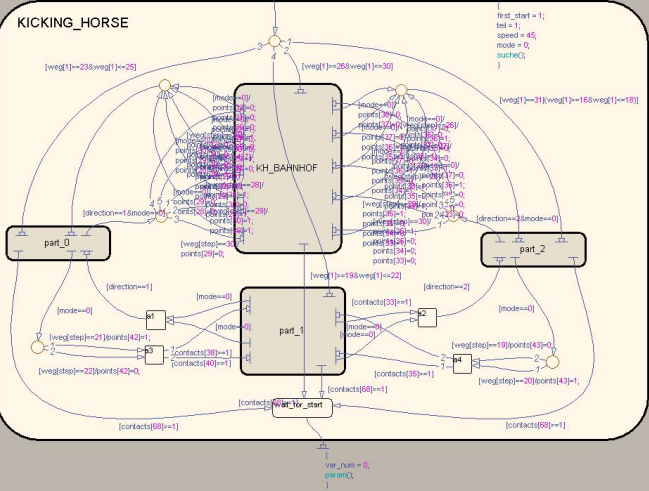
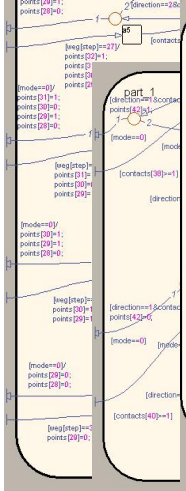
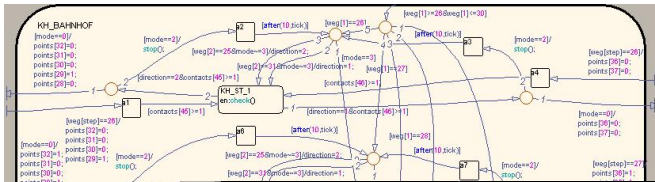


Complex Diagrams









Loosing the Context

scade_functional.yasm - SCADe - [SCU_set_point_calc1/eq_SCU_set_point_calc]

File Edit View Node Insert Layout Project Simulink Tools Browse Window Help

scade_functional.etp

Workspace

Any

Workspace

HTML

ACE_monitor
ACE_status_mce
clock_counter_limit
failureCodes_loopback
flap_calculator
IMA
MCE
MCE_simulation
PFU
PFU_acc_calc
PFU_acc_function
SCU_10_succloop1
SCU_1_directloop1
SCU_5_succloop
SCU_6_succloop
SCU_angle_calc
SCU_angle_decision
SCU_angle_restriction
SCU_Application_value
SCU_check_controller_error
SCU_monitor_error
SCU_monitor_statusolver
SCU_monitor_systemstate
SCU_monitor_wing
SCU_set_point_calc1
Interface
 eq_SCU_set_point_calc
 eq_SCU_set_point_calc
SCU_subcommand
SCU_subcommand_activeh
SCU_subcommand_brake
SCU_subcommand_dive
SCU_subcommand_emerge
SCU_subcommand_emerge

FileView Framework Design V...

speed to acc or dec in one tick

saturate at ω_{max}

accelerate

decelerate

fast decelerate

saturate at 0.0

distance bill decelerated

would we go beyond η_{cmd} if not decelerate? then decelerate now!

integrate ω_{cmd} to get ϕ_{cmd}

Fast decel if speed is too h due to change to halfspeed

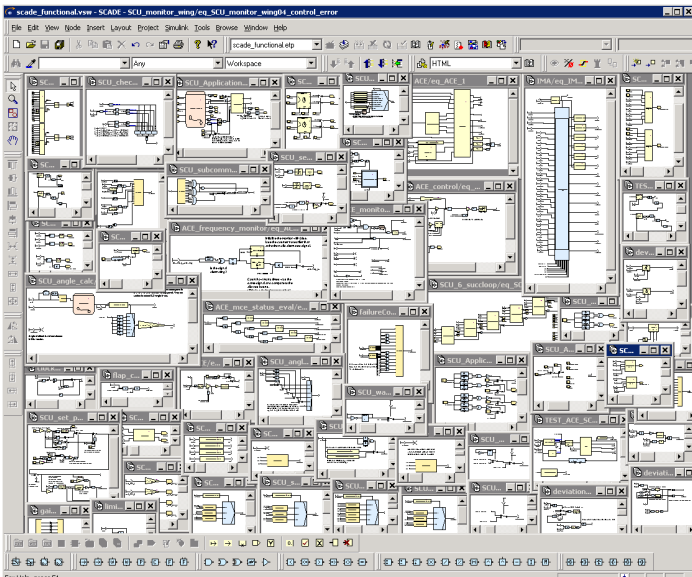
acc or dec?

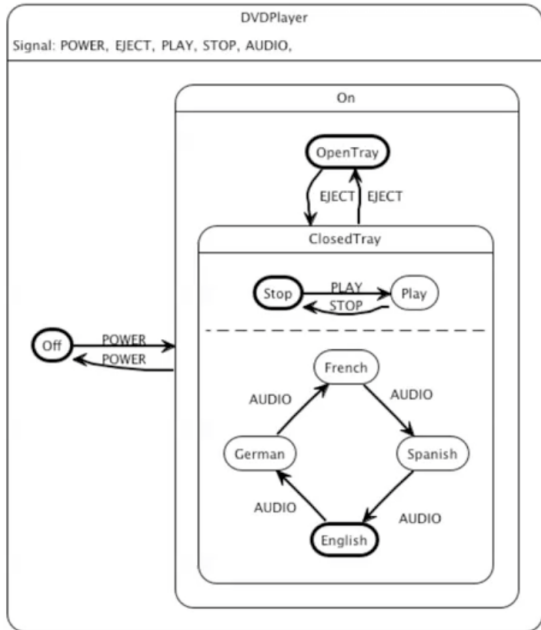
Messages | Matlab (TM) | MTC | Build | Simulator /

Loading project scade_functional.etp ...
Successfully loaded project scade_functional.etp
C:\Programme\Esterel Technologies\Scade511\scripts\ScadetoSCADEGUI.tcl: no such file

10 / 25

Loosing the Details





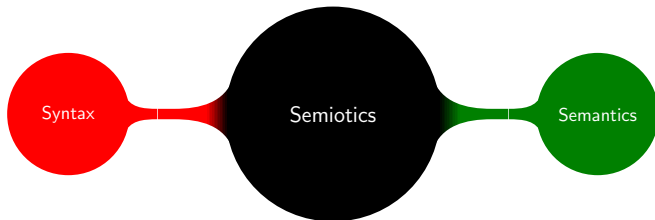
Palette



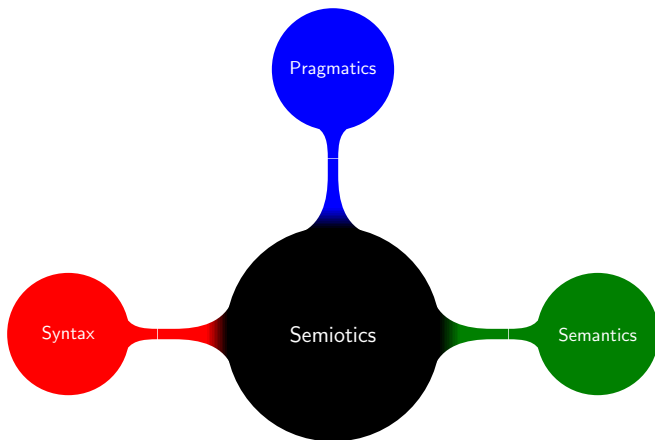
State

Transition

Semiotics



Semiotics



KIELER Objectives



KIELER Objectives



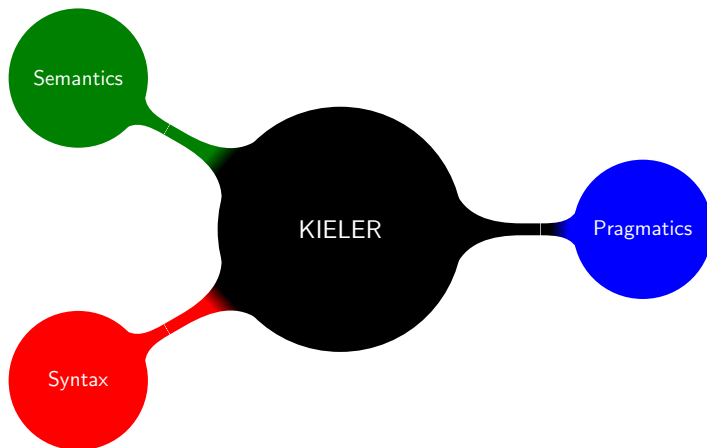
- Free user of manual mechanical work.
 - Manual placing of graphical objects.
 - Manual navigation in complex models.

KIELER Objectives

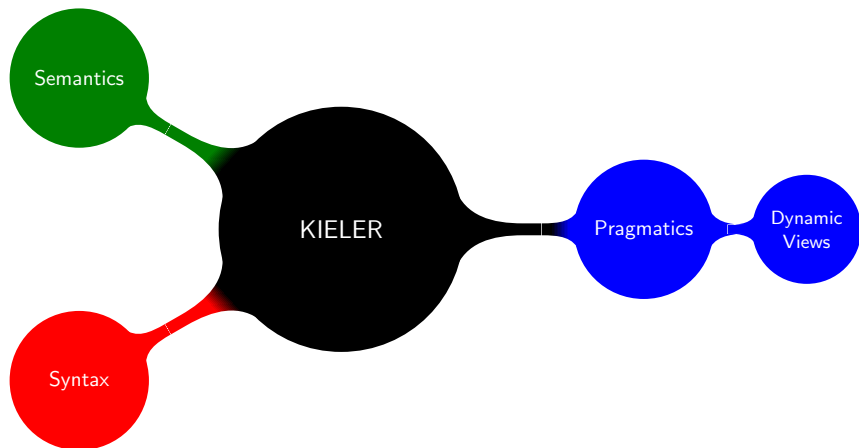


- Free user of manual mechanical work.
 - Manual placing of graphical objects.
 - Manual navigation in complex models.
- Focus on **pragmatics**.
 - New interaction methodologies.
 - New analysis methodologies.
 - New ways to synthesize models.

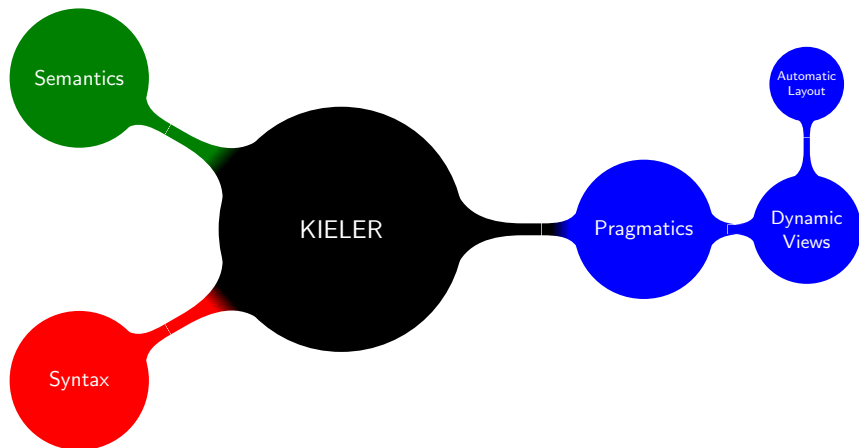
KIELER Semiotics



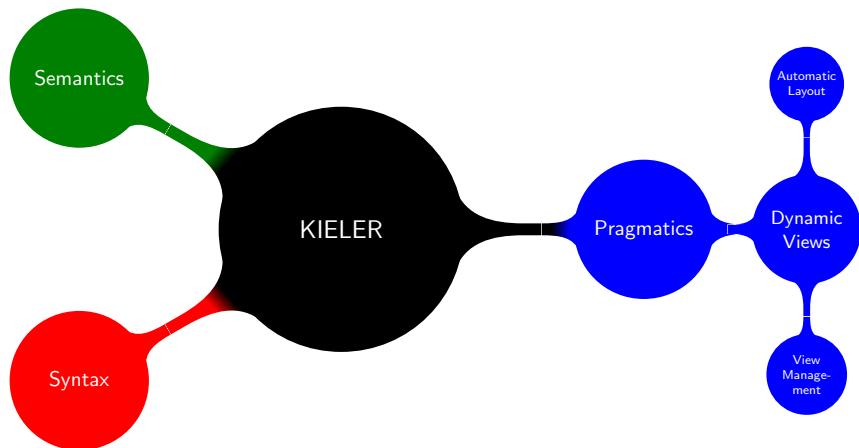
KIELER Semiotics



KIELER Semiotics



KIELER Semiotics



Automatic Layout

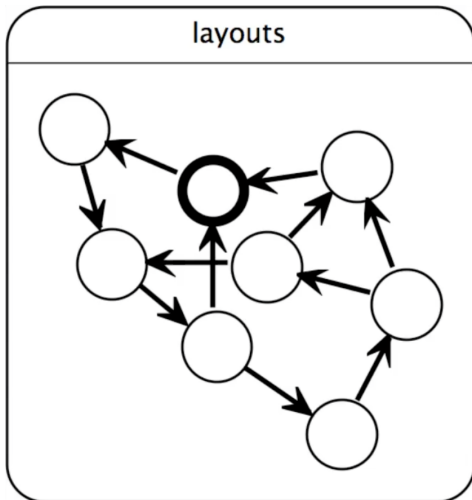
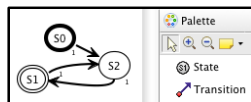


Diagram Editor View



Layout Algorithm

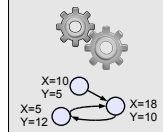
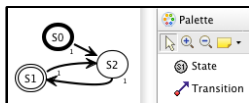
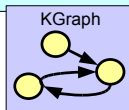
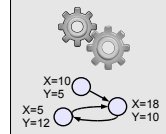
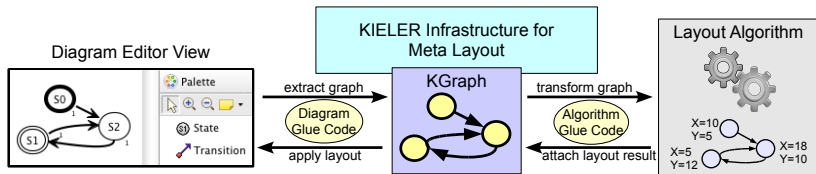


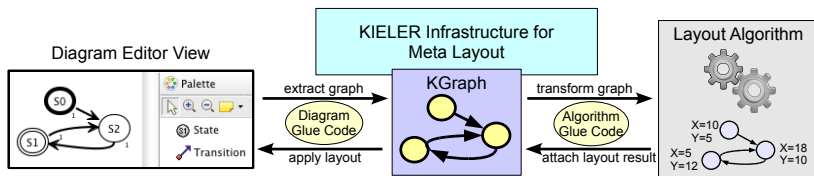
Diagram Editor View

KIELER Infrastructure for
Meta Layout

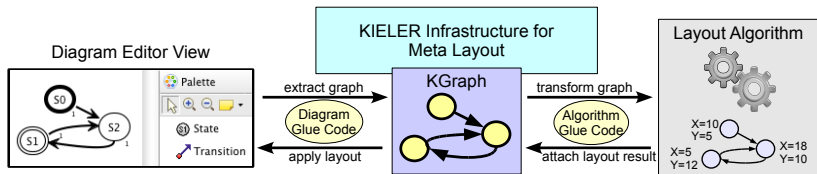
Layout Algorithm







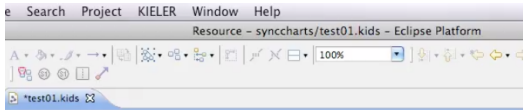
- Eclipse
GMF
- Graphiti
(ongoing)
- ...

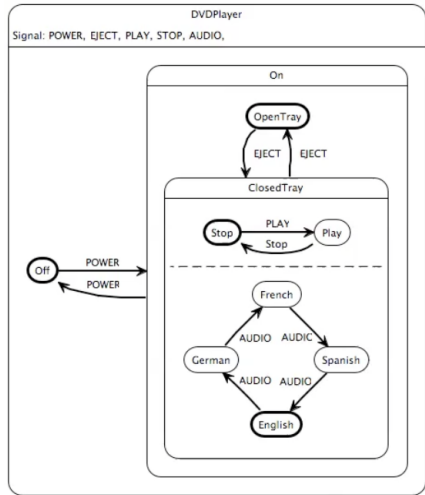


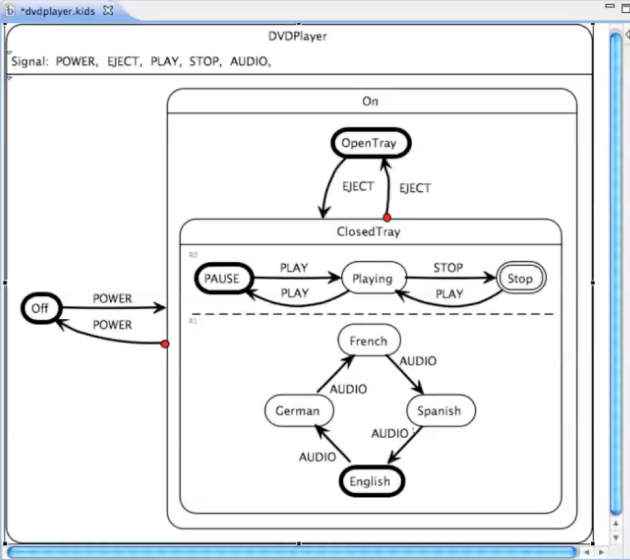
- Eclipse
GMF
- Graphiti
(ongoing)
- ...
- GraphViz
(Dot, Neato, FDP, Twopi, Circo, Radial)
- Open Graph Drawing Framework (OGDF)
(Class Diagram, Layer-Based, Force Directed, Orthogonal, Planarization, ...)
- Zest (GEF)
- Own Implementations (Ports, Layer-Based, Planarization, ...)
- ...

Build upon Layout: View Management

- Structure-Based Editing
- Textual Editing
- Simulation



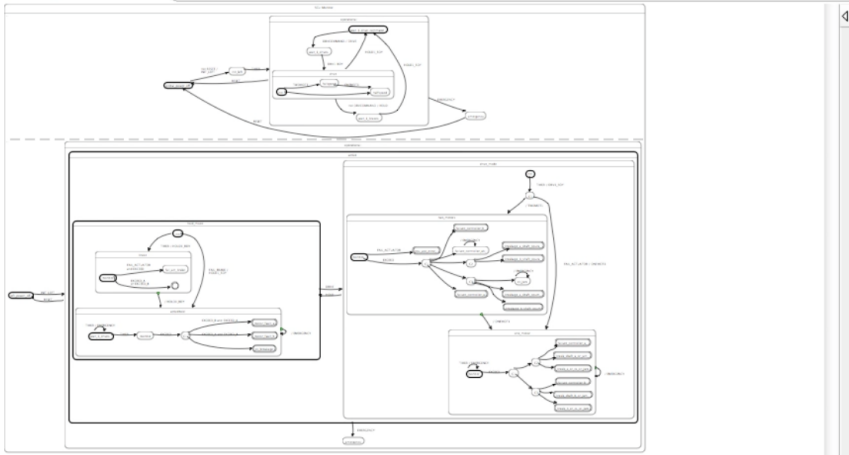




KITS SyncCharts textual view

```

state DVDPlayer {
  input signal POWER
  input signal EJECT
  input signal PLAY
  input signal STOP
  input signal AUDIO
  region R0:
  init state Off
  --> On with POWER
  state On {
    region R0:
    init state OpenTray
    --> ClosedTray with EJECT
    state ClosedTray {
      region R0:
      init state PAUSE
      --> Playing with PLAY
      state Playing
      --> 1 Stop with STOP
      --> 2 PAUSE with PLAY
      final state Stop
      --> Playing with PLAY
    }
    region R1:
    init state English
    --> German with AUDIO
    state German
    --> French with AUDIO
    state French
    --> Spanish with AUDIO
    state Spanish
  }
}
  
```

***Execution Manager**

syncchart Matching schedules 500ms 1

Component Name | Type | Master

- Synchronous Signal Resetter Observer/Producer
- Data Table Producer
- SyncCharts Ptolemy Simulator Observer/Producer
- Data Table Observer
- SyncCharts Visualization Observer

Data Table

P	Key	Value
<input type="checkbox"/>	DRVCOMMAND	
<input type="checkbox"/>	EXCEED	
<input type="checkbox"/>	EXCEED_A	
<input type="checkbox"/>	EXCEED_B	
<input type="checkbox"/>	FAIL_ACTUATOR	
<input type="checkbox"/>	FAIL_BRAKE	
<input type="checkbox"/>	RESET	
<input type="checkbox"/>	state	*, , , @states.0/@regions.9/@st
<input type="checkbox"/>	TIMER	

Trigger

Effect

Trigger

Effect

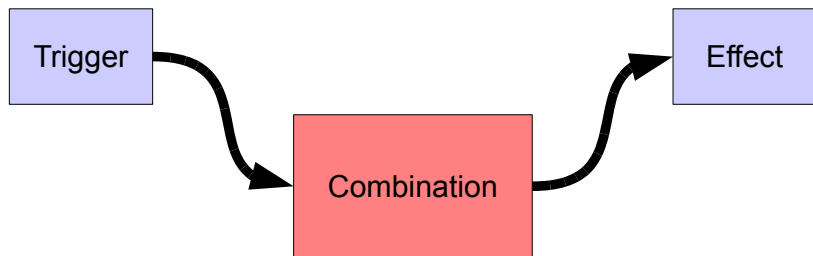
- ButtonTrigger
- SelectionTrigger
- SimulationEventTrigger
- ...

Trigger

- ButtonTrigger
- SelectionTrigger
- SimulationEventTrigger
- ...

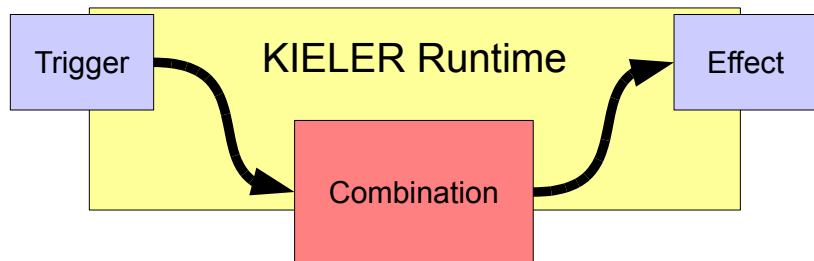
Effect

- AutoLayoutEffect
- HighlightEffect
- CollapseEffect
- FilterEffect
- ArrowEffect
- SimulationEffect
- ...



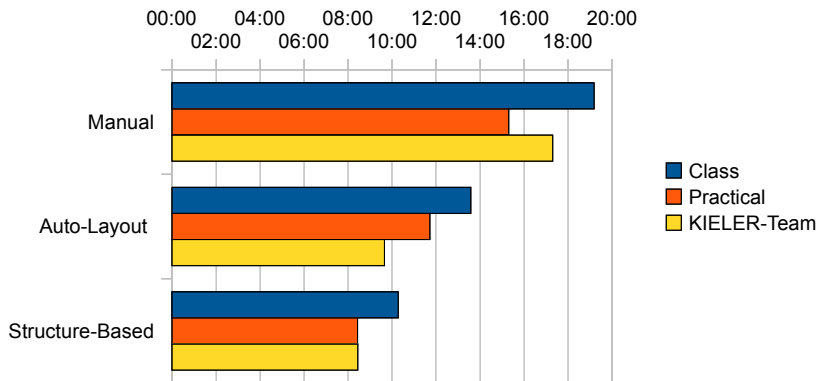
- ButtonTrigger
- SelectionTrigger
- SimulationEventTrigger
- ...

- AutoLayoutEffect
- HighlightEffect
- CollapseEffect
- FilterEffect
- ArrowEffect
- SimulationEffect
- ...



- ButtonTrigger
- SelectionTrigger
- SimulationEventTrigger
- ...
- AutoLayoutEffect
- HighlightEffect
- CollapseEffect
- FilterEffect
- ArrowEffect
- SimulationEffect
- ...

Evaluation of Structure-Based Editing







- H. Fuhrmann, R. von Hanxleden, *Taming Graphical Modeling*, MODELS 2010
- <http://informatik.uni-kiel.de/rtsys/kieler>



- H. Fuhrmann, R. von Hanxleden, *Taming Graphical Modeling*, MODELS 2010
- <http://informatik.uni-kiel.de/rtsys/kieler>

