BEHAVIOURAL MODELS FOR DEVICE CONTROL

L. Andolfato, M. Comin, S. Feyrin, M. Kiekebusch, J. Knudstrup, F. Pellegrin, D. Popovic, C. Rosenquist, R. Schmutzer
Library of Reusable Models

- Digitally controlled shutters
- Lamps with intensity control
- DC and stepper motors
- Multi-axis analog piezos
Exchanging Models

1) Language = Syntax + **Precise Semantic**
   - Avoid misunderstanding and enable Model Execution & Transformations

2) Models independent from specific technologies (**PIM**)
   - Facilitate reuse in other project/organizations

3) Exchange **format**
   - Tool independent (OMG XMI, EMF XMI, …?)
Precise Semantics

“When exiting a state, the do-activity should terminate.”

Upon the EXIT_CMD event:

1) Stop DoActivity
2) Invoke ExitAction
or
1) Invoke ExitAction
2) Stop DoActivity
Selecting a Modeling Language

OMG “Standard” but **without** (yet) a Precise Semantic for the State Machine.

Partial Syntax definition, **no** Semantic specification.

W3C recommendation **with** Precise Syntax and Semantic. XML textual format **easy** to exchange. *(Interpreted Statecharts.)*
Architectural Principles: State Semantic

HW and SW have dedicated States on different orthogonal regions.

States represent “HW and SW together” with priority given to HW.
Architectural Principles:

General & Specialized Behavior

Specialize

Composite

States

Vs

Dedicated

Orthogonal

Regions
<table>
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<tr>
<th>Phase</th>
<th>Goal</th>
<th>Failure Effect</th>
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<tbody>
<tr>
<td>Startup / Initialization</td>
<td>Increase System Reliability</td>
<td>Triggers system re-initialization.</td>
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<tr>
<td>Operation</td>
<td>Increase System Availability</td>
<td>Allows for retries (does not force a re-initialization).</td>
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Lamp Device
Using the Models

1. Design Document
2. Execute the Model
3. Transform into Code and Simulators
4. Formal Verification
Where to get our models? Open-MBEE

https://github.com/Open-MBEE/Comodo/tree/master/Models
MODELS RE-USE