Multimodeling

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Panel:
Addressing the Challenges of Multi-Modeling for Domain-Specific Modeling Languages

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Multimodeling

Simultaneous use of multiple modeling techniques.

- **hierarchical multimodeling**: hierarchical compositions of distinct modeling styles, combined to take advantage of the unique capabilities and expressiveness of each style.

- **multi-view modeling**: distinct and separate models of the same system are constructed to model different aspects of the system.
Some Hierarchical Multimodeling techniques that have influenced us:

- Statecharts [Harel 87]
- Ptolemy Classic [Buck, Ha, Lee, Messerschmitt 94]
- SyncCharts [André 96]
- *Charts [Girault, Lee, Lee 99]
- Colif [Cesario, Nicolescu, Guathier, Lyonnard, Jerraya 01]
- Metropolis [Goessler, Sangiovanni-Vincentelli 02]
- Ptolemy II [Eker, et. al. 03]
- Safe State Machine (SSM) [André 03]
- SCADE [Berry 03]
- ForSyDe [Jantsch, Sander 05]
- ModHelX [Jantsch, Sander 07]
- ...

Lee, Berkeley 3
Hierarchical Multimodeling: Statecharts

- Pred: pedestrian red signal
- Pgrn(0): turn pedestrian green off
- Cgrn: car green
- Sec: one second time
- 2 Sec: two seconds time
- Pgo/Pstop: pedestrian go/stop
Hierarchical Multimodeling in Ptolemy II

Many distinct models of computation can be hierarchically combined to create executable models.
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- **hierarchical multimodeling**: hierarchical compositions of distinct modeling styles, combined to take advantage of the unique capabilities and expressiveness of each style.

- **multi-view modeling**: distinct and separate models of the same system are constructed to model different aspects of the system.
Some Multi-View Modeling techniques that have influenced us:

- UML [Various, 90s]
- Ptolemy Classic [Buck, Ha, Lee, Messerschmitt 94]
- Model-integrated computing [Sztipanovits, Karsai, Franke 96]
- Colif [Cesario, Nicolescu, Guathier, Lyonnard, Jerraya 01]
- Metropolis [Goessler, Sangiovanni-Vincentelli 02]
- KIEL [Prochnow, von Hanxleden 07]
- ...
Multi-View Modeling:
Distinct and separate models of the same system are constructed to model different aspects of the system.
Maintaining Consistency Across Models?

- For hierarchical multimodeling:
  - Abstract semantics
  - Behavioral type systems

- For multi-view modeling:
  - Model synthesis
  - Model transformation
  - Model ontologies

All of these require substantial research (theory, methods, and tools)!
Teaching Multimodeling?

A basic principle:

We should teach things we understand…