



SysML in Factory Modeling

Leon McGinnis^{1,2A}, Edward Huang^{2B}, Kan Wu^{2B}

1 - Product & Systems Lifecycle Management Center

2 - Keck Virtual Factory Lab - School of Industrial & Systems Engineering (ISyE)

A - Gwaltney Professor of Manufacturing Systems

B - ISyE PhD Student

Presentation to

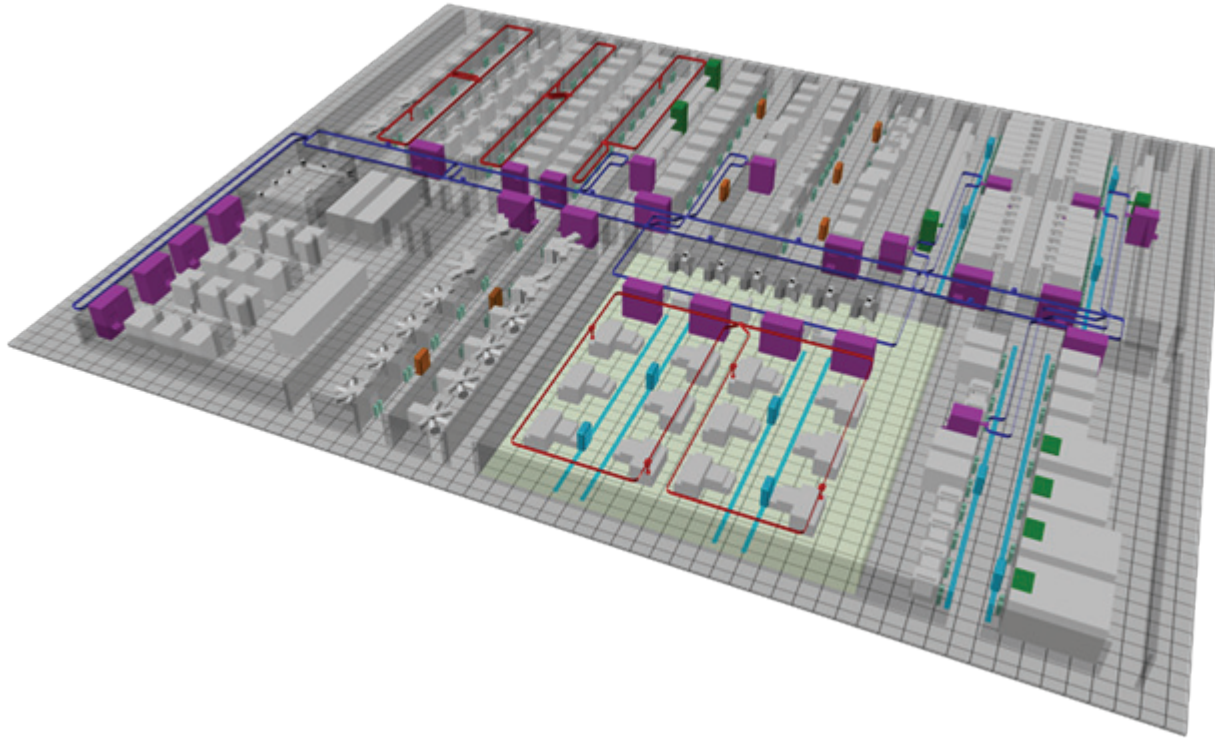
OMG Systems Engineering

Domain-Specific Interest Group (SE DSIG)

February 14, 2006

Tampa, Florida

Modern Wafer Fab



- ~ 10^3 process tools
- ~ 10^3 lots in process
- ~ 10^3 steps per lot
- ~ 30 layers per wafer
- ~ 60 days cycle time

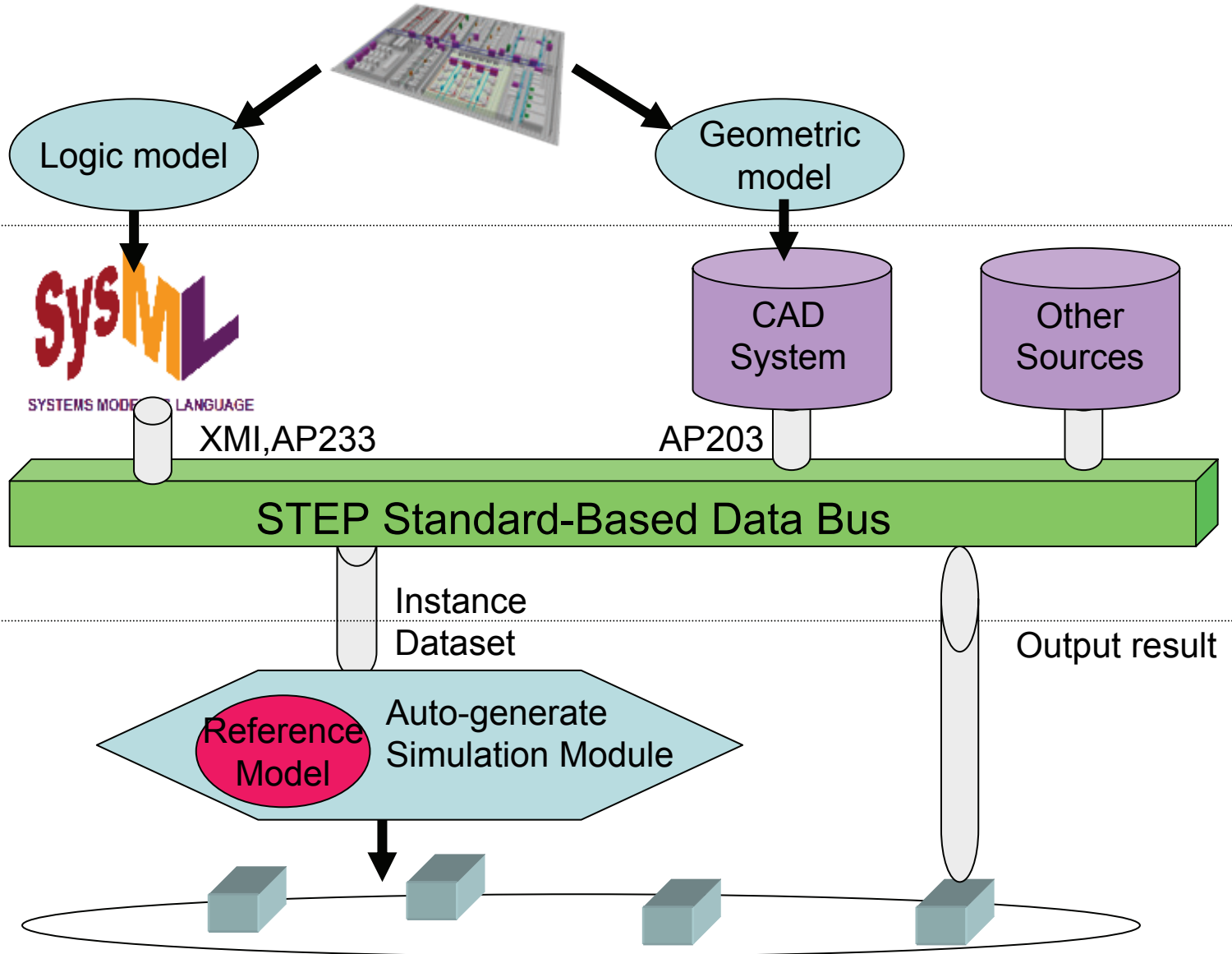
The only way to accurately predict manufacturing performance is to use a high-fidelity discrete event simulation model. These models are hand-build without engineering tools for capturing requirements or technical data describing the fab.

Data Capture for Simulation

Factory Aspect	Tool	SysML Elements
<ul style="list-style-type: none"> •Resource models <ul style="list-style-type: none"> –Tools –Storage –Transportation –People –Layout 	<ul style="list-style-type: none"> SysML SysML SysML SysML CAD 	<ul style="list-style-type: none"> Block / Class Block / Class Block / Class Class / State
<ul style="list-style-type: none"> •Product model <ul style="list-style-type: none"> –Process plans 	<ul style="list-style-type: none"> SysML 	<ul style="list-style-type: none"> Sequence / Activity
<ul style="list-style-type: none"> •Behavioral model <ul style="list-style-type: none"> –Orders –Schedules/Sequence 	<ul style="list-style-type: none"> Excel SysML 	<ul style="list-style-type: none"> Sequence / Activity

Scope Overview

Shop Floor System



Backbone Information System

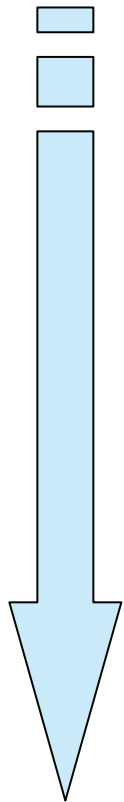
Evaluation System

Proposed Architecture

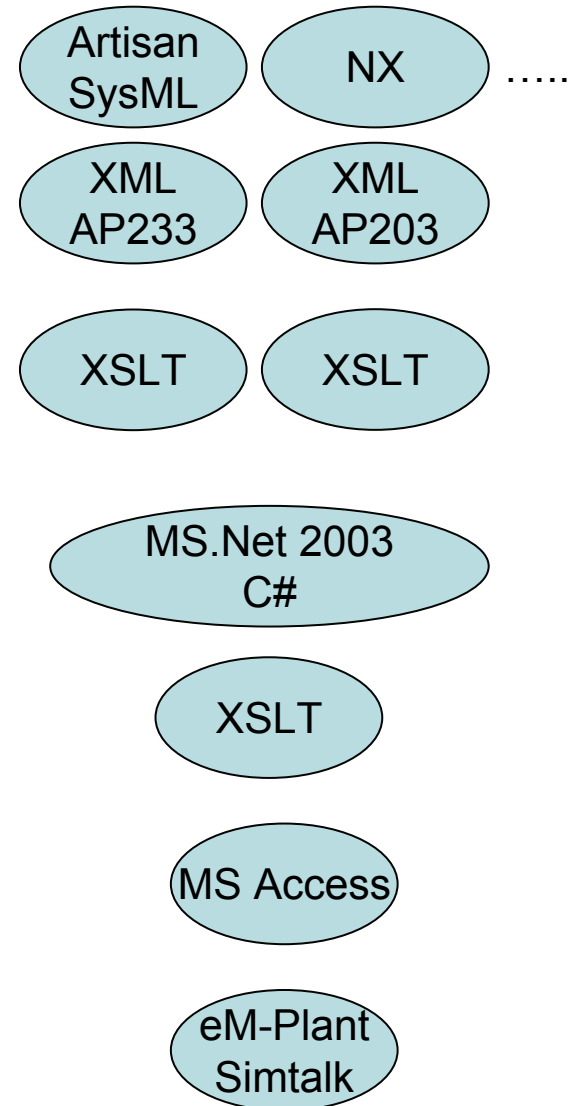
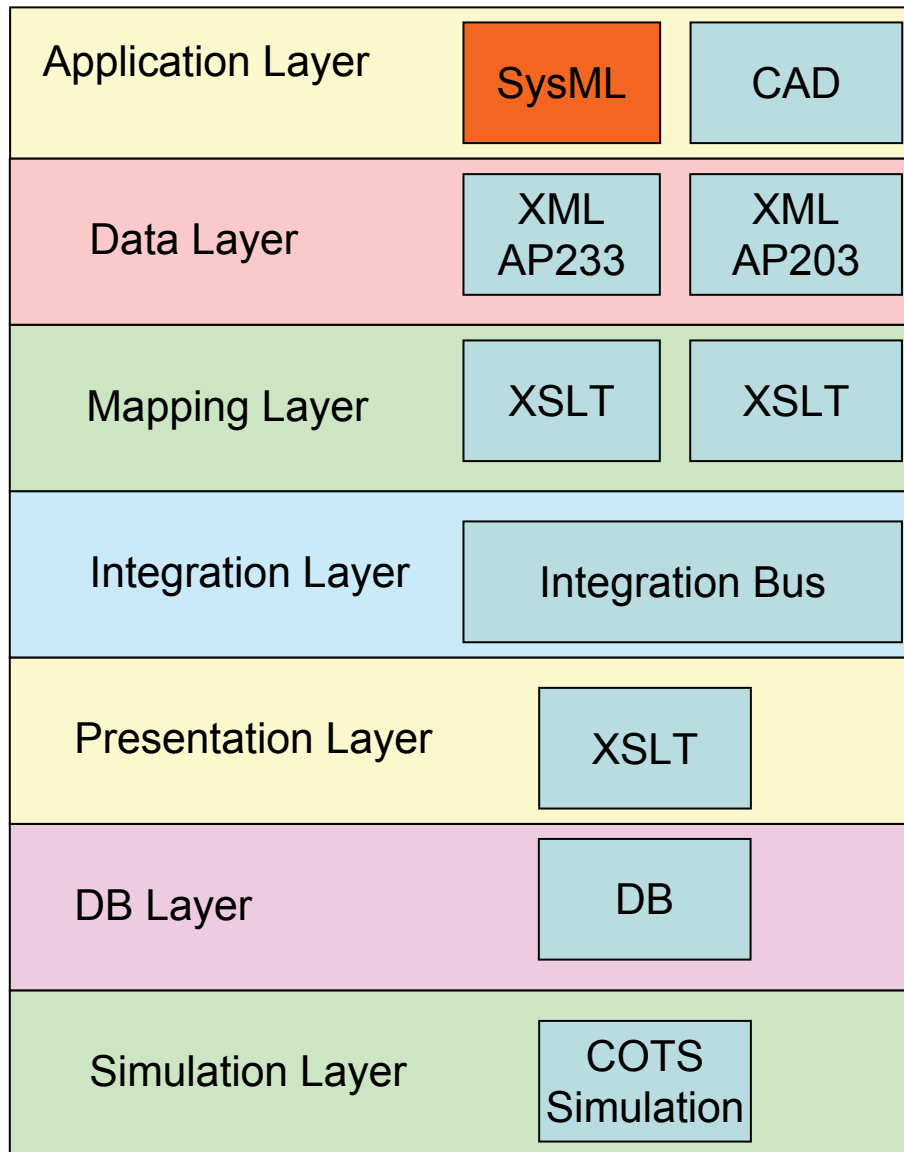
Software and Standards

Instantiation

Application Domain



Simulation Model



Progress To Date

- SysML data capture and standards-based data schema
- Simulation model generation from standard data schema
- Pending: CAD-based geometry capture and standard data schema