
Design Tool Plug and Play

What's It All About



Don Cottrell

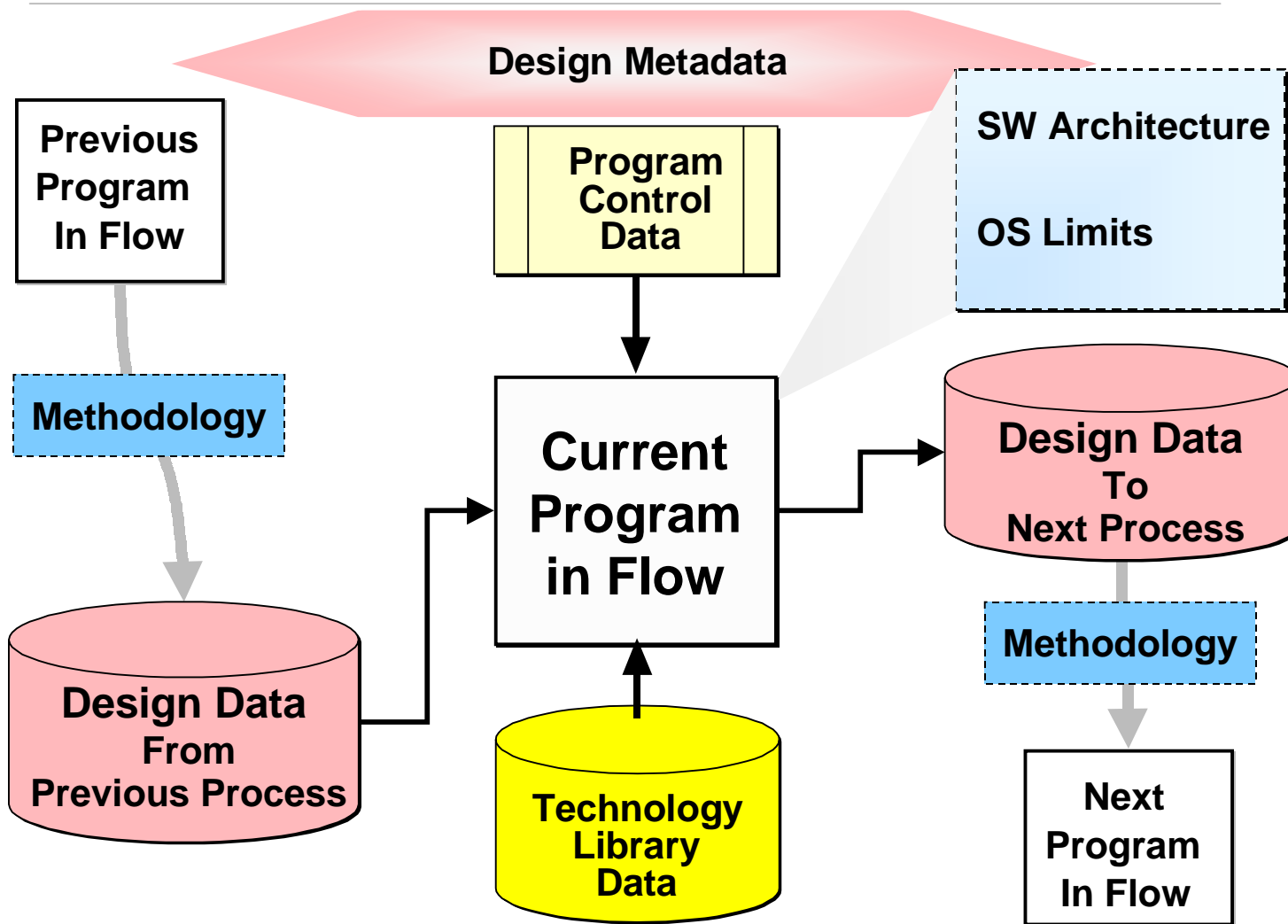
Si2, Inc.

PnP - So Why Care?

- **No external vendor meets all IC design needs,
All EDA vendors together don't meet all needs,
Thus, internal development is required.**
- **Nearly impossible for startups to break into the business due to integration barriers,
Startups enter business with intent to be purchased,
But once purchased by “big guys”, a time lag and loss of innovation result.**
- **Industry partnerships provide value,
But, integration cost acts as a barrier.**



The Elements of PnP



Program Control Data

- **Applications commands that control processing**
 - Name of program's executable, display options, design data and technology library directories
 - Design configuration information
 - Operational instructions (such as synthesis priorities, constraints, simulation run time, etc.)

- **Of particular importance for PnP when program generated**
 - From a predecessor tool in the design flow
 - By an external workflow-management system



Methodology

- **Defines of the flow of control and data across the totality of design tools**
 - Specifies data to be read and written by a particular program in the flow
 - Specifies the correct use of metadata to manage the overall design process

- **Of particular importance for PnP when defined or enforced by work flow automation**



Software Architecture

- **Physical packaging and procedural mechanisms necessary to enable execution of a tool**
 - Hardware software prerequisites
 - Hardware/OS platform support
 - Compiler and linker manufacturer and version
 - Design or procedural requirements such as dynamic loading, dynamic linking, or fork/exec techniques



Design Data

- **Original**

- Information about the IC that is required to manufacture the part
- Human input and program generated
- Netlist, layout, pin assignments, etc.

- **Derived**

- Information generated from the original-design data and used to analyze the design for correctness and completeness
- Parasitics, delays, simulation results, etc.

- **Metadata**

- Descriptive information about the design data
- Level, generation dates, format, etc.



Technology Data

- **Process Library**

- Physical and electrical descriptions of the IC process steps, electrical models, technology constraints, etc.
- Resistivity, dielectric constants, thickness, predefined areas, process variations, design rules, etc.

- **Cell Library**

- Physical, electrical, functional characteristics of qualified design elements (ASIC cells, user macros, cores)
- Delay characteristics, power equations, function, physical construction, usage rules/constraints

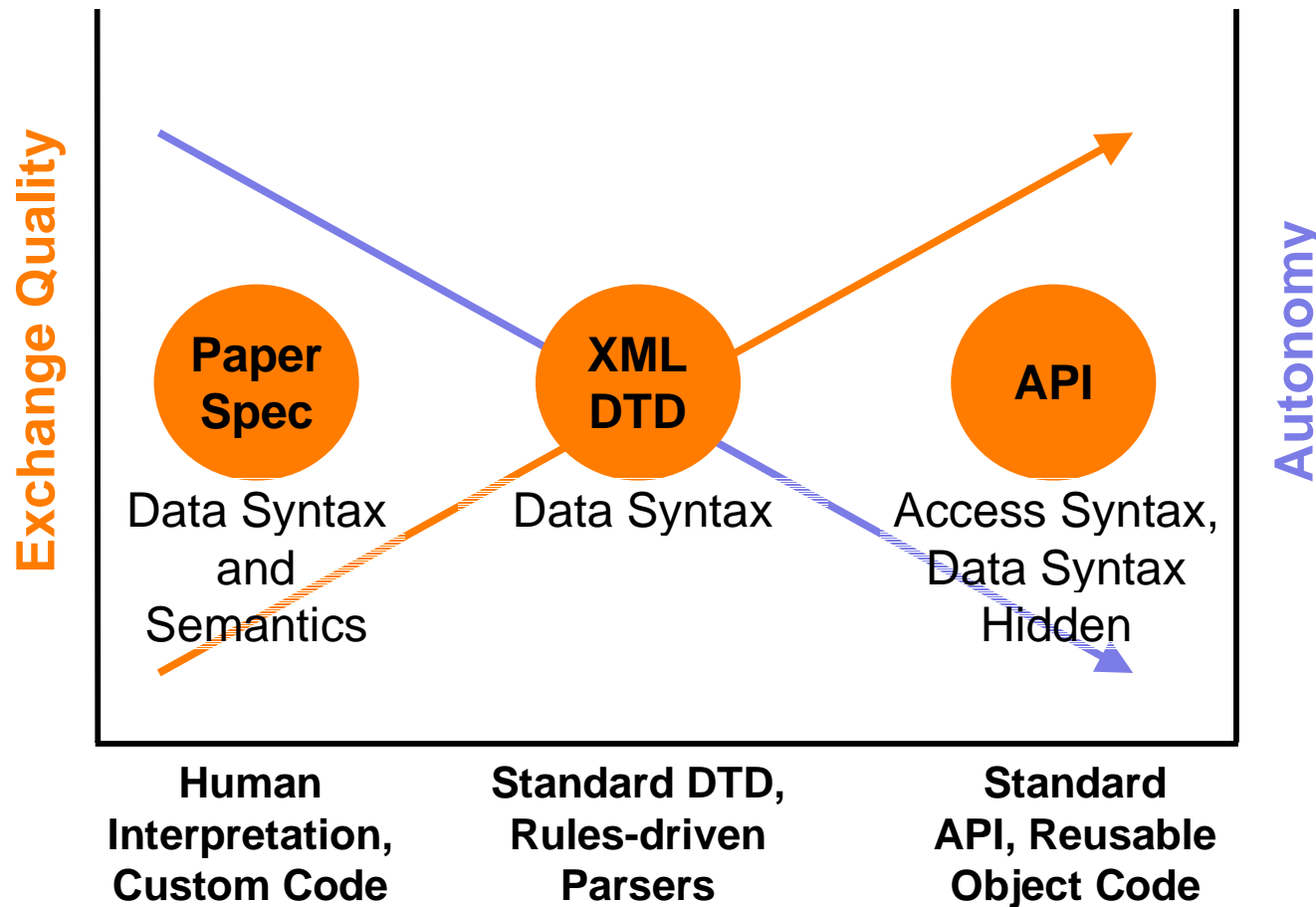


Data Standard Considerations

- **ASCII File vs. Binary**
 - Off the shelf edit tools vs. custom
 - Visible vs. “hidden”
- **Sequential vs. Direct Access**
 - Complete parse vs. incremental access
- **Encapsulation Level**
 - Data
 - Execution
- **Specification**
 - Format Specification vs. Access Specification
 - Format Spec - Paper vs. Public DTD
 - Access Spec - C vs. C++



Data Exchange Techniques



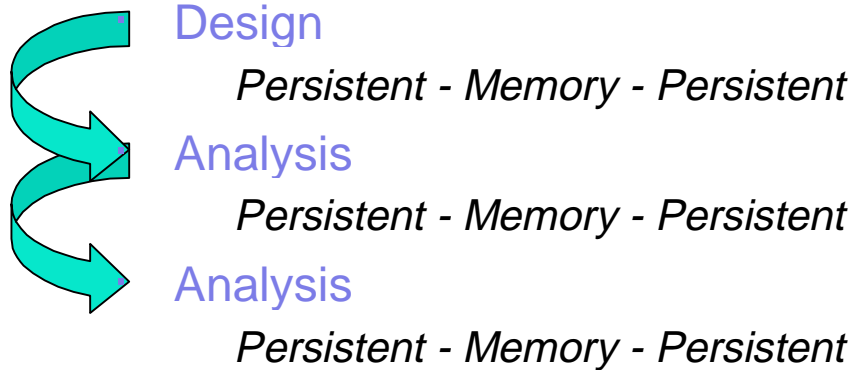
Top 5 Marketing Proverbs to Ignore

- **APIs are Faster than ASCII files**
- **APIs are Slower than ASCII files**
- **XML guarantees interoperability**
- **APIs guarantee interoperability**
- **Common model architecture can't work**

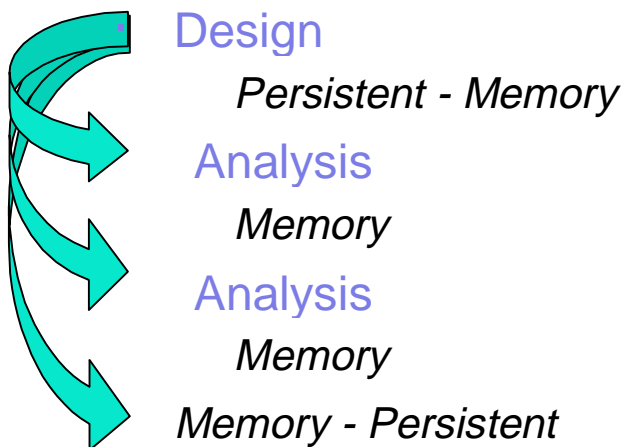


Integration Considerations

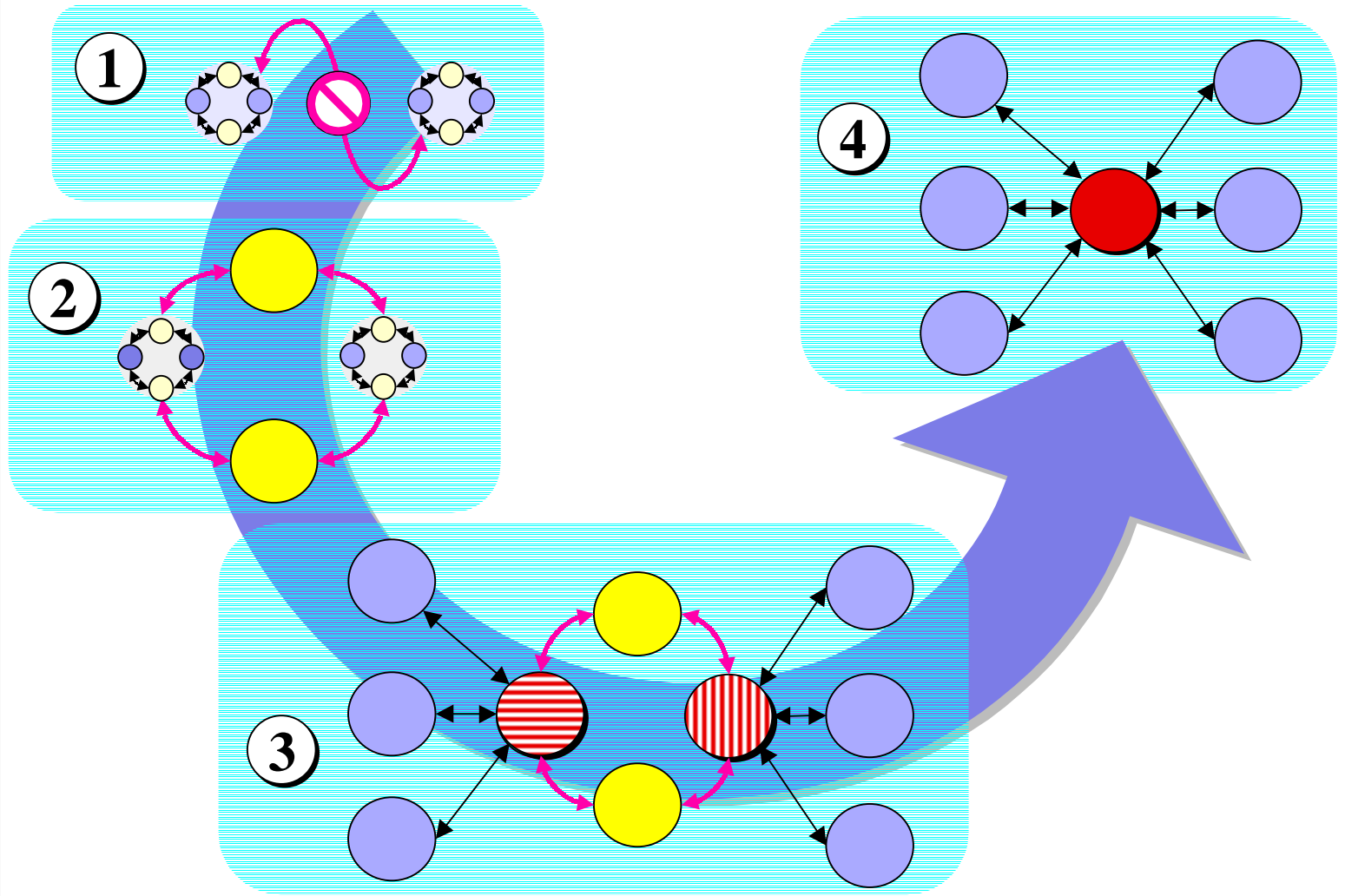
▪ Sequential Flow



▪ Concurrent Flow

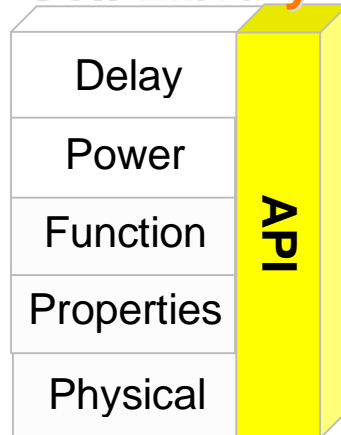


Data Plug and Play Reality

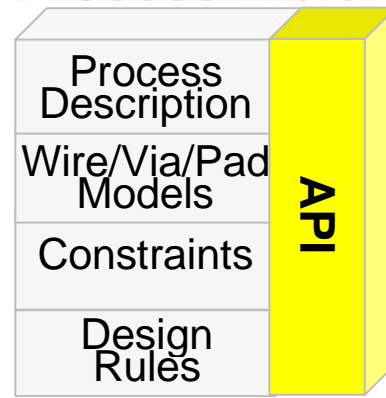


Data Integration Goal

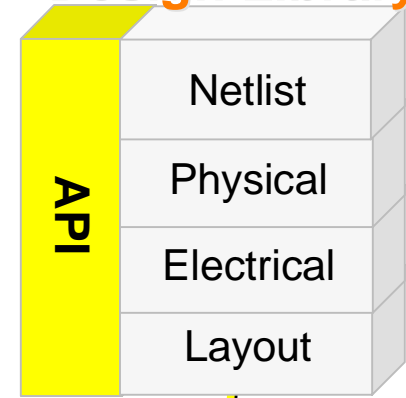
Cell Library



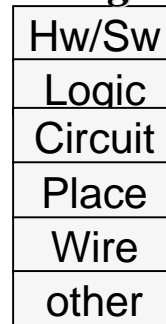
Process Library



Design Library

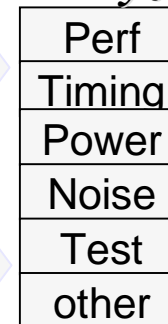


Design



Common Data Model

Analyze



Concurrent Communication