

# IP-XACT for ESL: A Call for Industry Alignment

DAC 2007

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# Examples: Working with Information

- Managing information

- *Document IP* - Electronic Data Book

- Document attributes of IP

- Interfaces, signals, default I/O values, parameters

- Memory maps, registers, files, etc.

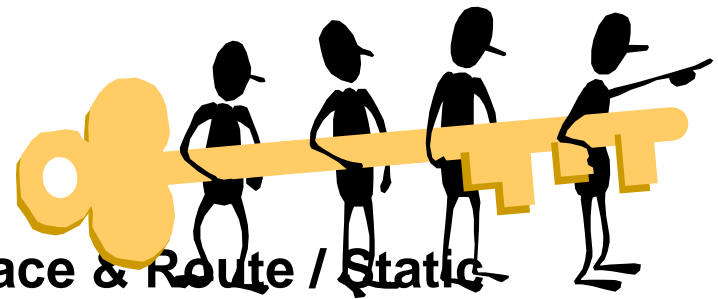
- *Document designs* - Systems

- Processing information

- Automate flows

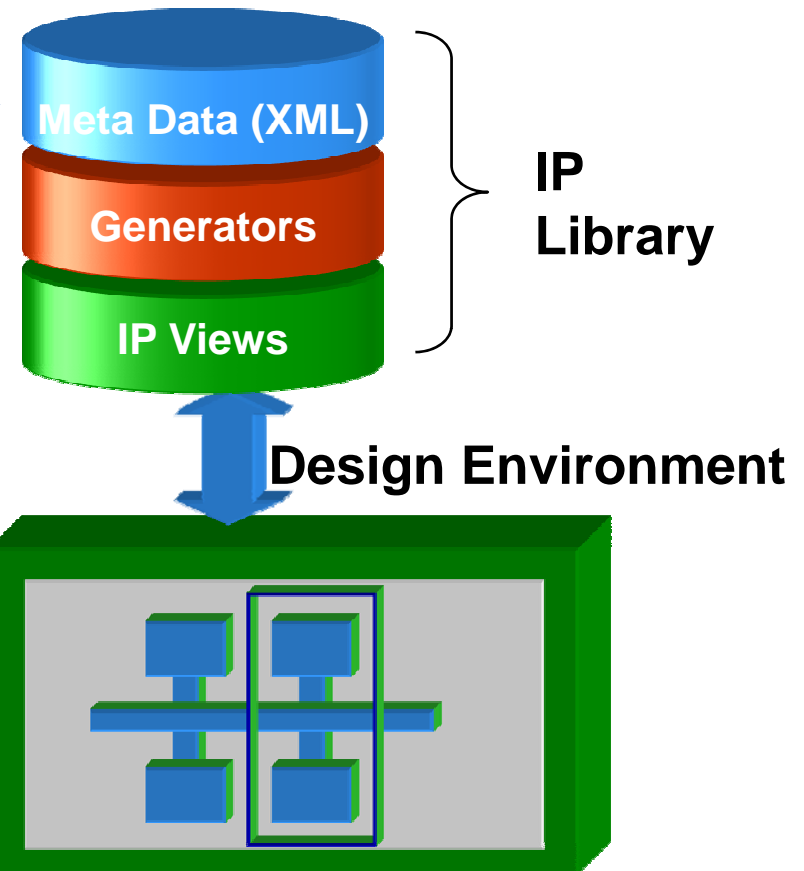
- Synthesis / Test insertion / Place & Route / Static timing analysis

- Generate verification environments



# IP-XACT for IP Descriptions

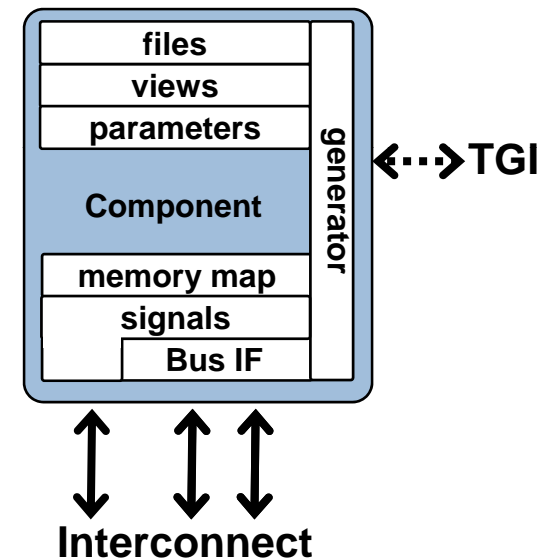
specifies ...



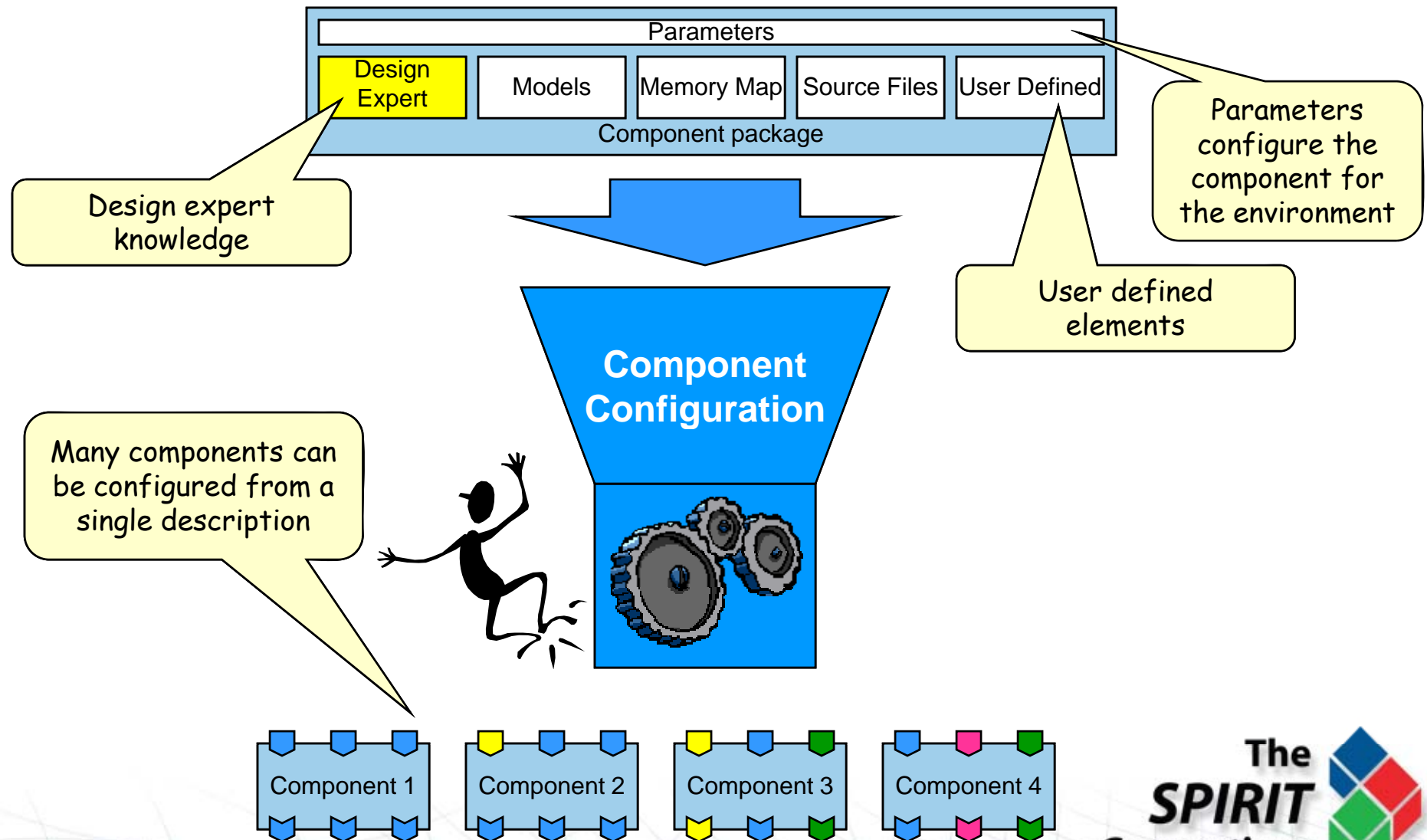
- IP-XACT is The SPIRIT Consortium Standard for documenting IP
- Enables automated design creation and configuration
- Tool independent
- Machine readable
- Base capability + standard “extension mechanism”

# What does IP-XACT describe?

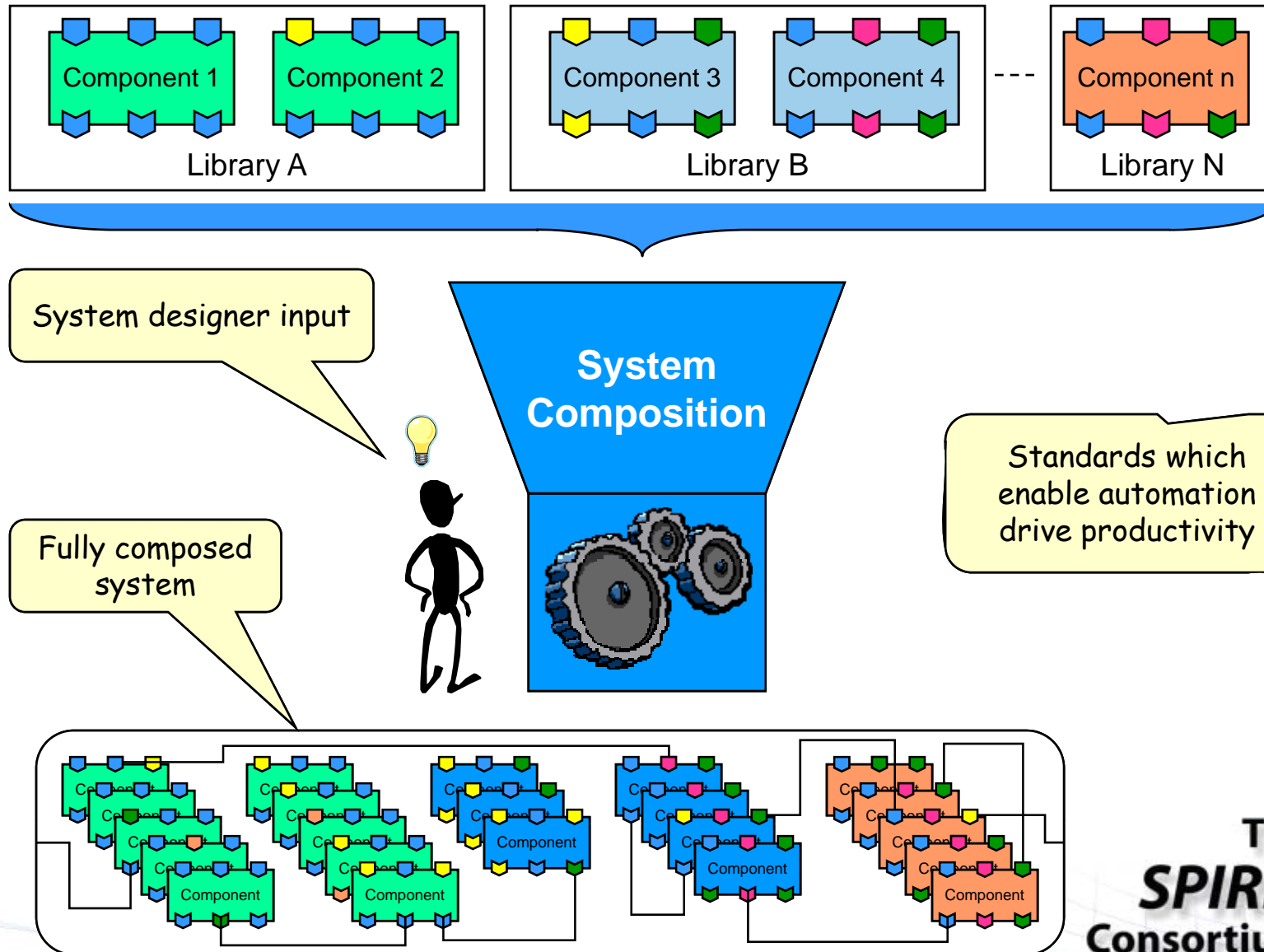
- Design data which describes
  - Components
  - Associated File Sets
  - Designs
  - Hierarchical components
  - Interfaces validated against Bus Definitions
  - Multiple complex memory maps with different views from different places in the system
  - Configurability of components
  - Timing constraints
  - Generators



# Enabling Component Configuration



# Enabling System Composition



# How is IP-XACT being extended?

- An XML Databook to encompass IP Reuse in ESL
  - Language neutral, but main emphasis has been on SystemC
- Reconciling ESL methodologies with today's RTL usage of IP-XACT...
  - ... last 6 months resolved many difficulties
- Finding a solution that works
  - Define unambiguous ESL design data
  - Manage language-specific issues
  - Drive approaches to ESL model re-use
  - Aligning support for SystemC TLM 2.0



# Writing Down Information: Unambiguously!

- IP-XACT information is true regardless of design context or usage
  - Many ESL methodologies use ‘subjective’ models optimized for specific purposes and ignore structures that are not required for a particular purpose
- IP-XACT information is much broader than HDL descriptions
  - IP structures correlated across multiple language representations
  - Problem when ESL models subjectively ignore/change structures!
- IP-XACT: a stricter sense of equivalence between models
  - ESL users will create more ‘versions’ of the ‘same’ design
- Tools will manage design equivalency !



# SystemC Language Limitations in IP-XACT

- IP-XACT Databooks encompass many languages
  - Some language constructs won't map easily to IP-XACT
  - Documenting SystemC models is no exception!
- Some expected limitations
  - Models using constructor classes for variable interfaces need transforms
  - A strict definition of a transactor called an 'abstractor'
  - SystemC Analysis Ports may not map well onto IP-XACT monitor interfaces
  - Generic bus types do not exist

# Shaping ESL IP Reuse methods

- There are few examples of commercial ESL IP available at the moment
  - IP-XACT is informed and validated by examples
  - IP-XACT Working Groups had to make some decisions and choices in defining ESL IP re-use
- Two areas of concern regarding ESL IP re-use
  - Assumes model source code is freely available, but this is often not the case for commercial IP
  - Model formats and purpose do not seem to be consistently correlated with the RTL equivalent models

# Validating IP-XACT on OSCI TLM 2.0

- Documenting component interfaces is key to IP-XACT
  - In Verilog, VHDL, etc., standard interface formats allow us to simplify the XML data model significantly
  - SystemC TLM2 will help drive IP-XACT adoption for ESL
    - Current proposed IP-XACT interface structures support arbitrary languages, interface, and abstraction formats
    - XML complexity is high and difficult to validate completely
    - Complexity in the data model means generator specificity. This is a barrier to generic adoption and robustness
- Adoption of common abstraction definitions and interface standards will help both organizations
  - We have an obligation to the industry to align

# The Call for a United Front

- **OSCI and The SPIRIT Consortium capture ESL design**
  - **SystemC: Leading language for ESL and transactional interfaces**
  - **IP-XACT: Only meta-data descriptor for complete systems**
- **We are finalizing IP-XACT with ESL extensions**
  - **We have completed significant internal technology alignment**
  - **We are starting the prototyping and validation phase**
  - **We need to check assumptions, perhaps revisit some decisions!**
  - **Common terminology and model usage is critical**
- **More models, more design-styles: more robust XML!**
  - **Active joint participation between The SPIRIT Consortium and OSCI will be encouraged in H2 2007**
  - **SystemC users can make a big difference**
- **Thanks for listening. Questions?**