IP-XACT for ESL:
A Call for Industry Alignment

DAC 2007

Monday, June 4th 2007

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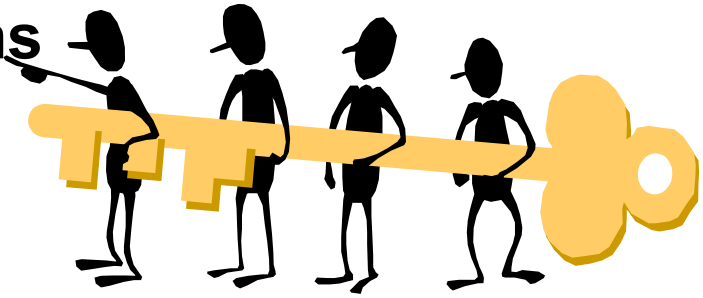
Examples: Working with Information

- **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

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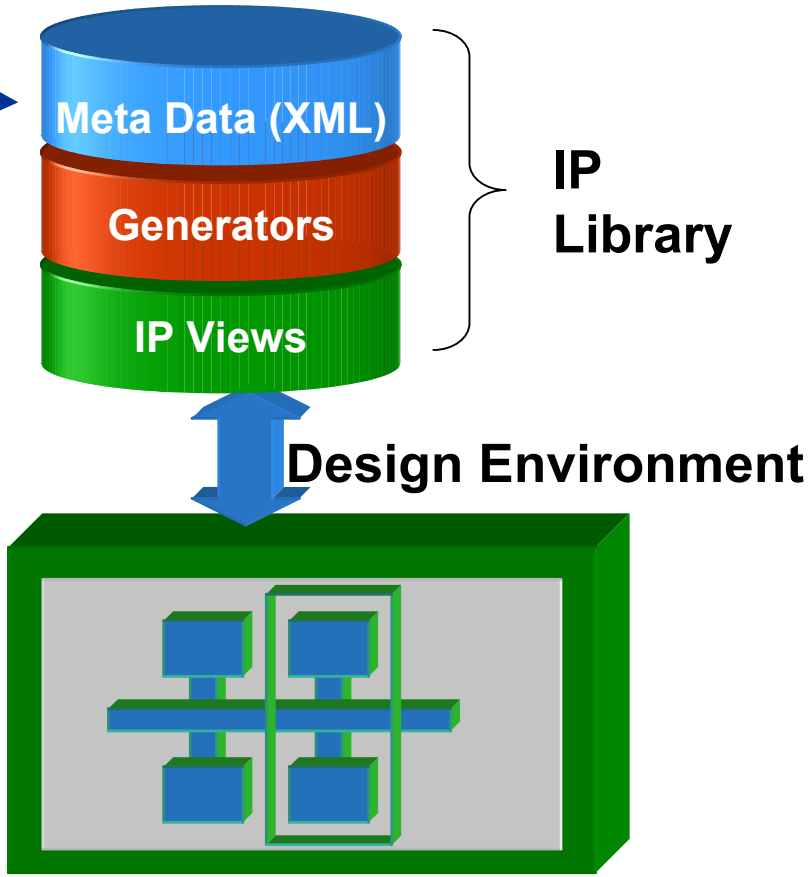
IP-XACT for IP Descriptions

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”

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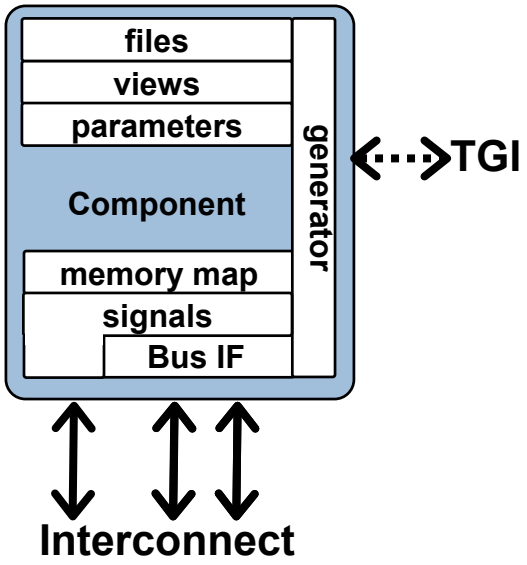
What does IP-XACT describe?

- 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



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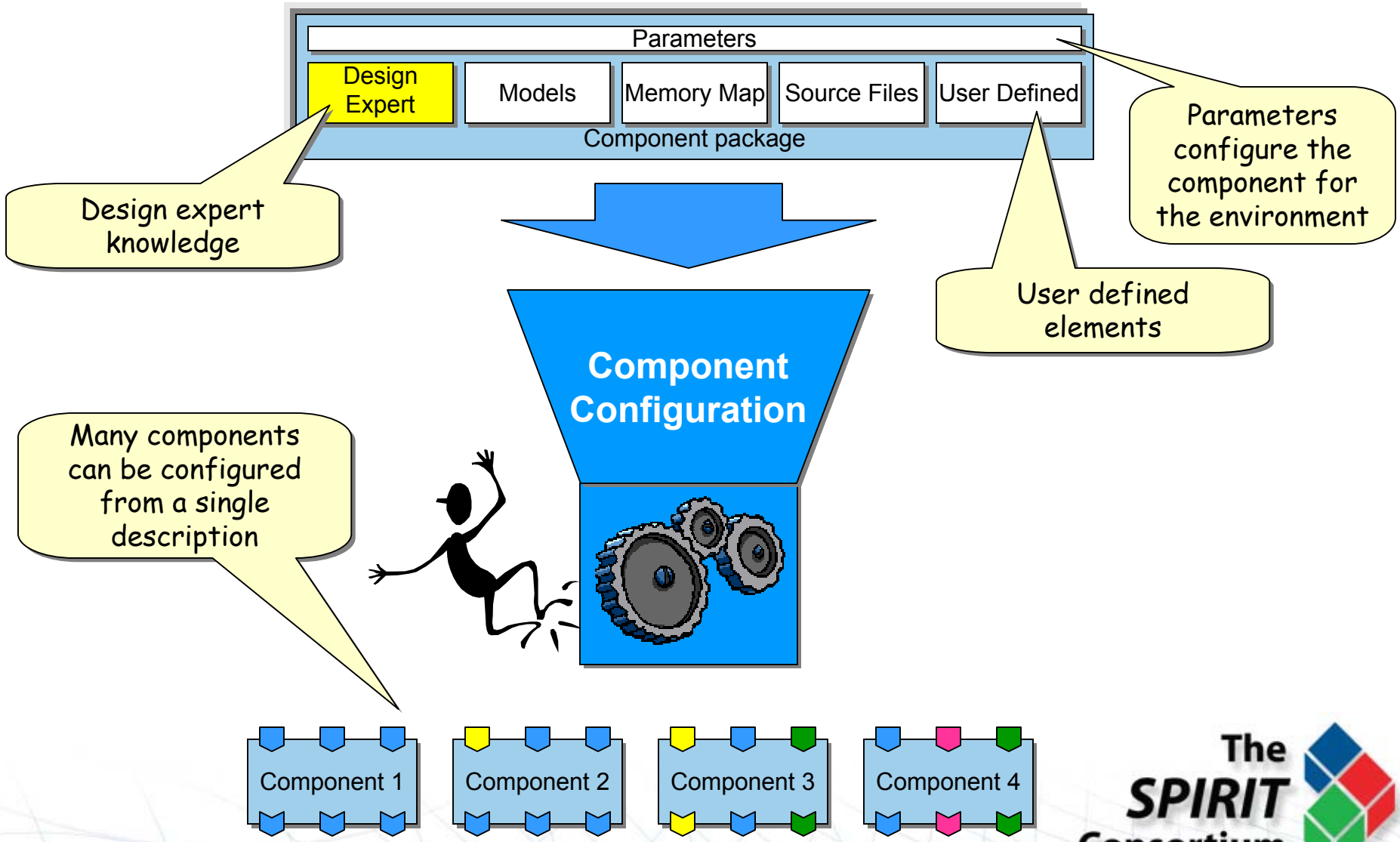
Enabling Component Configuration



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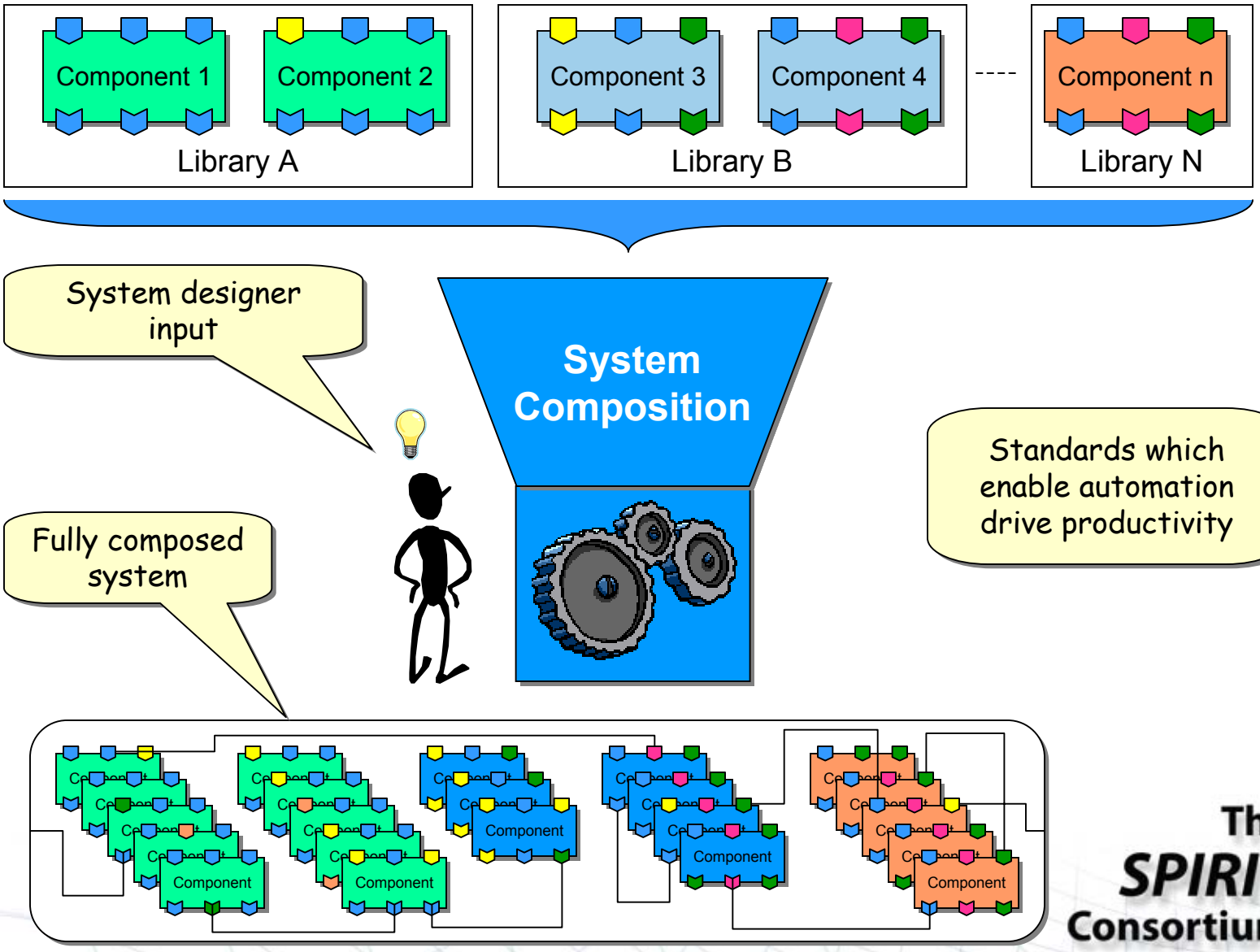
Enabling System Composition



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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

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Writing Down Information: Unambiguously!

- IP-XACT information is true regardless of design context or usage
  - Many ESL methodologies use ‘subjective’ models optimised 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 !

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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

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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

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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

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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?

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