OSCI Update and SystemC Directions

NASCUG February 2006

Pat Sheridan, Executive Director

www.systemc.org

OSCI Membership

- Corporate Members
  - ARM Ltd
  - Cadence Design Systems
  - CoWare
  - Forte Design Systems
  - Mentor Graphics
  - Philips
  - STMicroelectronics
  - Summit Design Inc
  - Synopsys
- Associate Corporate Members
  - Atrenta, Inc.
  - BlueSpec, Inc
  - Calypto Design Systems
  - Canon Inc
  - Carbon Design Systems
  - Celoxica Ltd
  - Chipvision Design Systems
  - Doulos Ltd
  - ESLX Inc.
  - Fraunhofer Institute for Integrated Circuits
  - GreenSocs Ltd
  - Intel Corporation
  - Jeda Technologies Inc
  - Prosilog SA
  - SpiraTech Ltd.
  - Synfora Inc
  - Tenison EDA Ltd

OSCI Board of Directors

- OSCI Board Members
  - ARM - John Goodenough
  - Cadence - Stuart Swan
  - CoWare - Pat Sheridan
  - Forte - Mike Meredith
  - Mentor - Mark Glasser
  - Philips - Ralph von Vignau
  - Summit - Emil Girczyc
  - STMicroelectronics - Alain Clouard
  - Synopsys - Rindert Schutten
- OSCI Officers
  - Chairman, Alain Clouard
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  - President, Mike Meredith
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  - Executive Director, Pat Sheridan
    - psheridan@CoWare.com
  - Treasurer, Stan Krolikoski
    - stank@chipvision.com
  - Secretary, Paul Tauber
    - Legal counsel

SystemC Language is IEEE 1666 !

- **Approved by IEEE on Dec. 6, 2005**
- **See IEEE and OSCI press releases Dec. 12, 2005**
- **IEEE LRM available in Q2'06 from IEEE**

- **International standardization at IEEE provides clear benefits for the SystemC community**
  - **Stability of the language**
  - **Furthers SystemC adoption**
  - **Grows community and ecosystem**

Vendor Commitment to IEEE 1666

- Actis
- Atrenta
- ARM
- Cadence
- Calypto
- Carbon
- Celoxica
- Chip Vision
- CoWare
- Doulos
- ESLX
- Forte
- Jeda
- Mentor
- Summit
- Synfora
- Synopsys
- Tensilica

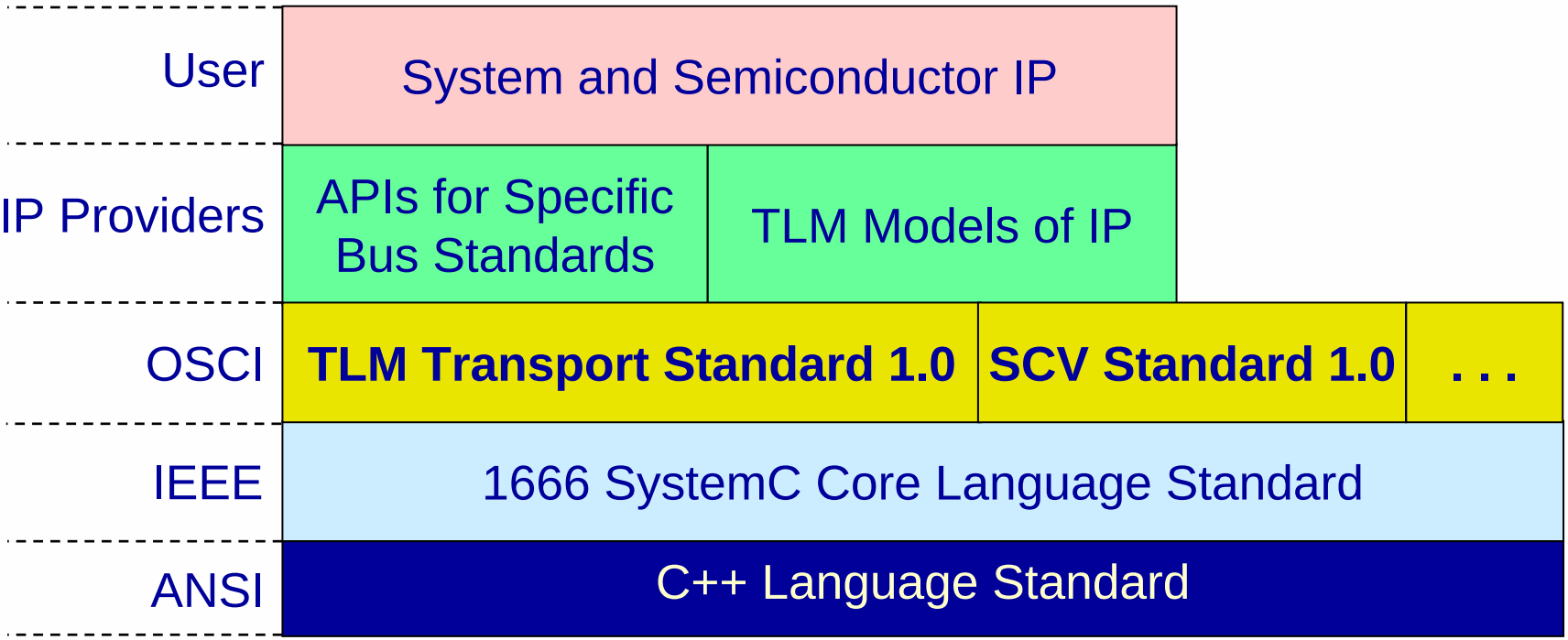
... and more !

Partial list, based on OSCI IEEE 1666 PR Quote Sheet, 12/12/05

OSCI's Continued Role...
... Your Opportunity to Participate

- **We develop consensus within the SystemC community, and work with the IEEE with respect to the SystemC language standard to enable growth**
- **We define layered standards for SystemC to**
  - **Bring existing layers forward to IEEE 1666**
  - **Enable interoperability of transaction-level IP models and tools from various sources**
  - **Extend the usage of SystemC into new areas, as driven by our members**
- **We foster and help promote a healthy ecosystem of commercial tools, IP, silicon and systems**

SystemC Layered Standards



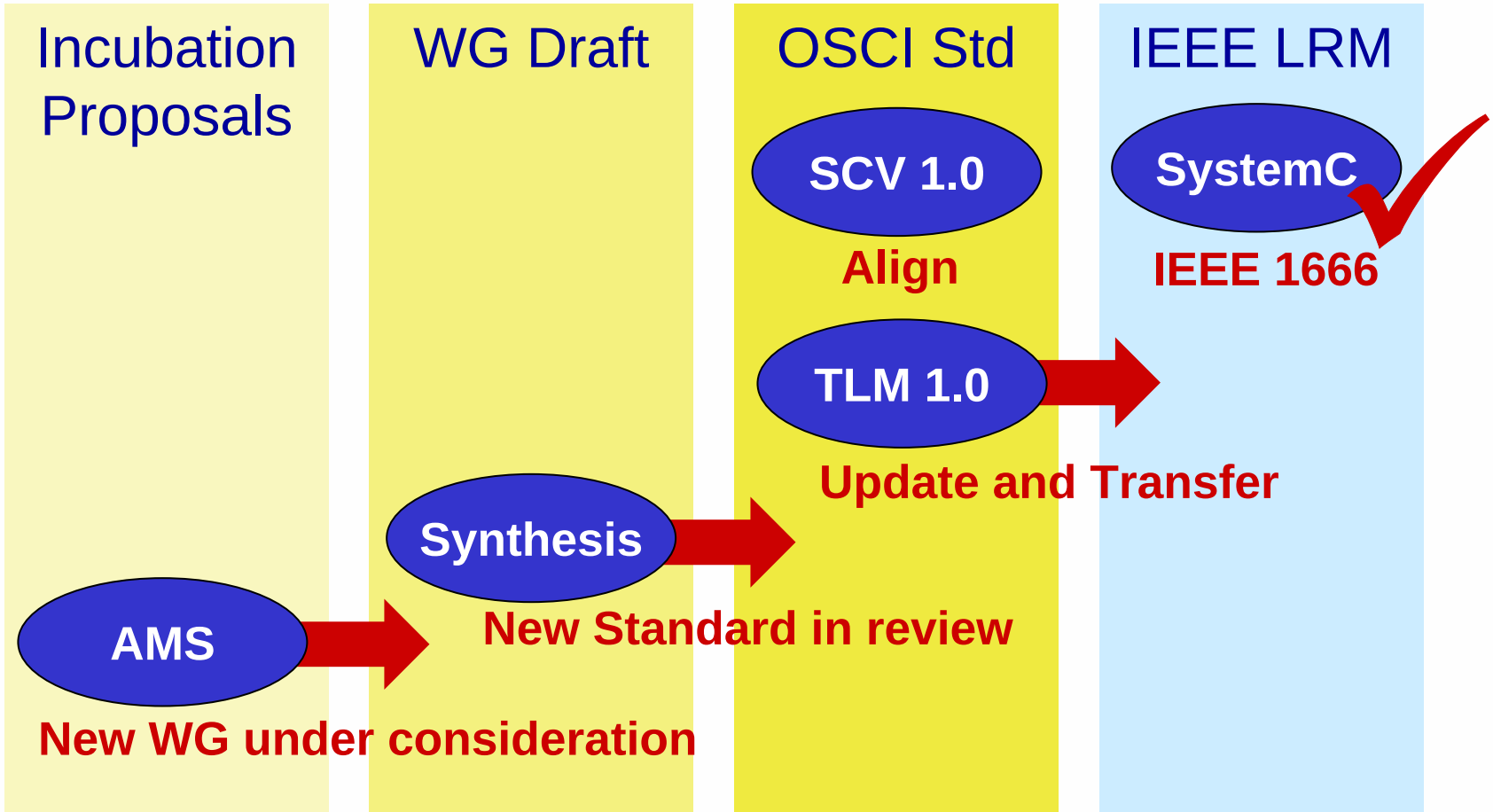
- **Where appropriate, OSCI provides open-source, proof-of-concept libraries to promote SystemC adoption**
  - **SystemC library, TLM library, SCV library…**

Key Objectives for OSCI (FY06)

- **Achieve standardization of IEEE 1666 SystemC**
  - **Consolidating usage and promoting compatible tools**
  - **Aligning layered standards to this foundation**

- **Continue SystemC adoption and further grow SystemC community**
  - **Enable and promote interoperability of SystemC models**
    - **across use models, across tools**
  - **Guide protocol & IP owners to provide TLM view of their protocol**
    - **reduce barriers to SystemC models distribution**
  - **Facilitate interoperability of SystemC and non-SystemC models**
    - **eg. C-based ISS, VHDL/Verilog RTL**
  - **Improve information on website**

OSCI Technical Agenda – FY06 Summary



Language WG Status

- Current standard is IEEE 1666
  - OSCI 2.1v1proof-of-concept library has some incompatibilities
- Library update in progress
  - Repair all known incompatibilities with IEEE 1666
  - Remove lambda expressions
    - Substantial body of code not needed to support IEEE 1666 semantics
  - 64-bit support
- LWG review begun in January

TLM WG status

- Current standard is OSCI TLM 1.0
  - OSCI has a goal to transfer TLM standard to IEEE in FY06
- Company representatives presented requirements for next TLM release, including internal existing solutions
  - Intel, CoWare, ST, Mentor, ChipVision, OCP-IP, GreenSocs, Cadence
- List of high-priority items defined
  - Should be additions to existing standard library
- Work distribution scheduled for January/February
  - Face-to-face meeting for initial code review of proposals at DATE - March, Munich

Verification WG Status

- Current standard is OSCI SCV 1.0
- Aligning SCV kit for compatibility with 2.1v1
  - Major contribution by Mentor Graphics
- Items under consideration for future SCV releases
  - IEEE 1666 compatibility
  - Coverage support
  - Simplification of existing features
    - Transaction Recording
    - Simulation Introspection
  - Temporal Assertion Support
  - Co-simulation API and debugging standard for the kernel

Synthesis WG Status

- **OSCI has a goal to produce a synthesisable subset specification standard in FY06**
- **Draft specification is being prepared for member review**

TLM WG Activity

Adam Rose, Mentor Graphics

What is TLM For ?

- Integrate HW and SW Models
- Early Platform for SW Development
- Early System Exploration
- Performance Analysis
- Verification Reuse

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Layered Standards

	User IP
Development Started Q305	**TLM Interoperability Layer**
OSCI : Summer 05 IEEE : 06	**TLM 1.0 – Common Transport Mechanism**
IEEE 1666	**SystemC Core Language**
ANSI C++	**C++**

Active OSCI TLM WG Members

- Cadence
- ChipVision
- CoWare
- ESLX
- Forte
- GreenSocs
- Intel
- Mentor
- Philips
- ST
- Tuebingen University

- Other Organisations
  - OCP is very supportive of these efforts
    - There is significant X membership between the two organisations
    - Technical Chair of OCP is an OSCI member
  - There is also significant X membership with SPIRIT

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What are we working on ?

- **IEEE standardization of TLM 1.0**
- **Standard Bus Modeling APIs**
  - **Generic PV**
  - **Generic PVT**
  - **Interrupt Modeling**
  - **Memory Map Services**
  - **Memory / Register Modeling**
- **Standard Configuration and Control APIs**
  - **Configuration Interface**
  - **Debug Interface**
  - **Analysis Interface**

How do we move transactions about ?

What transactions do we move about ?

How do we ***control*** and ***analyse*** the transactions moving through the TLM ?

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Timescales

- **We cannot commit publicly to any timescales at the moment**
- **We have already received significant contributions from members**
  - **More are on the way**
  - **Join OSCI and make your contribution**
- **Currently, this is the most active WG in OSCI**
  - **Watch this space !**

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Synthesis WG Status

Andres Takach (Acting Chair SWG)

Chief Scientist, C-Based Design
Mentor Graphics

Feb 22 2006

Synthesizable Subset Draft Document

- **Latest Version: Draft 1.1.21**
- **Defines Synthesizable Subset**
  - **C++ Base**
    - **ISO/IEC 14882: Programming languages - C++, 1998**
    - **ISO/IEC 9899: Programming languages – C, 1999**
  - **Bit-Accurate Data Types provided by SystemC dt:**
    - **Integer types: sc_(u)int, sc_big(u)int**
    - **Fixed-Point types: sc_(u)fixed**
    - **Logic: sc_bv, sc_lv, sc_logic**
  - **SystemC core:**
    - **Modules, events, signals, wait, ports, SC_CTHREAD**
    - **Supported reset styles for behavioral level**

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C++ Base

- C++ built-in data types: all integer types, bool, enumerations. Floating types excluded
- classes, structs, bit-fields, arrays. Excluded: union
- mem allocation (new/delete) not supported
- pointers: statically determinable
- all control flow: for/while, break, continue, if-then-else, case, return, goto
- full support for templates, namespaces
- exception handling not supported

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Next Steps

- Current Draft is an important milestone: need public review
  - Release for public review has been delayed by issues in the collection of OSCI contribution agreements from contributing members:
    - Several agreements were signed early, but did not refer to precise draft number
    - When issue was caught by OSCI legal, some members had left the SWG and the employer who had signed the agreement
    - Need to renew effort to get all the agreements signed
- Update draft based on SystemC 2.1
- More work on defining levels of abstractions: currently some references to RTL and Behavioral level

SWG Updates

- Several active members have left SWG. We thank them for their service
  - Masamichi Kawarabayashi (Kaba) from NEC: Chair (~2.5 years)
    - Andres Takach (Mentor) vice-chair serving as acting chair
  - Minoru Tomobe (NEC): active member (~3 years)
    - Katsuharu Suzuki (NEC) taking his place
  - Yutaka Tamiya (Fujitsu): active member (~3 years)
  - Erik Grimpe (Offis): active member (~2 years)
- Several new members have recently joined

THANK YOU