



Si2-GSA Workshop on Requirements for 3D Design Flow Interoperability Standards

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Interoperability – Standards – Collaborative Technology

Innovation Through Collaboration





About Si2



- **Si2 Mission**
 - Improve *interoperability* and *integration* across silicon design flows (Includes integration with manufacturing)
- **Membership**
 - 95 corporate members (37% user, 16% system, 47% EDA)
- **Philosophy**
 - Collaborative approach to delivering customer-centric, business focused solutions leveraging strong supplier partnerships
- **Projects**
 - OpenAccess: Open, industry-standard API & Reference Implementation with significant collateral for rapid adoption
 - Open Modeling: Standard interfaces to support characterization and modeling for analysis tools and DFM
 - DFM: Standard interfaces between design and manufacturing to support DFM
 - Low Power: Flow-based standards (incl. CPF) to support low-power design flows
 - **3D Design: Natural next step, design flow-based standards, based on customer/member request**



A Few Statistics (11/10/2009)...



• LEF/DEF Specification Downloads	10,680
• OpenAccess Coalition Downloads	
– OpenAccess Releases	23,100
– OA Tutorial	4780
• Low-Power Coalition Downloads	
– CPF Tutorials (since 11/07)	20,390
– CPF Pocket Guide (since 9/07)	6,750
– CPF Specifications (1.0, 1.1)	2,930
– LPC Glossary (since 1/08)	4,270
• Open Modeling Coalition:	
– ECSM Specifications	1,850
– FreePDK45 / Nangate Generic Library	595
• Si2 Account Totals:	
– Total Active Users	6,525
– Active Member Company Users	2,174
– Active Individual / Academic Member Users	323
– Guest Company Users	703
– Visitor Users	3,325



- Established in 1994 as FSA (Fabless Semiconductor Association)
- 40 founding members, now almost 500 member companies in 25 countries and across all industry segments
- Key elements of GSA's mission:
 - Foster a more effective semiconductor eco-system
 - Accelerate industry growth and increase ROI
 - Encourage and support entrepreneurship

GSA Board

Technology Committee

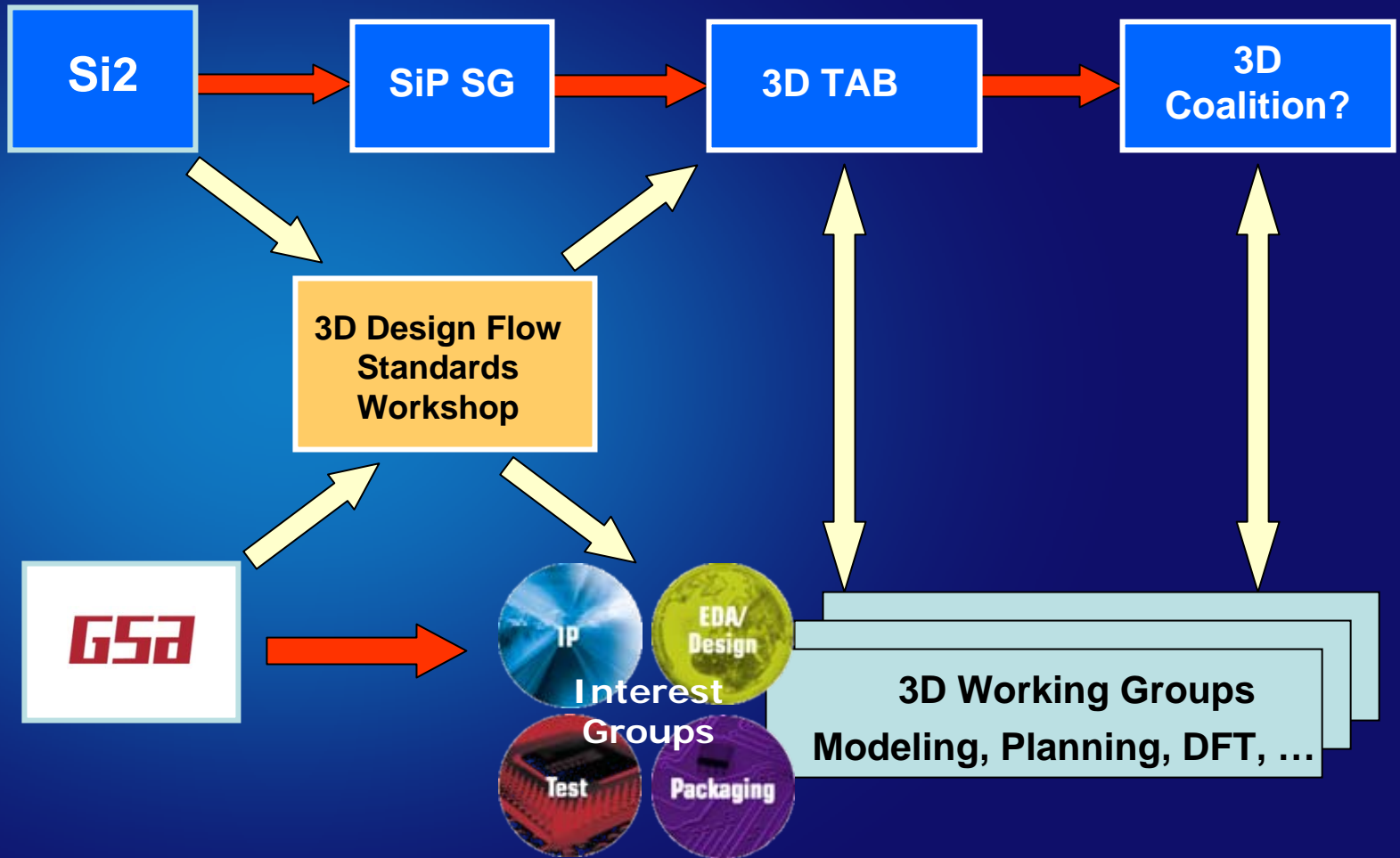
Interest Groups

Interest Groups





Cooperative Operational Model





3D Design Flow Standards Workshop Goals



- Accelerate adoption of 3D/TSV technology by establishing **interoperability standards** for design, modeling, and manufacturability
- Specific focus on following topics:
 - Define key interfaces in design flows where standards will facilitate 3D design and manufacturing
 - Enlist participating standards organizations and EDA vendor & user companies
 - Enlist likely early adopters among the IC design and manufacturing companies
 - Identify areas that do not require our attention, i.e., standards exist or others are working on them
 - Engage academics already pursuing 3D R&D efforts, with interested industry players for very specific projects



3D Design Flow Standards Workshop Demographics



- **Workshop held 10/01/2009**
- **> 35 organizations/companies, ~50 attendees present**
- **Representation from all stakeholders:**
 - Major IDM's, foundries and fabless semiconductor companies
 - EDA and IP companies
 - Other standards organizations
 - Academia and other research institutions



3D Design Flow Standards Workshop Agenda



- 09:00am - 09:20am: Introductory remarks from Si2 & GSA
- 09:20am - 12:00pm: Presentations by invited speakers
Order of presentations:
 1. IMEC, SPIRIT, SEMI
 2. IBM, Qualcomm, ST, SUN, Xilinx
 3. NC State, PRC – Ga.Tech.
 4. Atrenta, Cadence, Gradient, Magma, Mentor, R3 Logic, Synopsys
- 12:00pm – 01:00pm: Working lunch (cover spillover from above)
- 01:00pm – 03:00pm: Discussion/consolidation of standards recommendations
- 03:00pm – 04:00pm: Alignment, prioritization of requirements, follow-up AI's
Concluding remarks

Note: All presentations available from Si2 (www.si2.org) and GSA (www.gsaglobal.org/eda/index_wg.aspx)



- **Focus areas from 3D Design Flow Standards Workshop**
 - Dictionary of common terms
 - TSV modeling for all required views and design steps
 - Infrastructure update, including API's, databases, input/output formats
 - New standard interfaces to link to thermal/mechanical stress engines
 - New standard for expressing thermal constraints
 - Interface standards to represent both homogeneous and heterogeneous 3D chips to package design systems
 - Extend existing standards, e.g., JTAG, STIL, etc., for DFT, ATPG and test



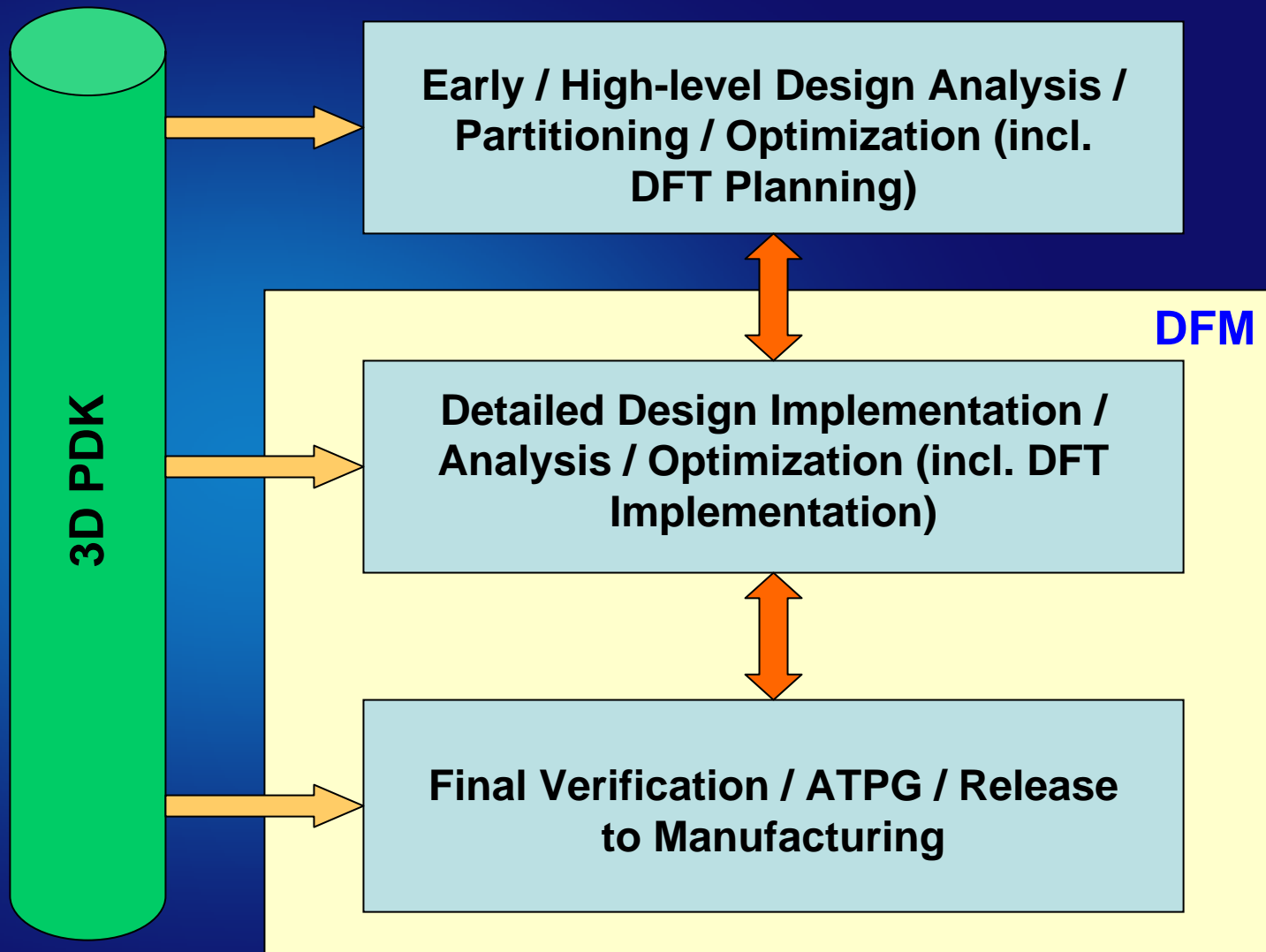
Open 3D TAB: Dev. Process



- **Start multiple working groups at both Si2 and GSA to address items in priority order**
- **Coordinate also with other standards bodies to:**
 - **Minimize overlap and duplication**
 - **Ensure necessary areas are covered**
- **Address “low-hanging fruit” from overall design flow PoV to get stakeholders to move forward**
- **Move to next steps to provide advanced features, as required by stakeholders**



3D 3-Box Model





- **3Q2009 Highlights**

- BoD approved TAB in 07/2009 for 12 month operation
- Workshop held 10/01/2009
 - ◆ Included all stakeholders: ~50 attendees, >35 companies/organizations
 - ◆ 17 presentations (now available on Si2 and GSA web-sites), excellent discussions, many opportunities unearthed

- **4Q2009 – 1Q2010 Proposed/Planned Actions**

- Document action items, define prioritized list of opportunities
- Start first projects to evaluate stakeholder buy-in
- Drive membership growth for interoperability standards development
- Evaluate potential for Open 3D Coalition in 2010