

SystemC Users Group Survey Data Trends Report, April 2007



I. Introduction

The SystemC community is a growing and vibrant community. Today there are SystemC users groups world-wide in North America, Europe, Japan, and India that meet regularly in conjunction with industry conferences and regional events. In September of 2007, SystemC users in Brazil are forming another new group for Latin America.

In conjunction with these regional groups, OSCI has been sponsoring SystemC user group meetings and collecting feedback from users at the major EDA conferences (DAC, DVCon, DATE, and EDSF) since 2002.

The user groups are always well attended, relative to the host conference or event. The table below provides a summary of SystemC User Group meeting attendance. As can be seen from the table we the SystemC Users Group meeting attendance has grown from 488 in 2002 to a consistent 750+ annual attendance rate. 2007 promises to be even higher with DATE and DAC figures to be added to the total as well as additional users group meetings in Europe, India, and South America.

User Group Attendance	2002	2003	2004	2005	2006	2007
Asia						
JSCUF (EDSF Japan)	--	414	320	351	134	132
ISUG (ESLD India)	--	--	--	--	--	75
Americas						
NASCUG (DAC)	307	348	303	278	222	--
NASCUG (DVCon)	--	--	48	--	141	145
NASCUG (GSPX)	--	--	72	--	--	--
LASCUG (Sept/07)	--	--	--	--	--	--
Europe						
ESCUG (DATE)	120	166	117	159	214	--
ESCUG (FDL)	61	59	49	45	50	--
User Group Attendance	2002	2003	2004	2005	2006	2007
Worldwide since 2002	488	987	861	833	761	352

II. Survey Methodology

This report summarizes survey data and trends from survey responses at various SystemC User Group events worldwide. Not all attendees completed surveys. Survey questions are similar, but may vary slightly between the different user groups. This means exact comparisons are not always possible

apples-to-apples and estimates are made by OSCI to help correlate responses.

There is some very interesting data contained in these surveys. An example survey is included at the end of this report, as background information.

This report highlights survey trends in 4 major areas:

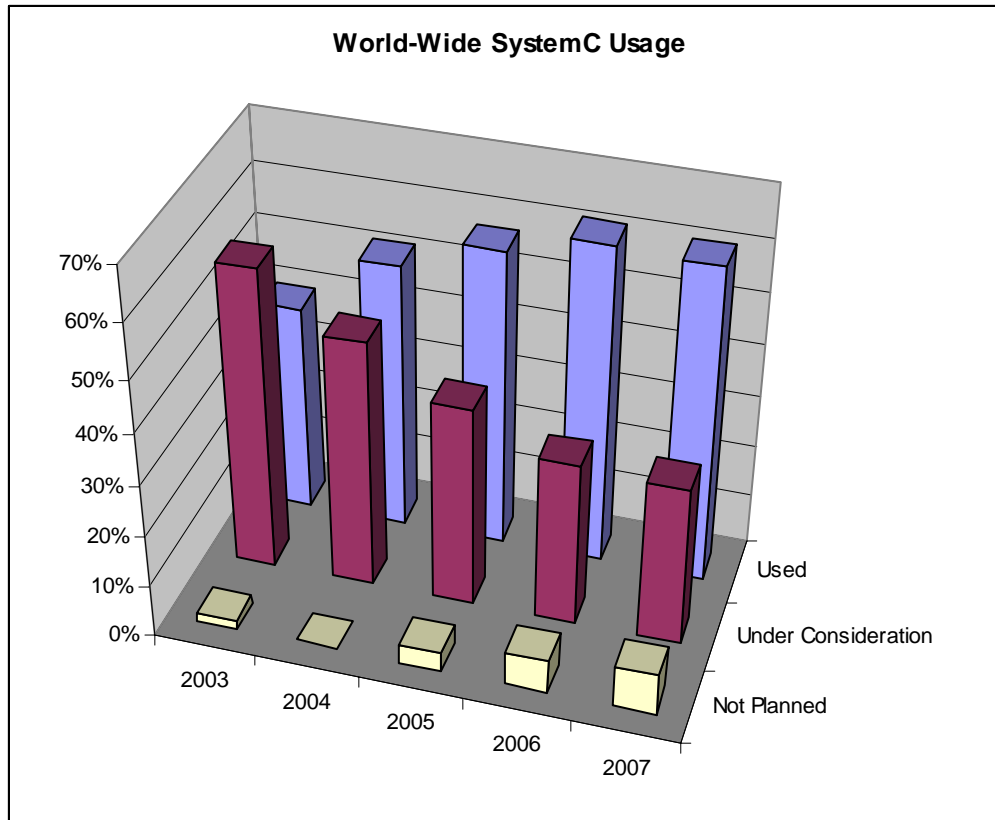
- Growth trends in SystemC Use
- Growth trends in SystemC Project Experience
- Trends in SystemC TLM Use Models, in terms of mix
- Trends in End Product Market Segment, in terms of mix

Survey results for 2007 include the 3 events to date: the EDSF 2007 Japan SystemC User Forum and the inaugural India SystemC User Group meeting at the ESLD 2007 Conference in Bangalore, both in January, and the North America SystemC User Group meeting and OSCI TLM Workshop held at DVCon 2007 in February

III. Trend: SystemC Use

As can be seen from the data below, the percentage of SystemC users is growing among respondents to the surveys. SystemC usage rate climbed from 40.2% to 60.9%.

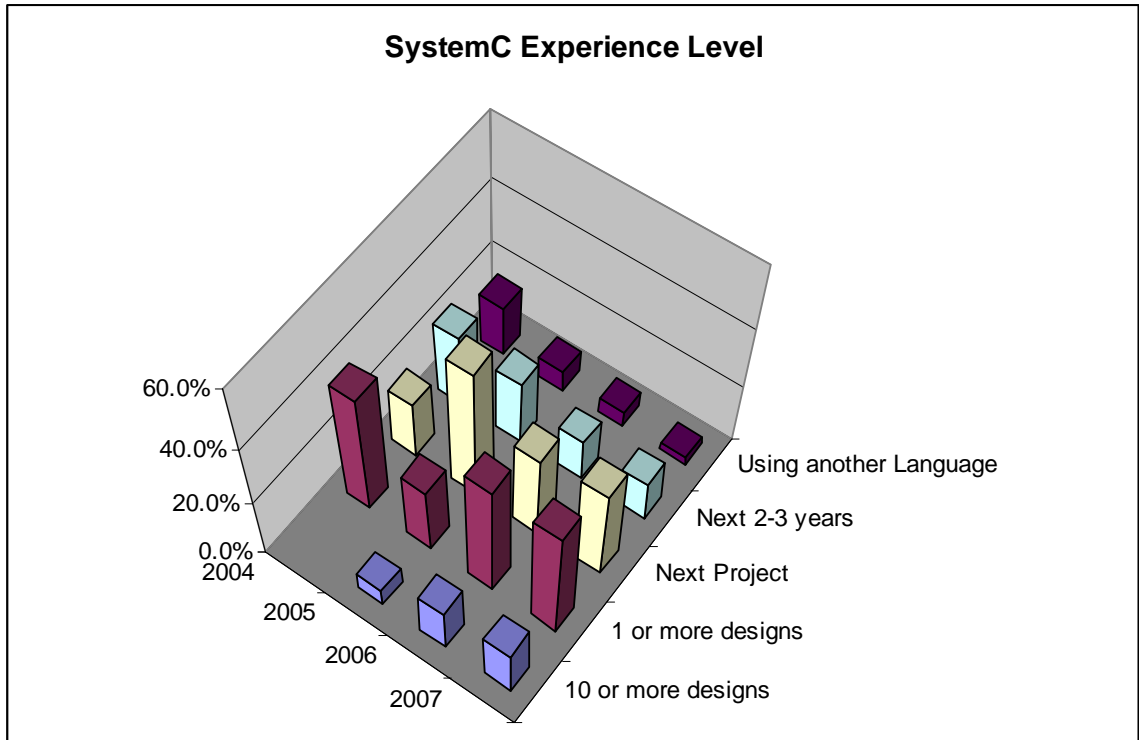
World-Wide SystemC Usage					
	2003	2004	2005	2006	2007
Used	40.2%	51.7%	57.5%	61.6%	60.9%
Under Consideration	58.3%	47.9%	38.8%	31.8%	31.1%
Not Planned	1.5%	0.3%	3.7%	6.6%	8.1%



IV. Trend: SystemC Project Experience

At an early SystemC Users Group in 2002 only 16% of the attendees using SystemC had actual project experience in their company. We began measuring the attendee SystemC project experience in 2004. At that time, 40.4% of the attendee's company had performed 1 or more design projects using SystemC. Today, we are pleased to find that project experience keeps growing, with over 15% having experience with 10 or more designs and over 53% having performed 1 or more projects. This confirms that most user group attendees are very experienced with SystemC. This engaged user community continues to provide experienced feedback that significantly influences the future direction of SystemC.

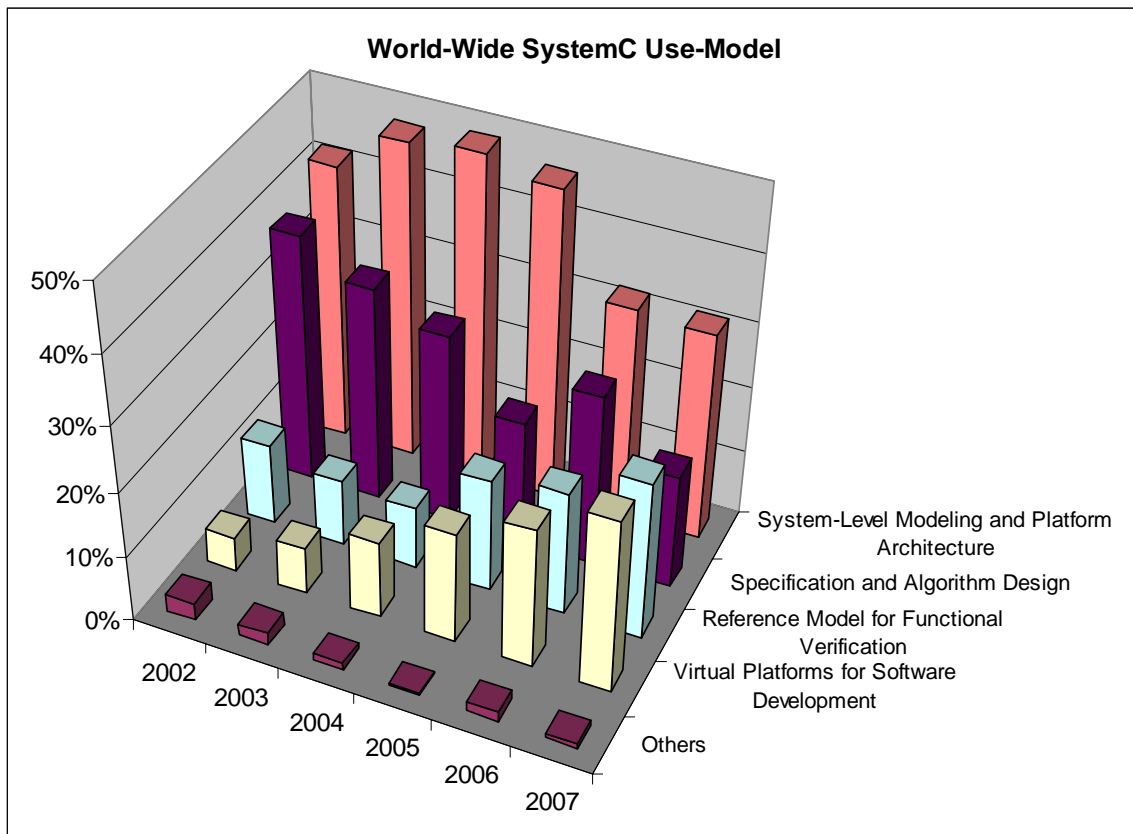
World-wide SystemC Project Experience	2004	2005	2006	2007
10 or more designs	--	6.0%	14.4%	15.8%
1 or more designs	40.4%	22.1%	38.3%	37.7%
Next Project	18.9%	43.9%	28.2%	30.7%
Next 2-3 years	23.8%	21.2%	14.0%	13.2%
Using another Language	16.8%	6.8%	5.1%	2.6%



V. Trend: SystemC Use Model, in terms of Mix

What is also interesting is applications areas for SystemC. There is a growing trend to use SystemC and TLM as a virtual platform for software development. We also see growing use of SystemC and TLM being used as the “golden model” for verification and testbench development. Specification and Algorithm Design and System Modeling and Platform Architecture remain a steady part of the mix, although the proportion of the total has changed.

World-Wide SystemC TLM Use-Model						
	2002	2003	2004	2005	2006	2007
Virtual Platforms for Software Development	5.3%	7.2%	11.8%	16.9%	21.2%	26.3%
Specification and Algorithm Design	37.7%	32.8%	28.8%	18.8%	26.1%	17.4%
System-Level Modeling and Platform Architecture	41.9%	47.9%	49.0%	46.7%	32.3%	31.7%
Reference Model for Functional Verification	12.4%	10.2%	9.4%	17.3%	18.9%	23.9%
Others	2.7%	1.8%	1.0%	0.3%	1.5%	0.8%



VI. Transaction-Level Modeling (TLM)

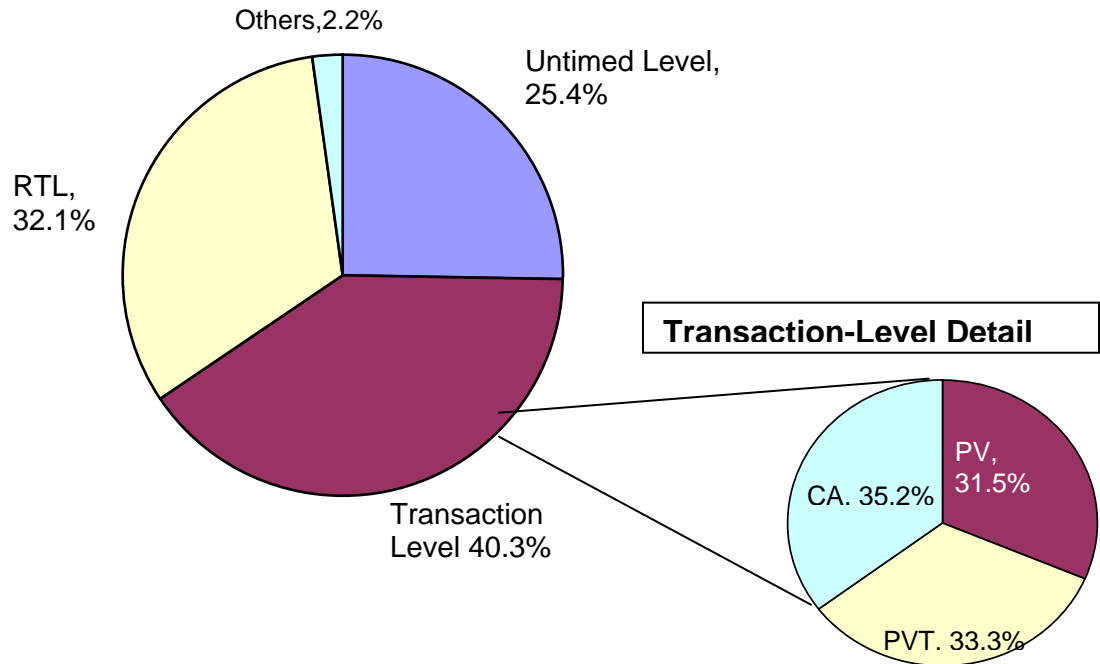
It is clear from the 2007 JSCUG survey that SystemC is predominately used in Japan at the transaction level and higher. We have reason to believe that this is true world-wide and will begin collecting TLM statistics on future surveys.

There are a couple of reasons for this. When we examine where SystemC is being used by these respondents, we see that over 62.9% of the usage is for system design and software development. This is where TLM is the most useful and natural. Where SystemC at the transaction-level offers a significant performance advantage over RTL simulators, as the design abstraction becomes more detailed and closer to cycle-level, highly tuned RTL simulators offer a performance advantage over SystemC.

Untimed Algorithmic Level	25.4%
Transaction Level (Detail in below)	40.3%
RTL	32.1%
Others	2.2%

Transaction Level Detail	
PV	31.5%
PVT	33.3%
CA (Cycle Accurate)	35.2%

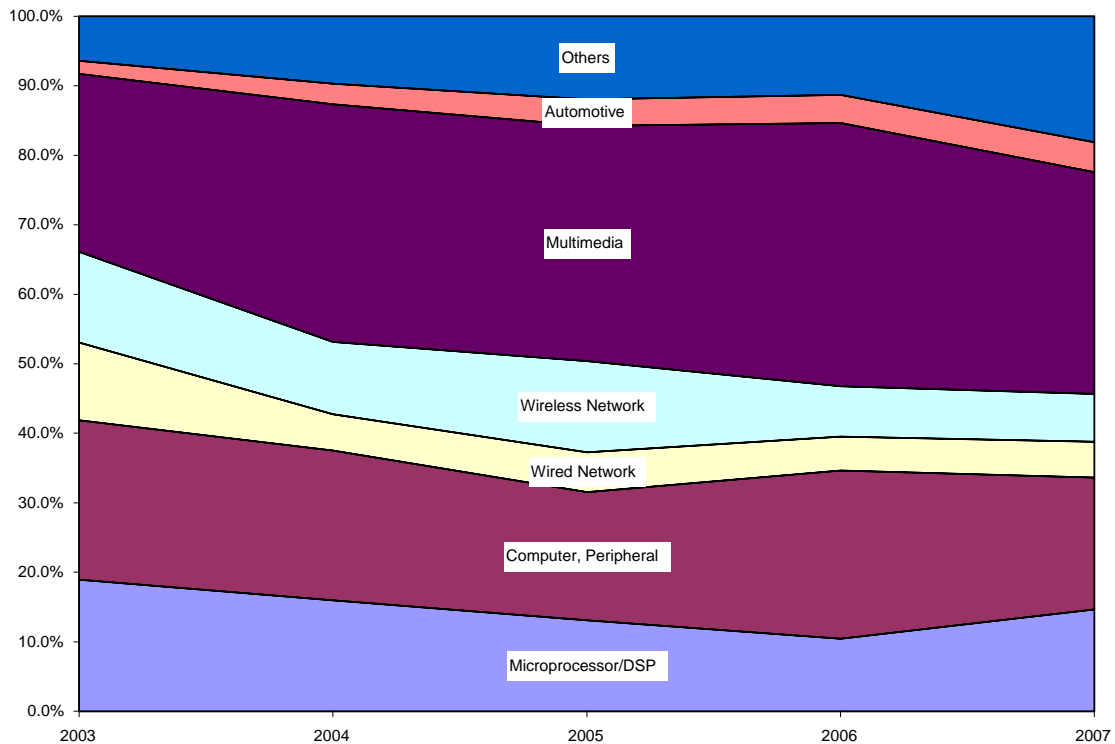
2007 JSCUG SystemC Abstraction Level



VII. Trend: End Product Market Segments, in terms of mix

What is interesting is where SystemC is being used. From the Japan SystemC User Forum (JSCUF) we see that SystemC is used across a broad spectrum of market segments.

End Product Markets	2003	2004	2005	2006	2007
Microprocessor/DSP	18.9%	16.0%	13.1%	10.5%	14.7%
Computer, Peripheral	22.9%	21.6%	18.5%	24.2%	19.0%
Wired Network	11.2%	5.2%	5.8%	4.8%	5.2%
Wireless Network	13.1%	10.4%	13.1%	7.3%	6.9%
Multimedia	25.6%	34.2%	33.8%	37.9%	31.9%
Automotive	1.9%	3.0%	3.8%	4.0%	4.3%
Others	6.4%	9.7%	11.9%	11.3%	18.1%



VIII. Conclusion

It is difficult to draw exact comparisons between regions do to the use of different survey questions across the regions and the years. Moving forward, we will endeavor to ask standard questions of all the SystemC users.

What we do see is that SystemC is being used in the design of a diverse range of end products and is useful for a number of different design and verification activities.

We are also seeing a strong demand for transaction-level modeling (TLM).

The growth of the world-wide SystemC users groups is a sign of a very robust SystemC community. This active community, which is characterized more as users than EDA vendors, is driving SystemC to meet the needs of the user. This user-driven community is supported by a growing EDA ecosystem.

Example Survey

Full Name: _____
Title: _____
Company: _____
Address: _____
City: _____ State/Prov: _____
ZIP/Postal Code: _____ Country: _____
Email: _____ Phone: _____

1. Describe your company's business focus:

- Systems Semiconductors IP Provider EDA
 Embedded Systems Press
 Other: _____

2. What is your design focus? (✓ all that apply)

- System Design Hardware Design Software Design
 Functional Verification Algorithm Design Engineering Mgmt.
 Other: _____

3. Primary languages used in my design environment. Check all that apply.

- C++ Verilog SystemVerilog VHDL SystemC ANSI C
 Vera "e" PSL SVA
 Other: _____

4. What is your familiarity with SystemC?

- Power User Use Everyday Beginner None

5. What are your organization's plans for SystemC?

- Current user Have plans to adopt No plans to adopt at this time

6. We currently/plan to apply SystemC in the following areas?

(✓ all that apply)

- Algorithm design
 System Modeling (HW/SW partitioning, mem/bus architectures)
 Early software development for internal users
 Early software development for customers
 Reference Model for Functional Verification of IC's
 Behavioral/Algorithmic Synthesis
 Testbench development
 Other: Describe: _____

7. How do you rate SystemC for the following uses? 1-4, 1 being best, 4 being poorest)

- ___ Virtual platform development for software/driver development
 ___ Inside my company
 ___ External use
___ Abstract modeling of algorithms
___ For design specification, HW/SW partitioning, & system architecture
___ For design verification
___ To create a golden model of the system functionality
___ To share models inside & outside of my company
___ Testbench development
___ Other: Describe: _____

8. Please check all that apply:

- My company completed 10 or more designs where we used SystemC
- My company completed 1 or more designs where we used SystemC
- I will be using SystemC in my next project
- I will begin using SystemC within the next 2-3 years
- I am not using ESL languages
- I am using another language for ESL; please specify: _____
- Until today I was unfamiliar with SystemC

9. What is the primary level of abstraction that you use to develop your SystemC models?

Transaction Level

- PV (Programmer's View)
- PVT (Programmer's View with Timing)
- CA (Cycle Accurate)
- RTL

10. What does SystemC need most? Check all that apply:

- ___ Automatic path to implementation
- ___ Faster Simulation
- ___ More commercial IP models
- ___ More EDA tools
- ___ Better Debug/Analysis
- ___ Automated HW/SW partitioning
- ___ Other: _____

11. Please let us know your thoughts about today's panel:

- Excellent Good Average Poor

Comments: _____
