

Verification Academy

Navigating the Perfect Storm

Trends in Functional Verification

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2014 Wilson Research Group Study

- 2014 Double blind functional verification study
- Worldwide study conducted in four phases
 - North America, Europe, Japan, Rest of World
- Sample frame consisted of 1886 participants
 - 3.3x larger than our 2012 study
 - 9.4x larger than the 2004 Collett study
- Confidence interval 95%
 - $\pm 2.19\%$ Margin of Error



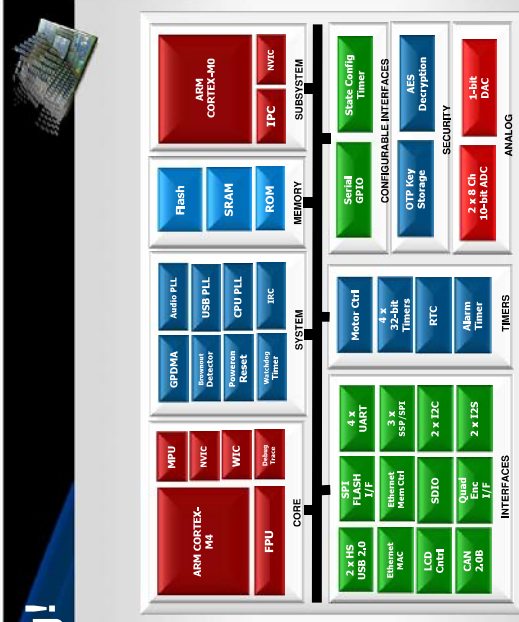
The perfect storm is brewing



Perfect storm—an expression that describes an event where a combination of circumstances will aggravate a situation drastically.

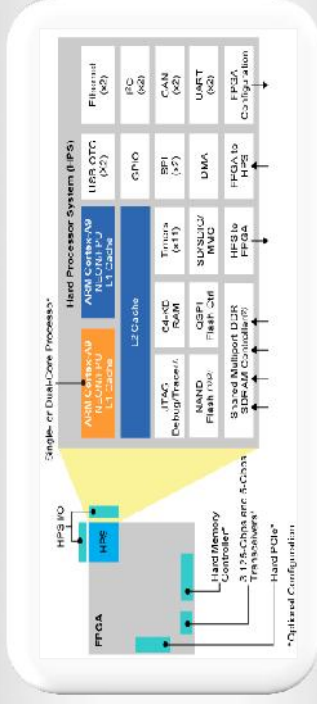
SoC Changed Everything!

- **Target Market**
 - Embedded Processing
- **Design Trends**
 - Multiple Embedded Cores
 - Re-use of IP Blocks
 - Distributed design teams



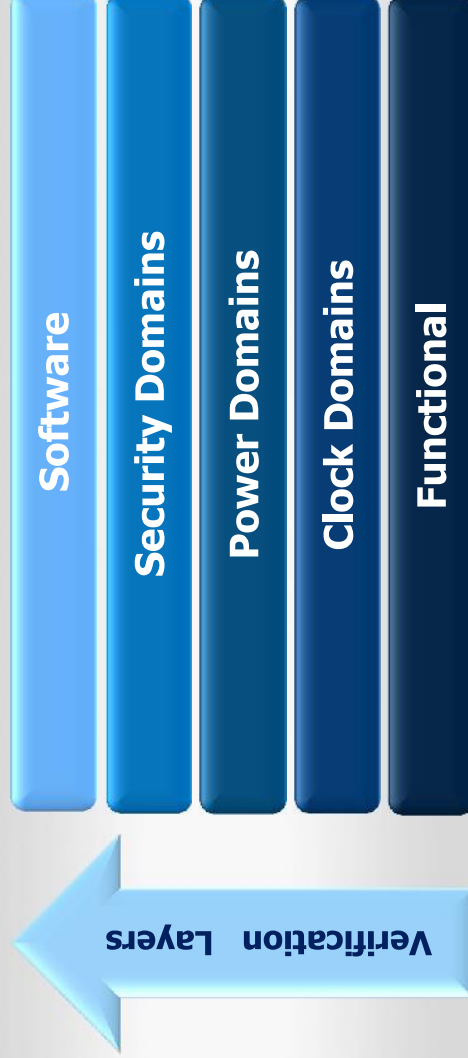
Today's FPGAs are SoC

- **Target Market**
 - FPGA Applications
- **Design Trends**
 - Same as SoC...



Yet, increased functionality is only part of the verification challenge!

The Emergence of New Layers of Verification

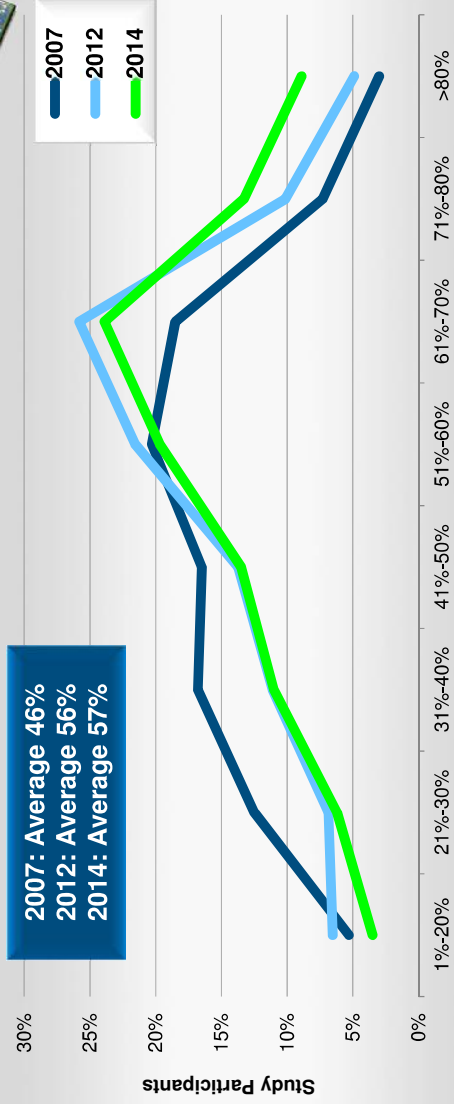


What's the Impact with today's Rising Complexity?

All these verification layers are converging to form the perfect storm.

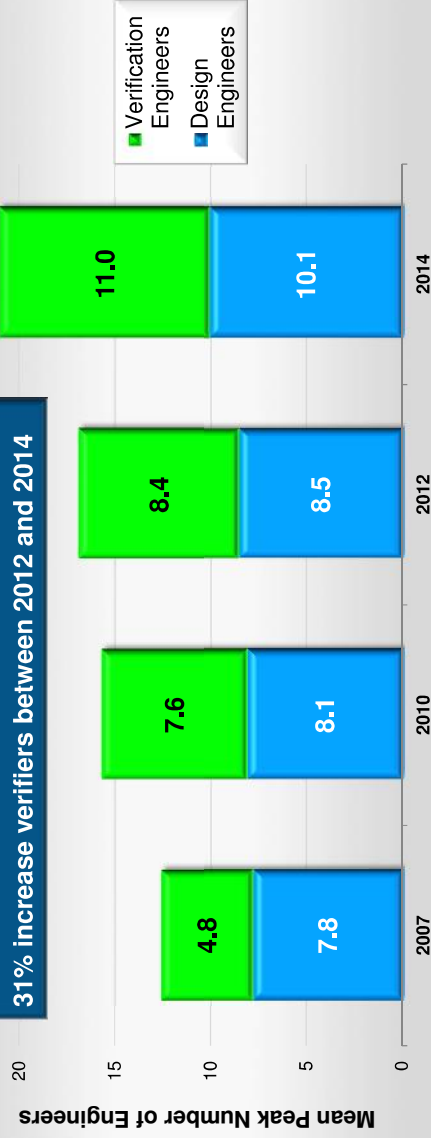


Verification Consumes Majority of Project Time



Mean Peak Number Engineers Increasing

16% increase designers between 2012 and 2014
31% increase verifiers between 2012 and 2014

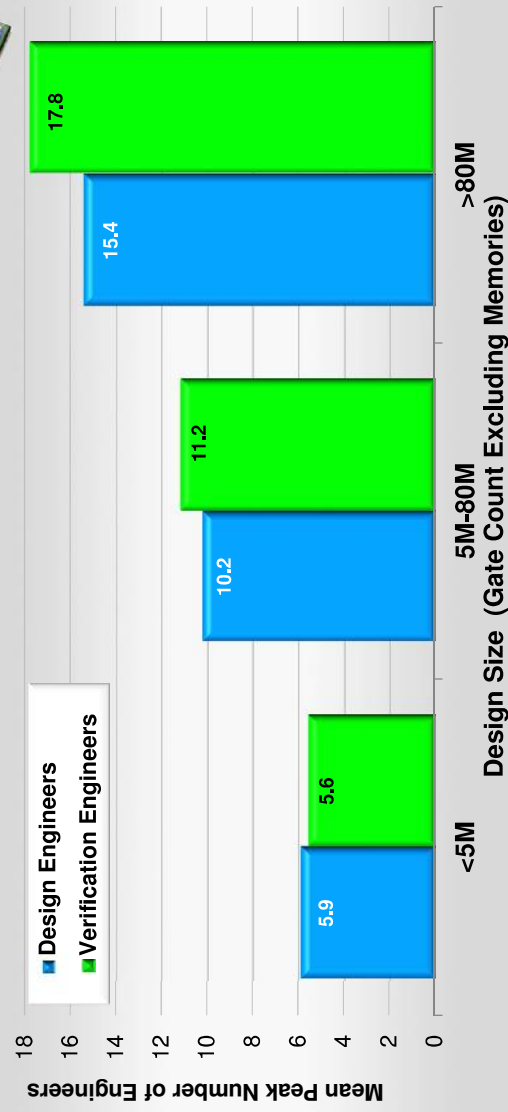


Source: Wilson Research Group and Mentor Graphics, 2014 Functional Verification Study

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2014 Mean Peak Engineers by Design Size

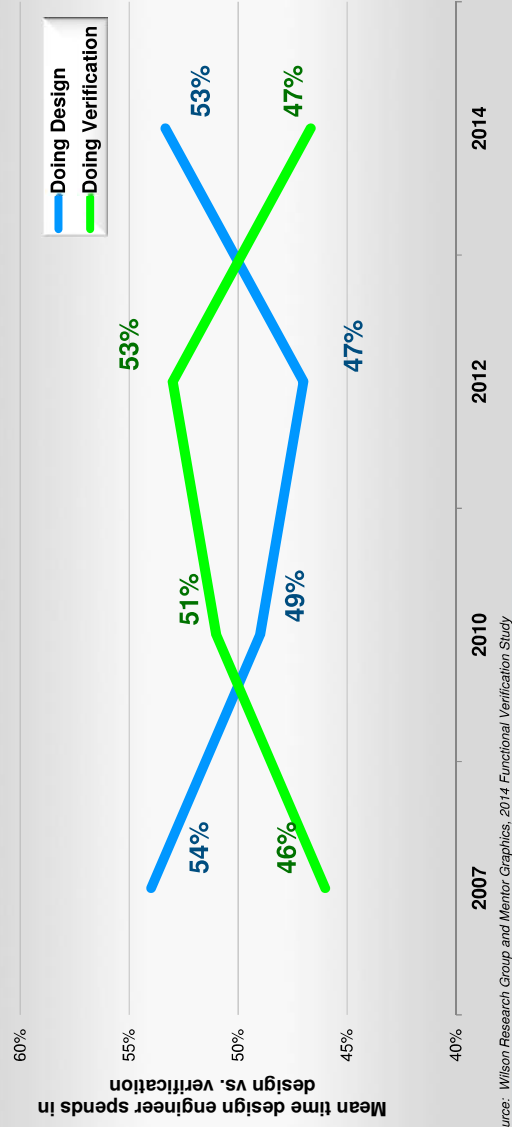


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Where Designers Spend Their Time

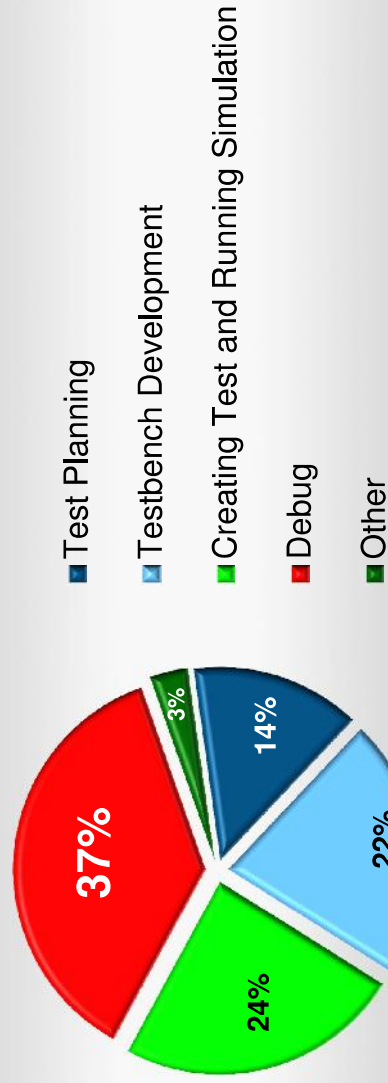


Source: Wilson Research Group and Mentor Graphics, 2014 Functional Verification Study

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2014 Where Verification Engineers Spend Their Time

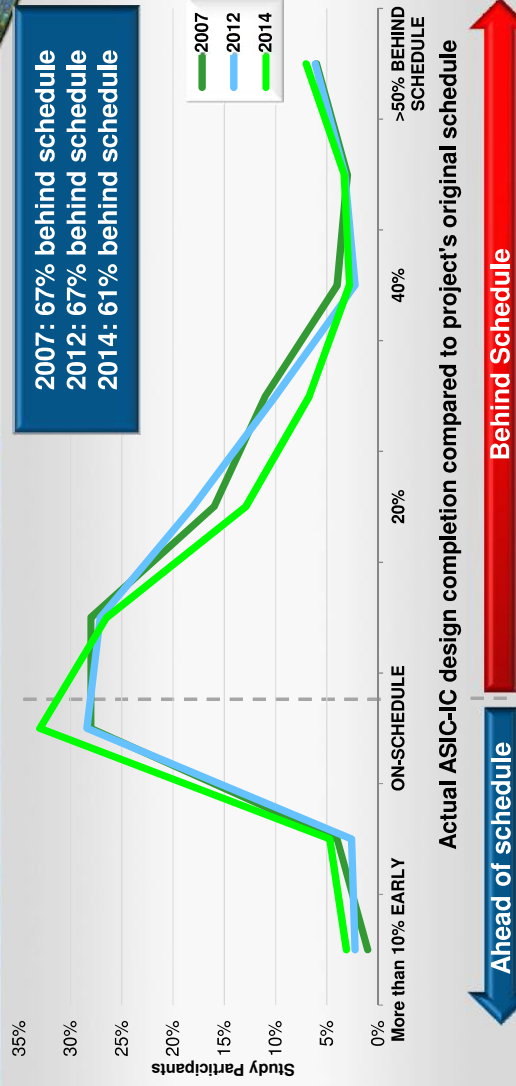


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Many Projects Miss Schedule

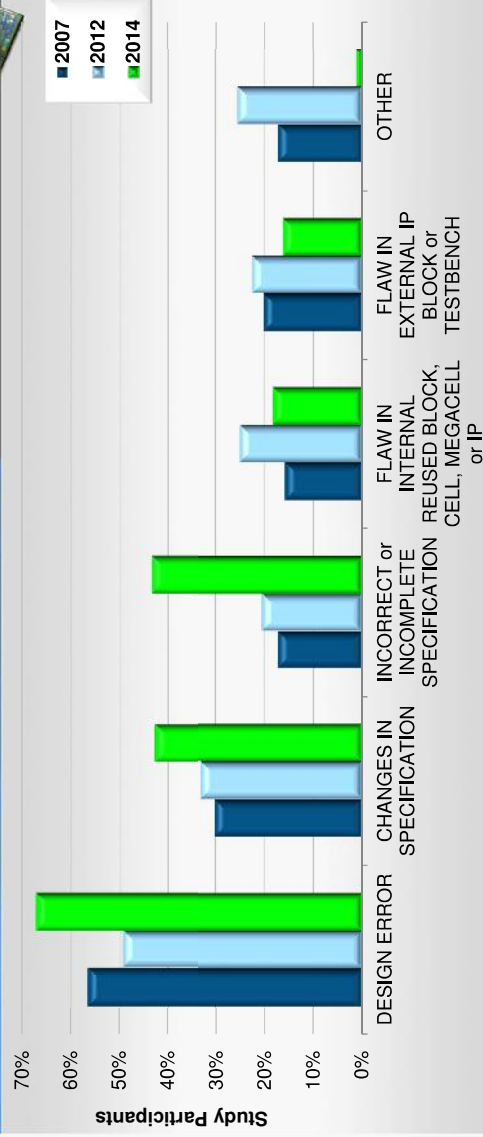


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Root Cause of Functional Flaws

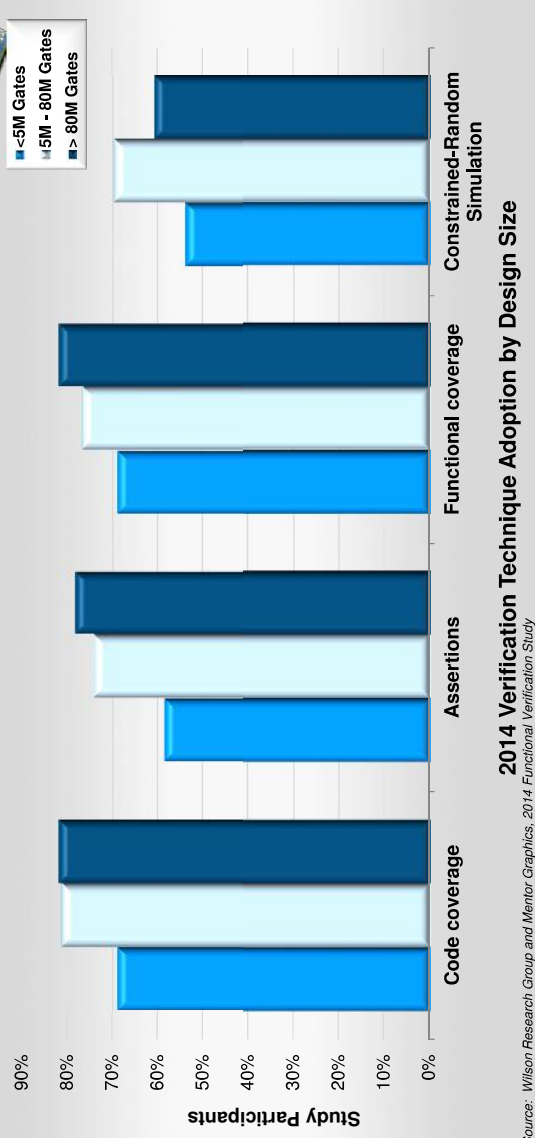


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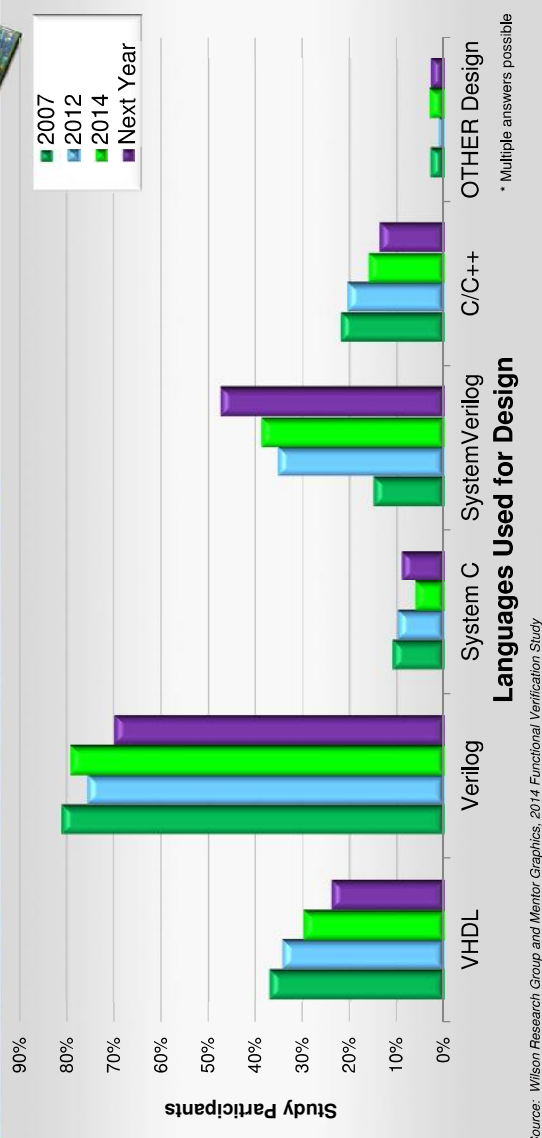
Verification Technique Adoption by Design Size



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29

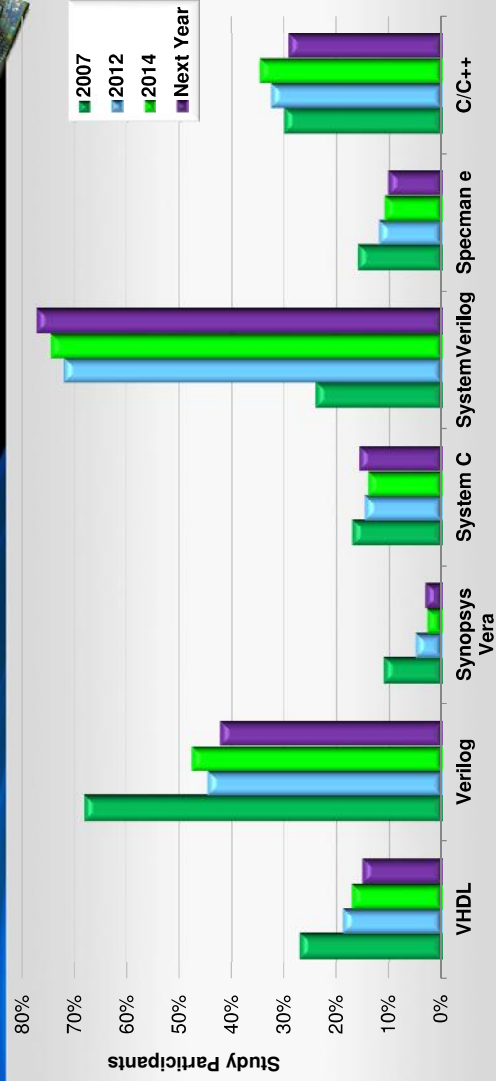
Design Language Adoption Trends



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31

Verification Language Adoption Trends

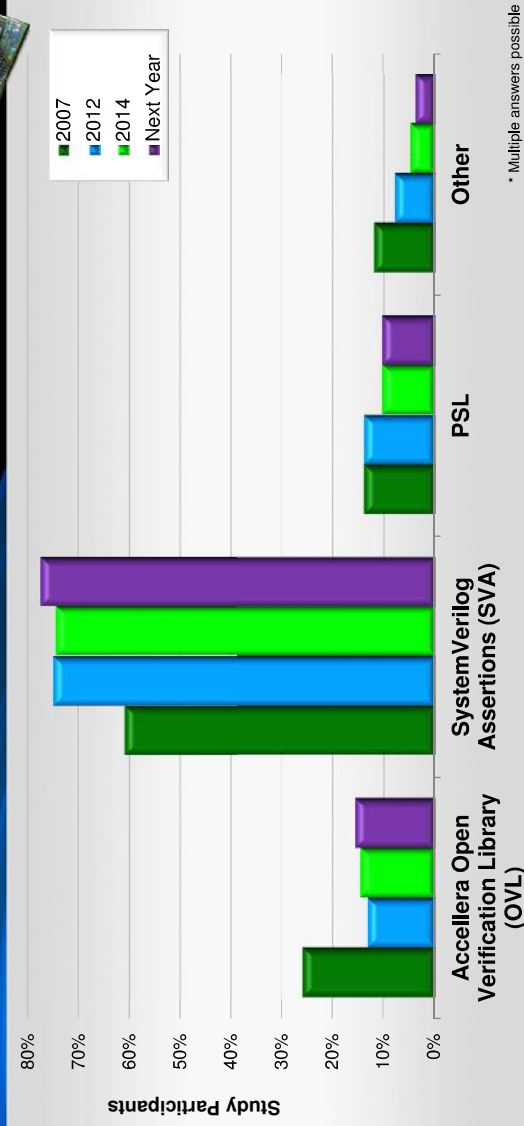


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33

Assertion Language Adoption

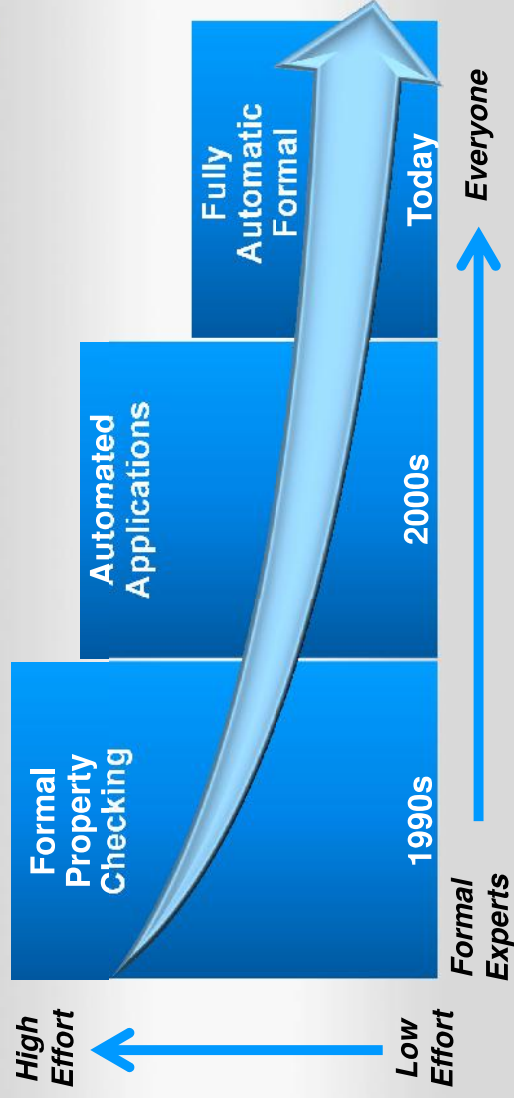


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39

Formal Verification—Not Just for Experts Anymore!

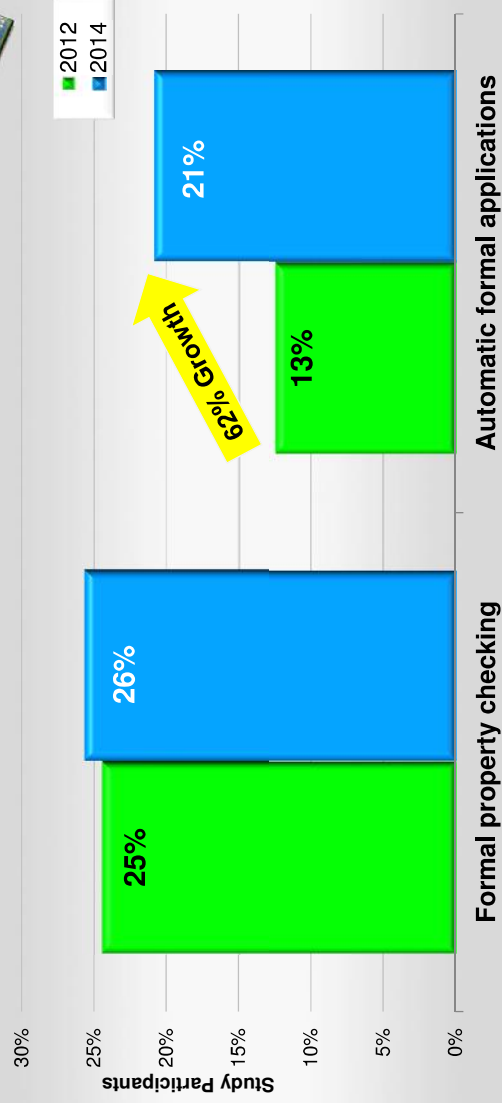


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50

Formal Technology Adoption



Source: Wilson Research Group and Mentor Graphics, 2014 Functional Verification Study

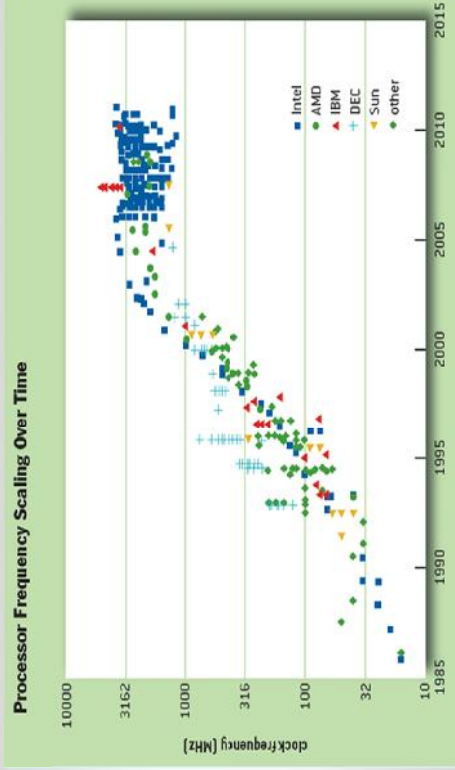
* Multiple answers possible

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51

Clock Speed Scaling Stalls



Source: Recording Microprocessor History, 4/6/2012 Andrew Danowitz, Kyle Kelley, James Mao, John P. Stevenson, Mark Horowitz <http://queue.acm.org/detail.cfm?id=2181798>

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Emulation Required
to Extend Performance



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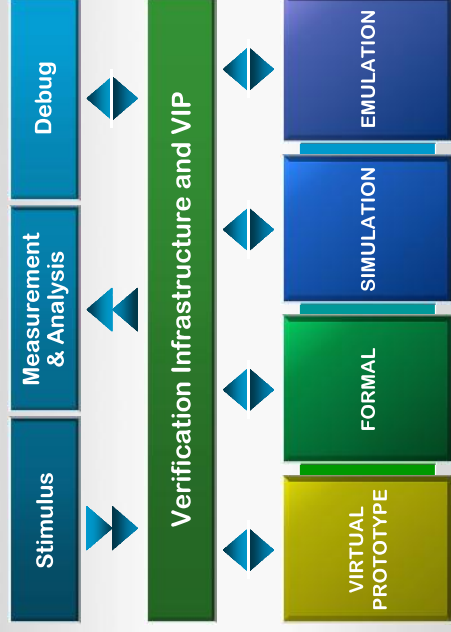
From increasing
Cycles of *Verification*



To maximizing
Verification per **Cycles**

Enterprise Verification Platform

An environment where the verification process is completely abstracted from the underlying verification engines



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Navigating the Perfect Storm *Trends in Functional Verification*

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