Accelerating Innovation

In the Era of Exponentials

Dr. Chi-Foon Chan
President and co-Chief Executive Officer, Synopsys, Inc.

August 27, 2013

SYNOPSYS®
Accelerating Innovation

asQED
Symposium 2013

Accelerating Technology Innovation

Exciting time to be an Engineer

The Era of Electronics

Technology

The Future Ahead

SYNOPSYS®
Accelerating Innovation

$1.76B FY12 Revenue

~84 Offices Worldwide

~8,195 Employees

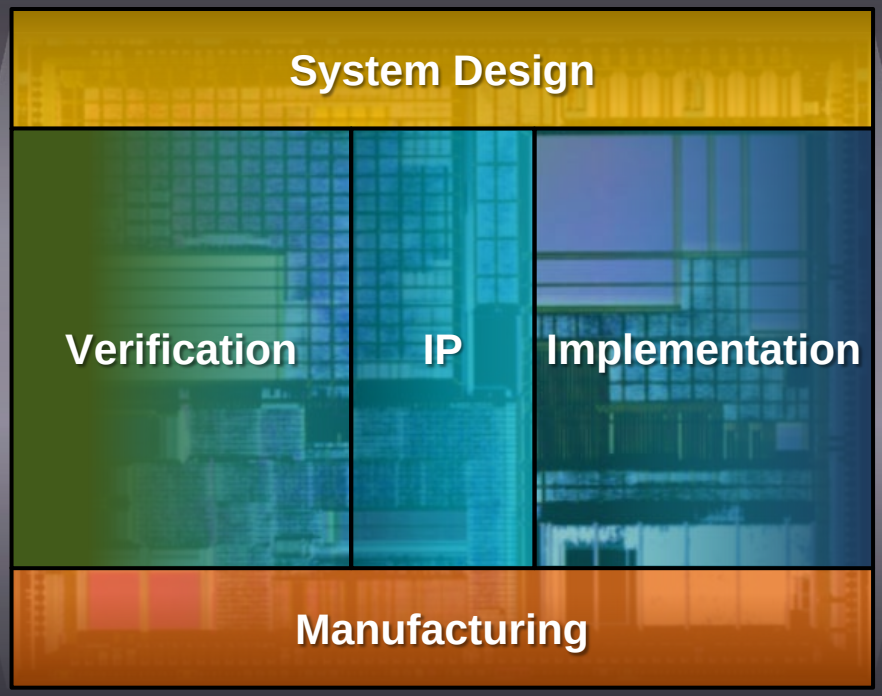
~4,431 Masters/ PhD Degrees

~31% R&D/Revenue

~5,129 R&D Engineers

~1,100 Application Consultants

~1,889 Issued Patents



Advanced Technology Leadership Delivers Benefits at Every Node

What Happens in

639,800 GB of global IP da

204 M
Emails Sent

>2 Million
Search Queries

6 Million
Facebook Views

1.3 Million
Video Views

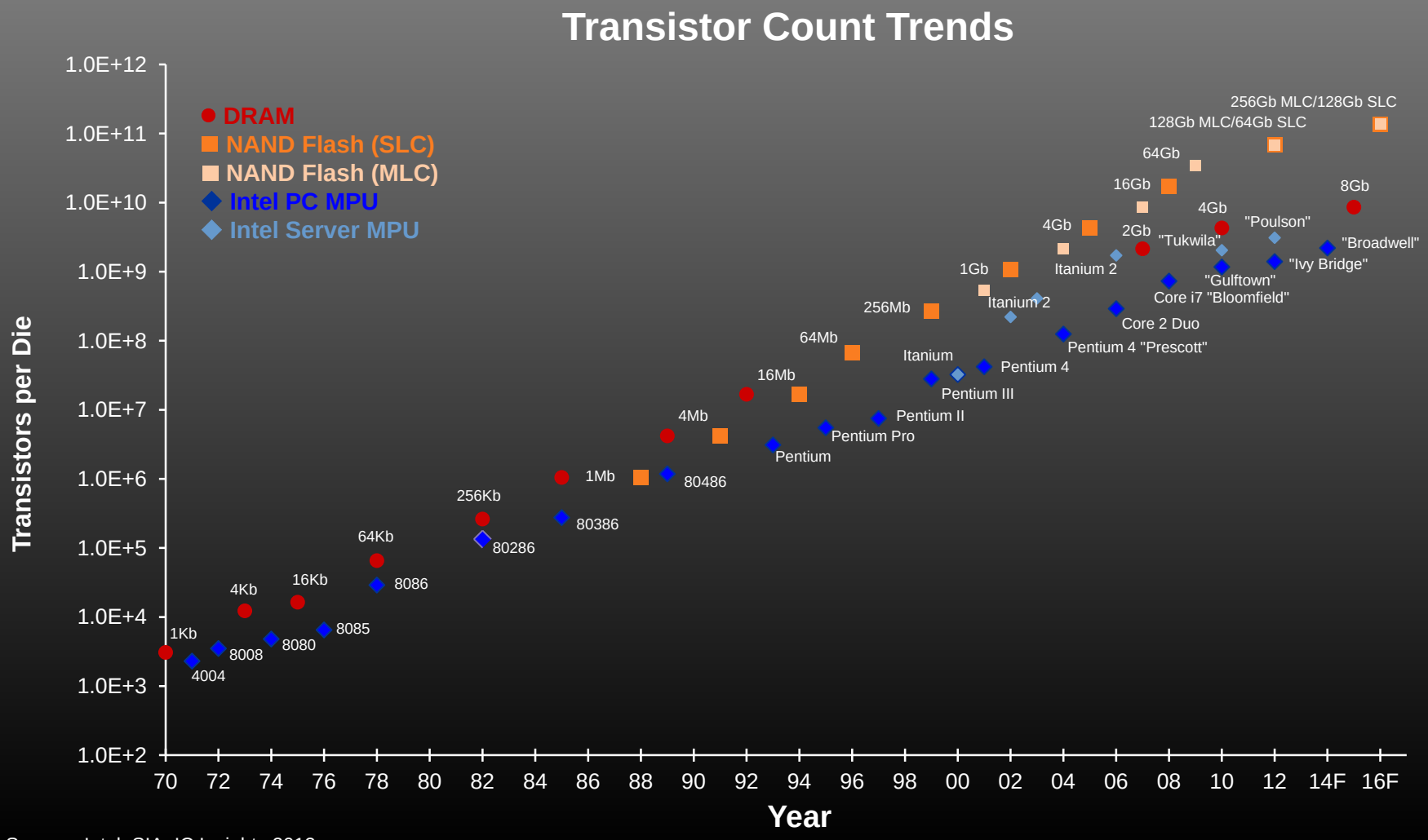
And the Future Growth is Exponential

Today, the number of networked devices =  **the global population**

By 2017, the number of devices connected to IP networks will be 3x as high as  **the global population**

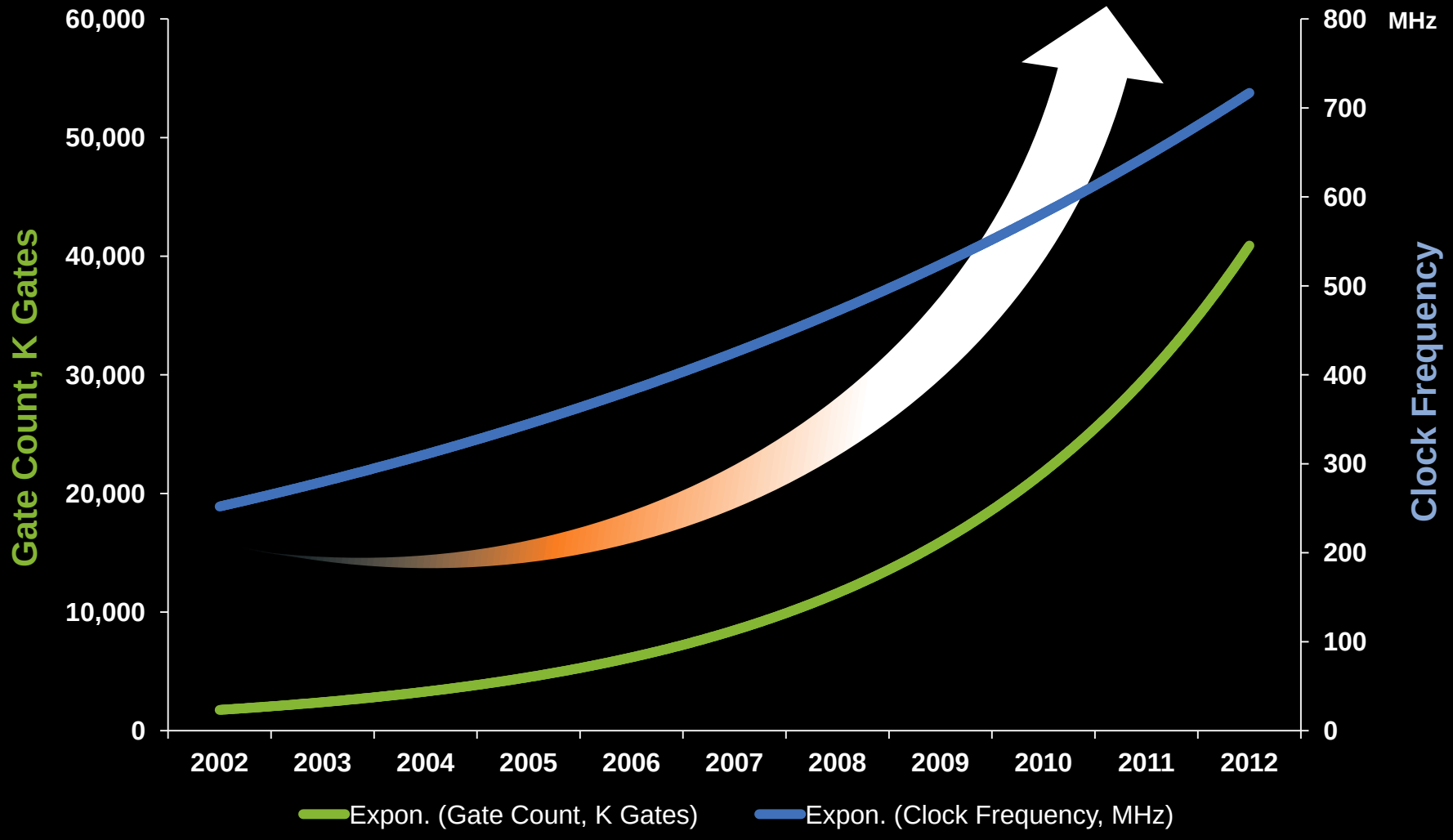
Source: Cisco Systems, VNI Global Mobile Data Traffic Forecast Update 2013 and Intel SmartTech Blog

Moore's Law Continues…



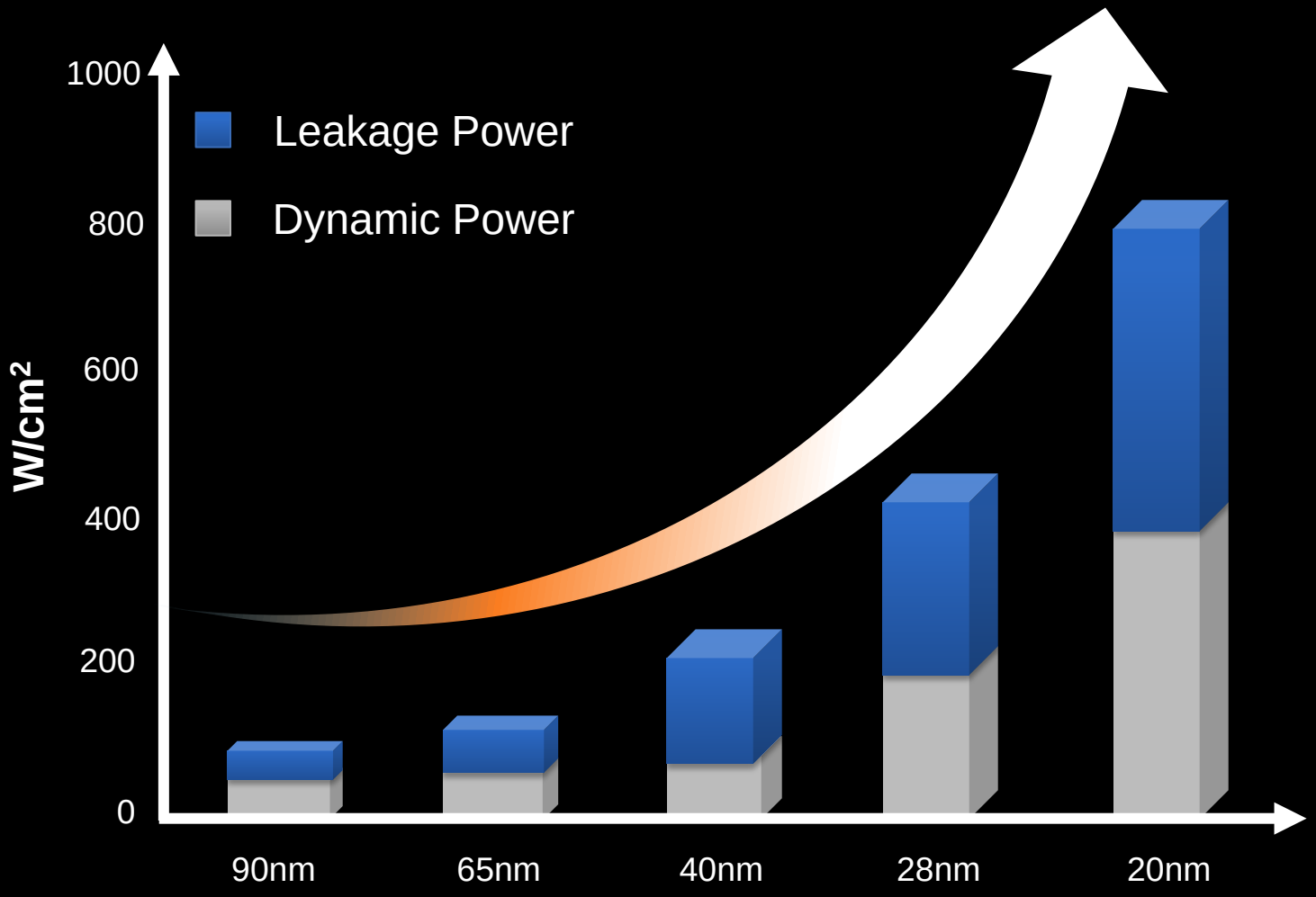
Source: Intel, SIA, IC Insights 2012

Designs Are Larger and Faster



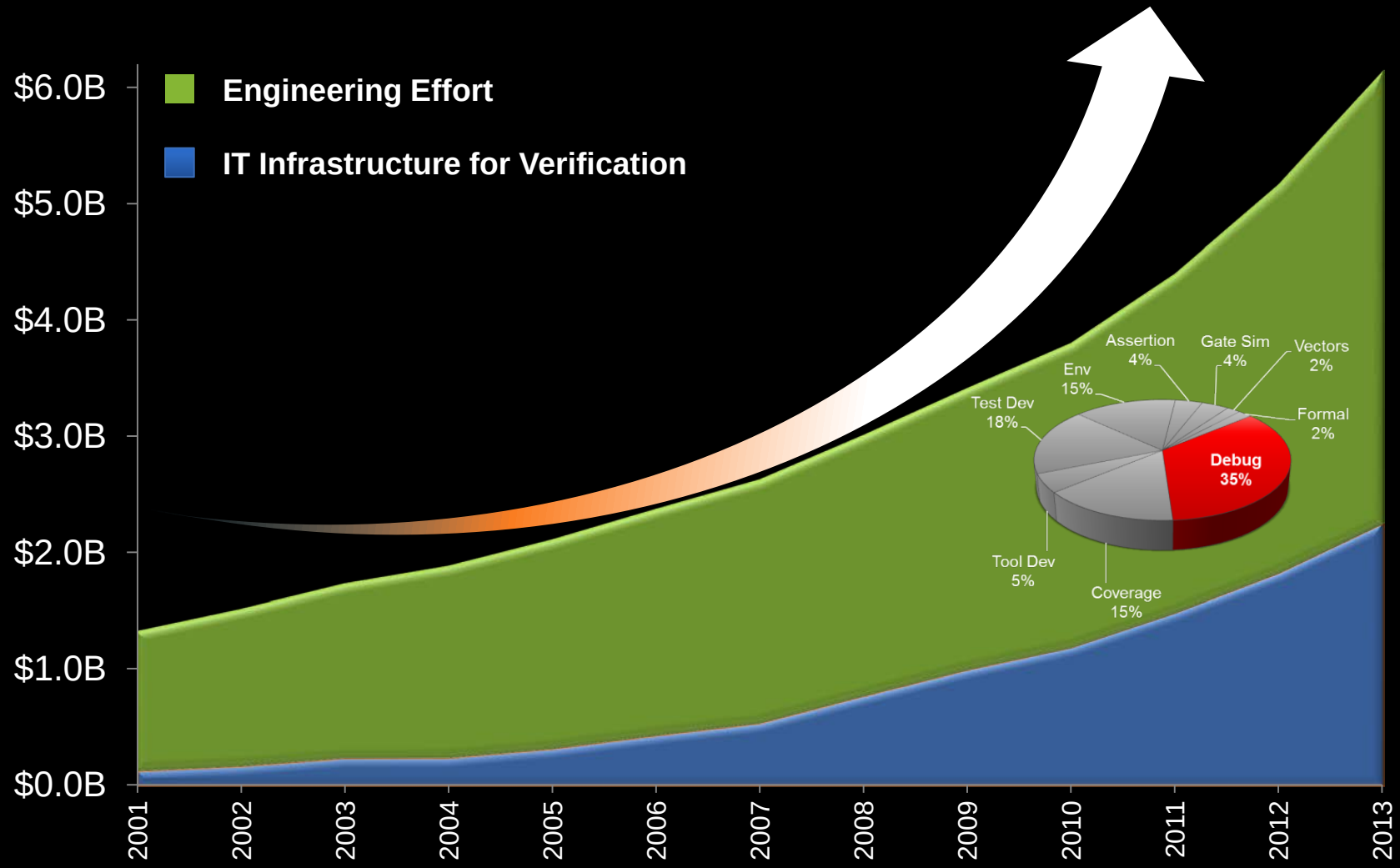
Source: Synopsys Global User Survey, 2002-2012

Power Is a Growing Problem



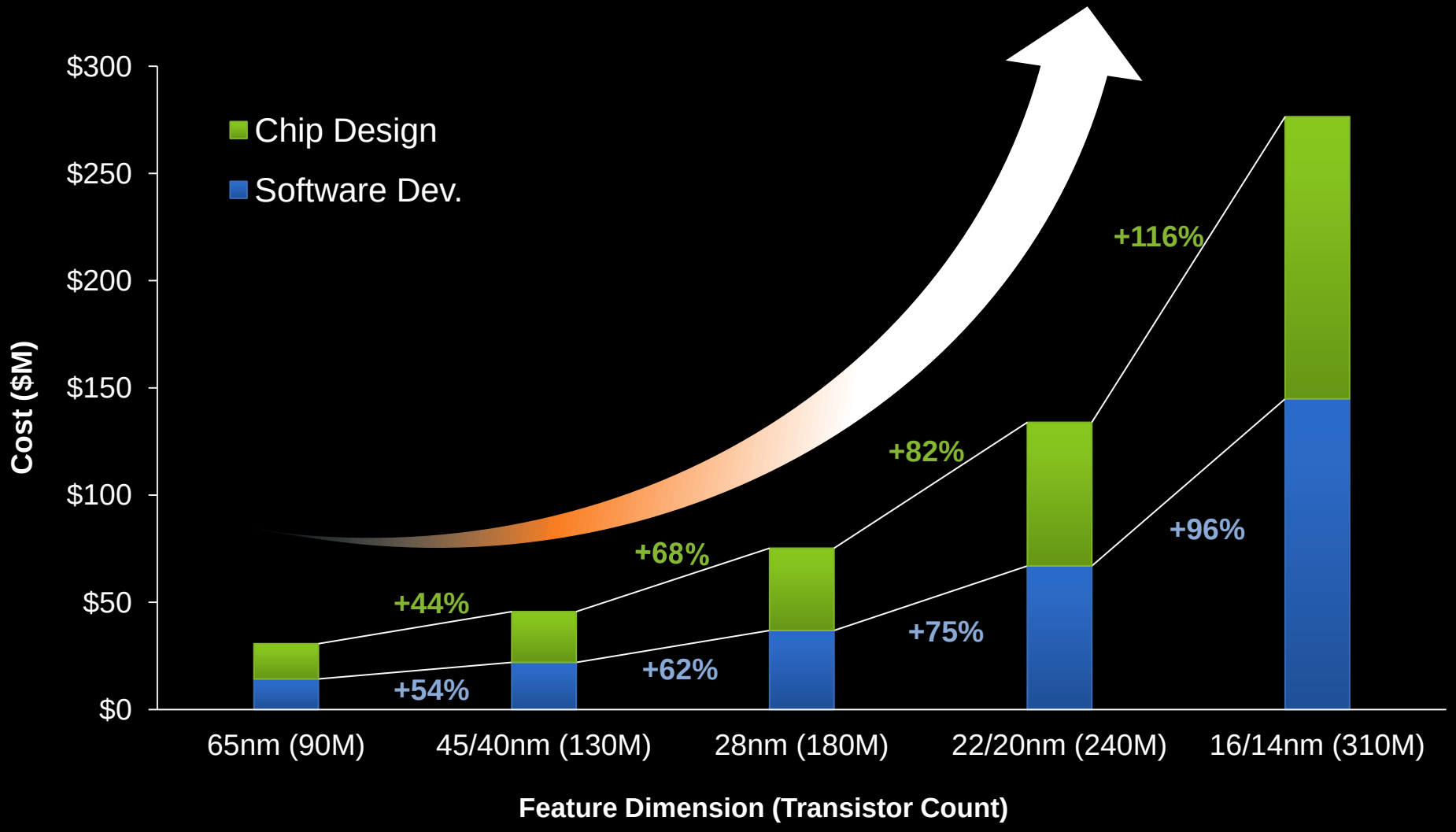
Source: IBS

Functional Verification Costs Are Exploding



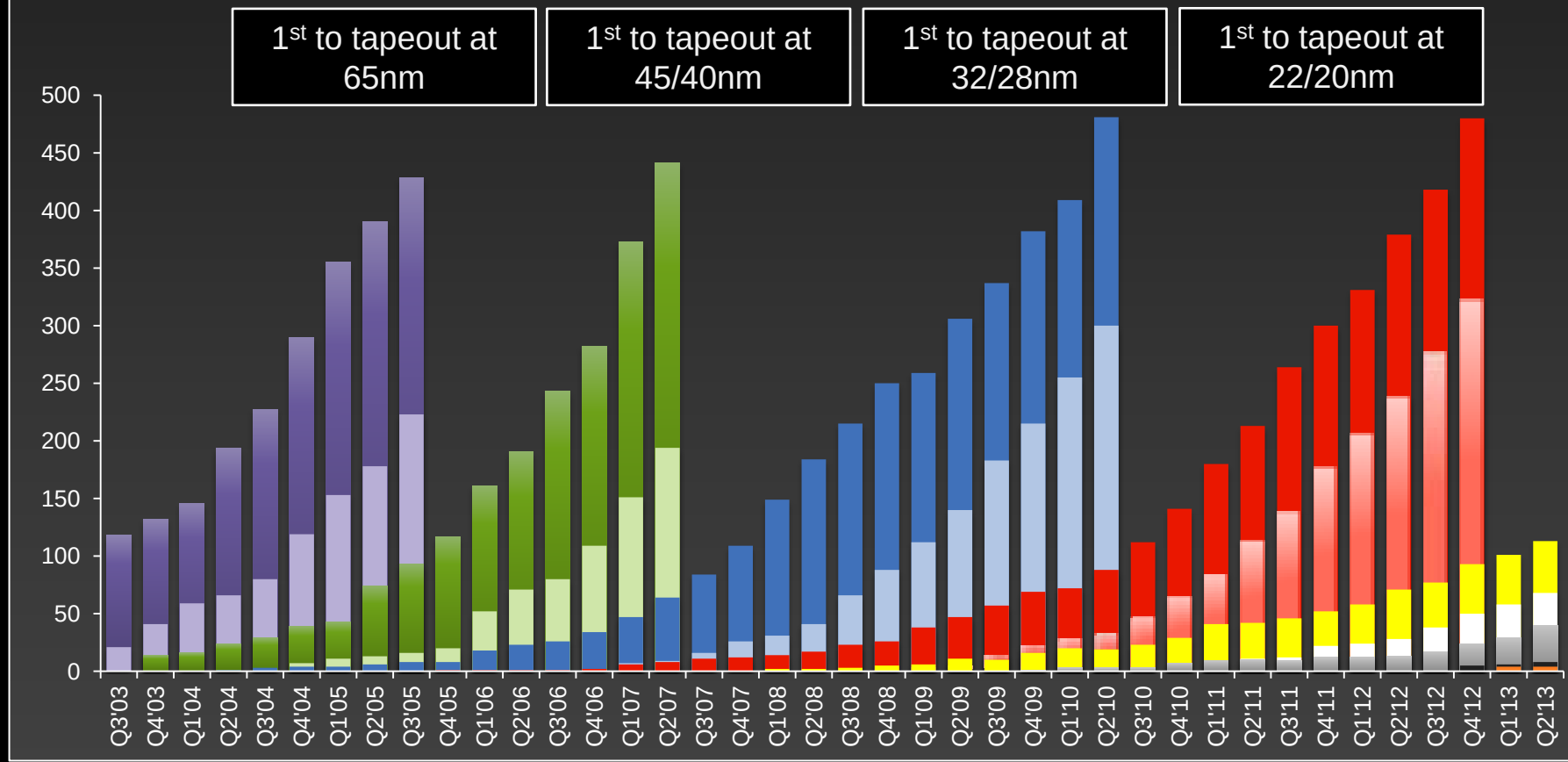
Source: VCS User Companies, Synopsys

Chip Development Costs Are Increasing



Source: IBS, December 2012

Advanced Designs at Every Node



Advanced Tapeout Counts

90nm

65nm

45/40nm

32/28nm

22/20nm

16/14nm

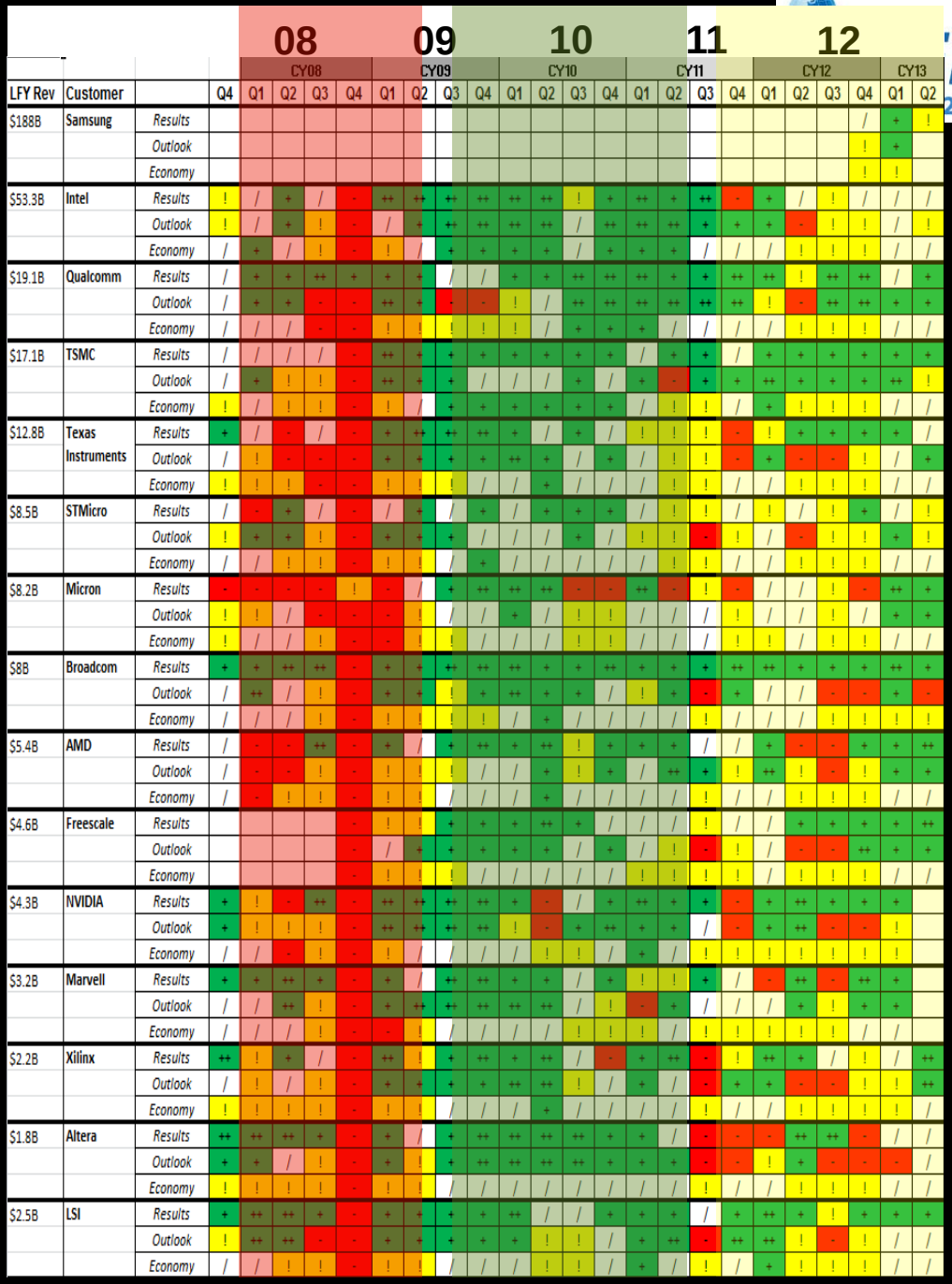
10nm

Companies Working Hard to Differentiate

Recession

Recovery

Uncertainty



Semi Snapshot as of 7/23/2013

1H13 Top 20 Semiconductor Sales Leaders ($M, Including Foundries)

1H13 Rank	2012 Rank	Company	Headquarters	2012 Tot Semi	1H12 Tot Semi	1Q13 Tot Semi	2Q13 Tot Semi	1H13 Tot Semi	1H13/1H12 % Change
1	1	Intel	U.S.	49,114	24,296	11,555	11,785	23,340	-4%
2	2	Samsung	South Korea	32,251	15,101	7,952	7,771	15,723	4%
3	3	TSMC*	Taiwan	16,951	7,810	4,460	5,152	9,612	23%
4	4	Qualcomm**	U.S.	13,177	5,928	3,916	4,222	8,138	37%
5	8	SK Hynix	South Korea	9,057	4,406	2,577	3,521	6,098	38%
6	6	Toshiba	Japan	11,217	5,659	2,938	2,868	5,806	3%
7	5	TI	U.S.	12,081	6,077	2,718	2,922	5,640	-7%
8	10	Micron	U.S.	8,002	4,204	2,144	2,450	4,594	9%
9	9	ST	Europe	8,364	4,126	1,994	2,033	4,027	-2%
10	11	Broadcom**	U.S.	7,793	3,687	1,954	2,035	3,989	8%
11	7	Renesas	Japan	9,314	4,480	1,886	1,920	3,806	-15%
12	15	GlobalFoundries*	U.S.	4,560	2,340	1,240	1,325	2,565	10%
13	14	Infineon	Europe	4,928	2,564	1,208	1,327	2,535	-1%
14	16	NXP	Europe	4,325	2,053	1,085	1,188	2,273	11%
15	13	AMD**	U.S.	5,422	2,998	1,088	1,161	2,249	-25%
16	12	Sony	Japan	5,709	2,986	1,049	1,148	2,197	-26%
17	24	Elpida***	Japan	3,075	1,997	945	1,160	2,105	5%
18	22	MediaTek**	Taiwan	3,366	1,457	817	1,115	1,932	33%
19	20	UMC*	Taiwan	3,730	1,804	898	1,015	1,913	6%
20	19	Freescale	U.S.	3,803	1,892	917	988	1,905	1%
Top 10 Total				168,007	81,294	42,208	44,759	86,967	7%
Top 20 Total				216,239	105,865	53,341	57,106	110,447	4%

*Foundry **Fabless ***Purchased by Micron on July 31, 2013

Source: IC Insights' Strategic Reviews Database

Source: IC Insights Report, August 02, 2013.

1H13 Top 20 Semiconductor Sales Leaders Ranked by Growth ($M, Including Foundries)

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Source: IC Insights' Strategic Reviews Database

Source: IC Insights Report, August 02, 2013.

Forces Driving Consolidation

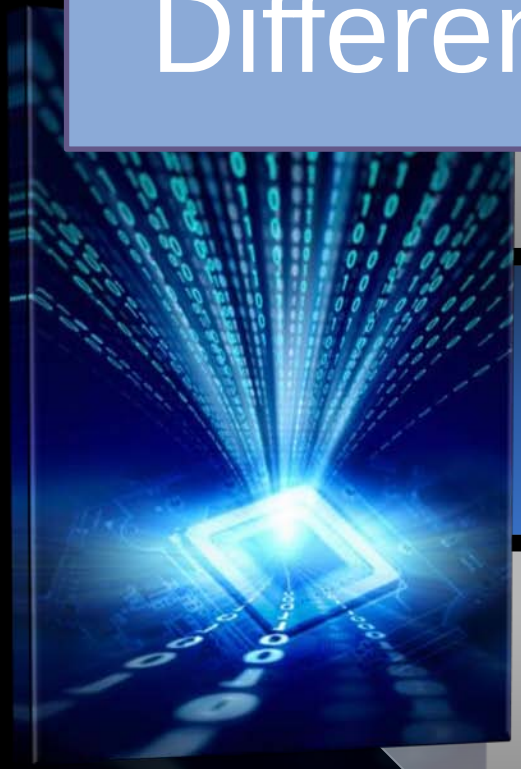
- Critical Mass
- Differentiation
- Collaboration

Shaping the Industry

Accelerating Innovation

Accelerating Technology Innovation

Differentiation

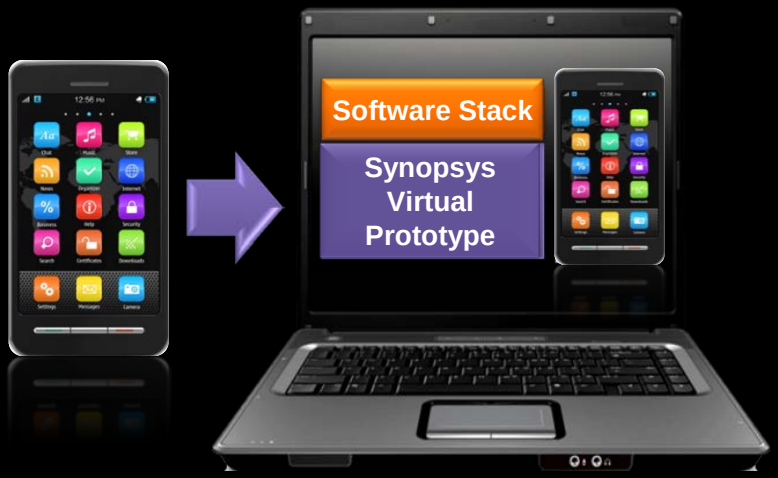


tra of Electronics

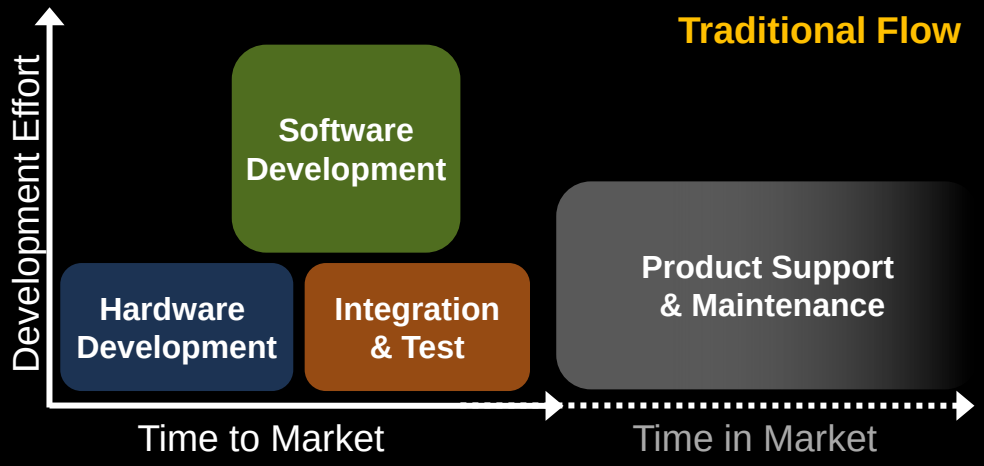
Technology

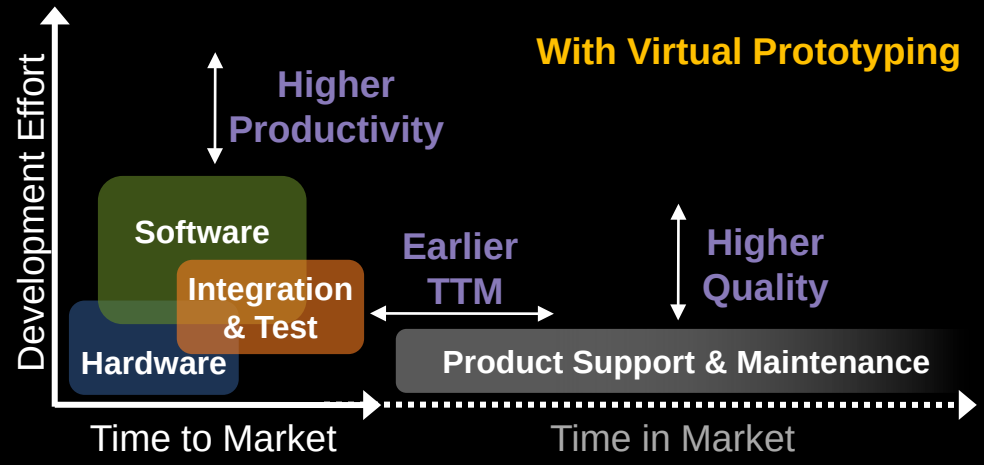
The Future Ahead

Prototyping Enables Earlier Software Development

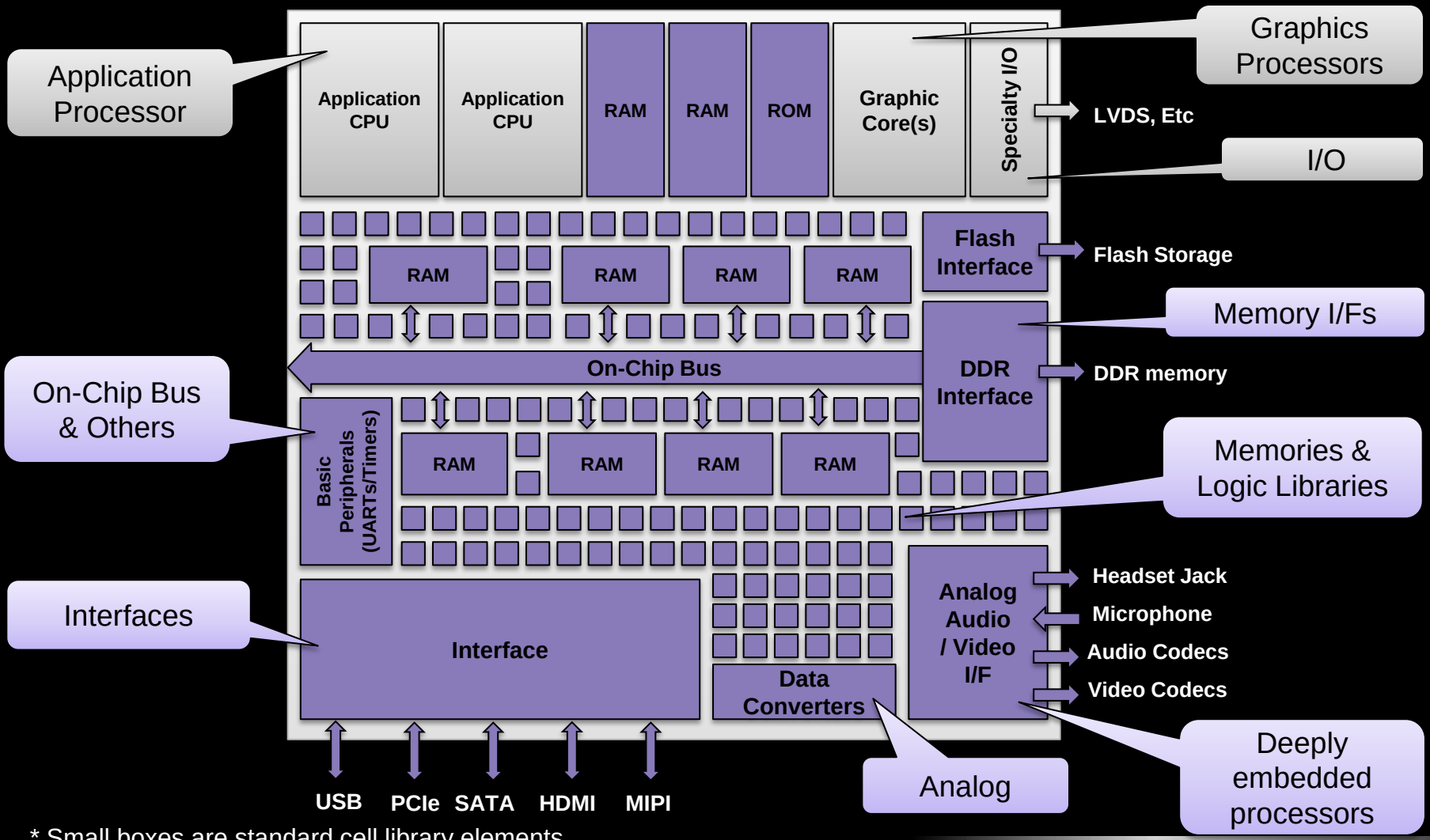


Prototype
A simulation model for the targeted hardware





Increasing Use of Silicon IP and Silicon IP Subsystems



* Small boxes are standard cell library elements.

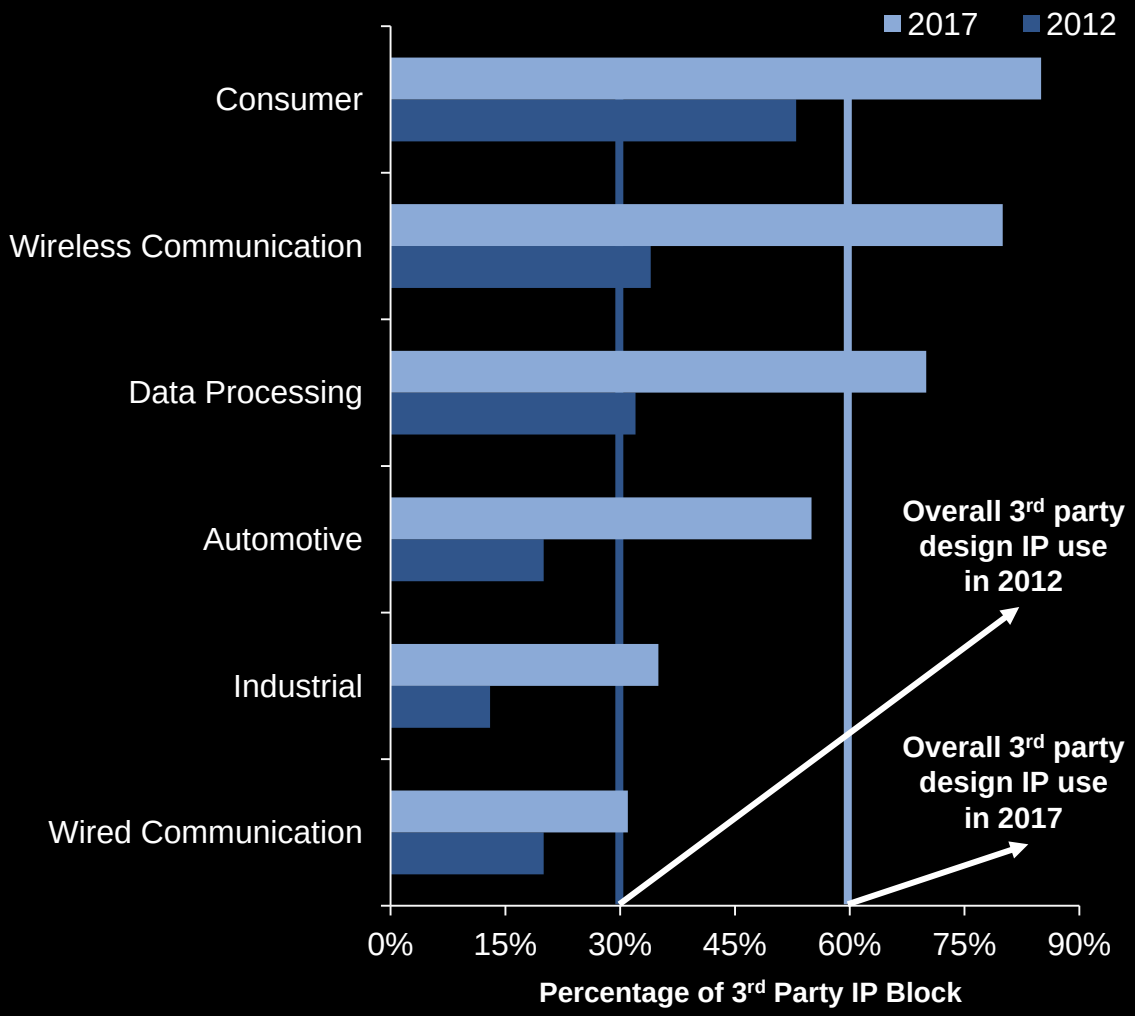
3rd Party IP Usage Will Continue to Double Through 2017

Increasing Design Complexity

Escalating Design Costs

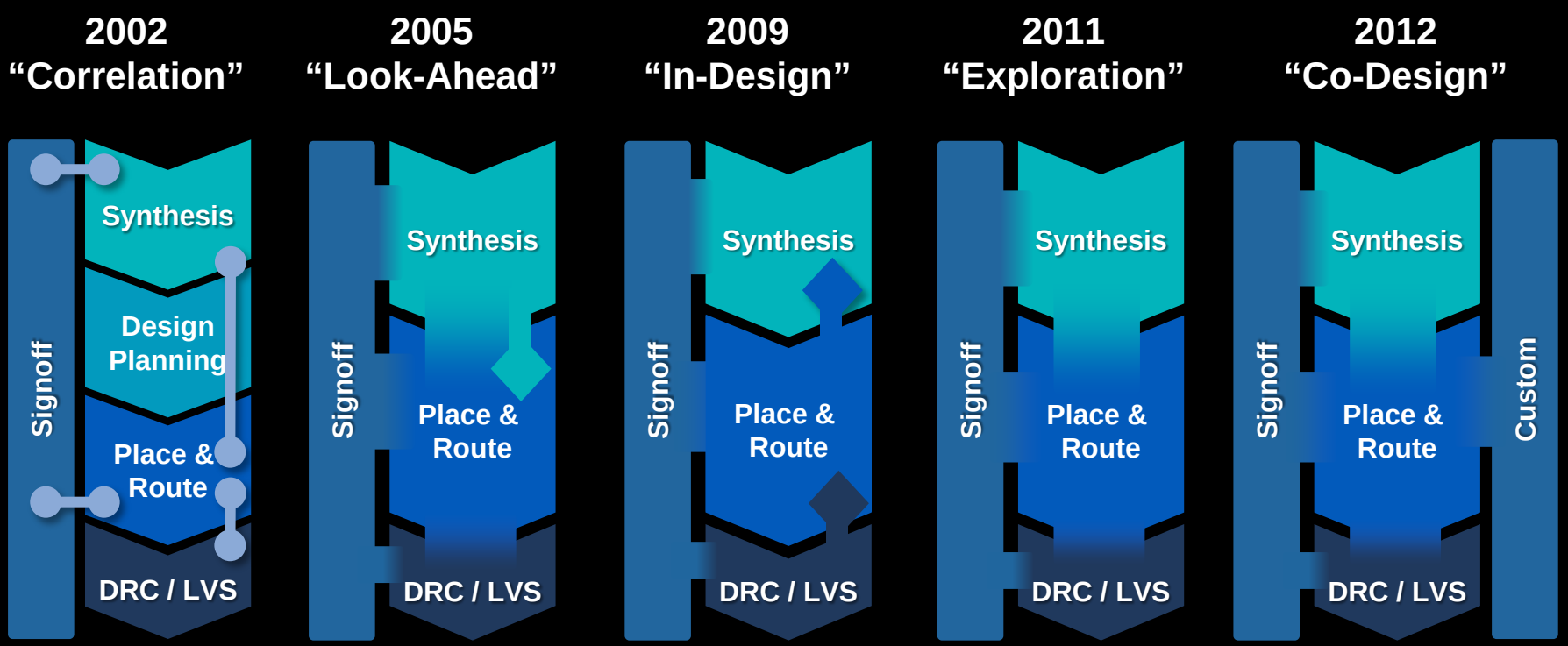
Shorter Time Window for New Product Launch

Strong Growth in 3rd Party IP Usage



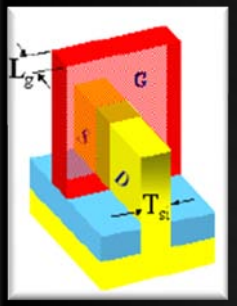
Source: Gartner, Semi IP Market, March 2013

Evolution of Implementation Technology



Below 22nm Requires Advanced Solutions

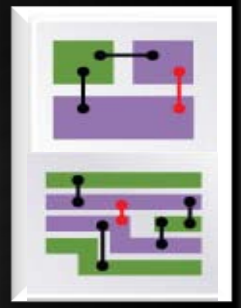
FinFET

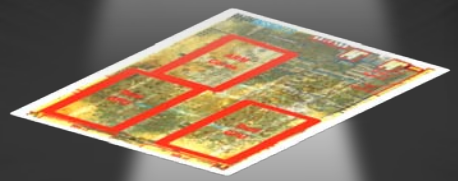


- Power
- Performance

Double Patterning (DPT)

- Density / Integration
- Performance
- Power

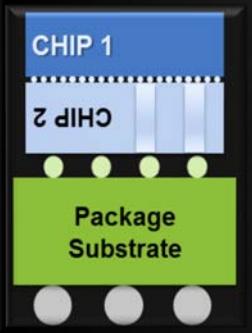




Power **Area**

Performance

3D-IC



- Density / Integration
- Power
- Performance

Delivering

More Performance

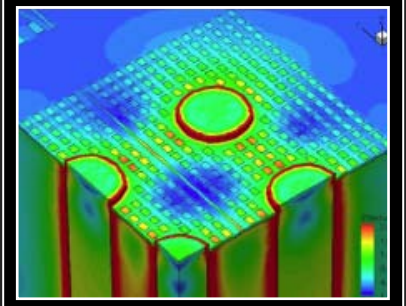
with Less Power

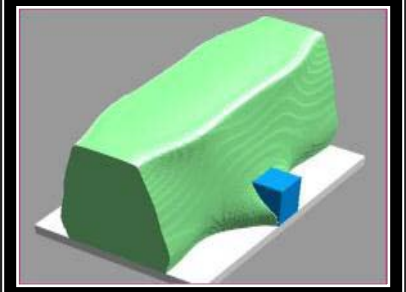
in a Smaller Area

FinFET Technology Must Be Supported Across the Entire SoC Design Process

Process Develop. | **Characterization** | **Design Implementation** | **IP**

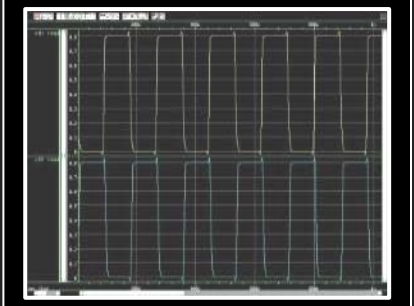
TCAD

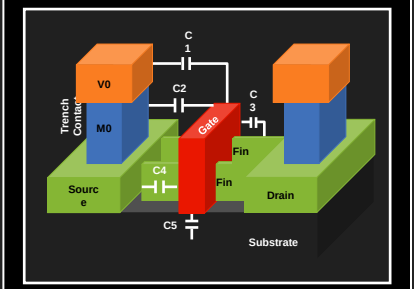




3D Lithography

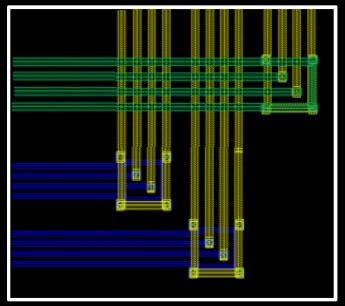
Circuit Simulation

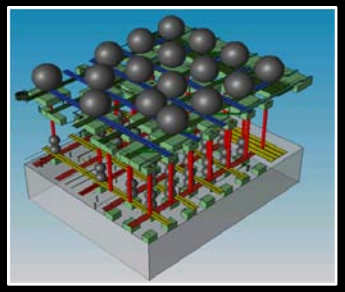




Extraction

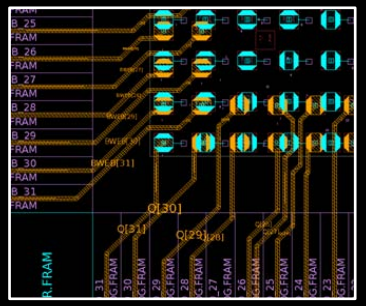
Custom Design

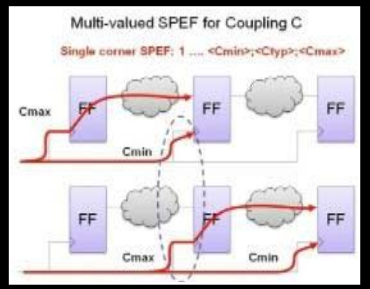




Physical Verification

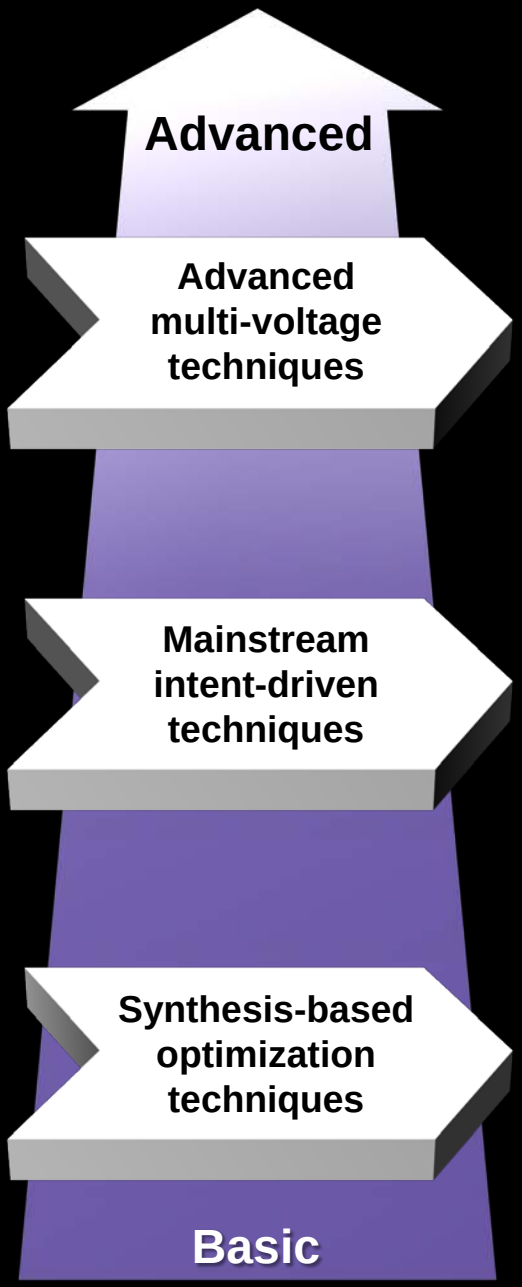
Implementation



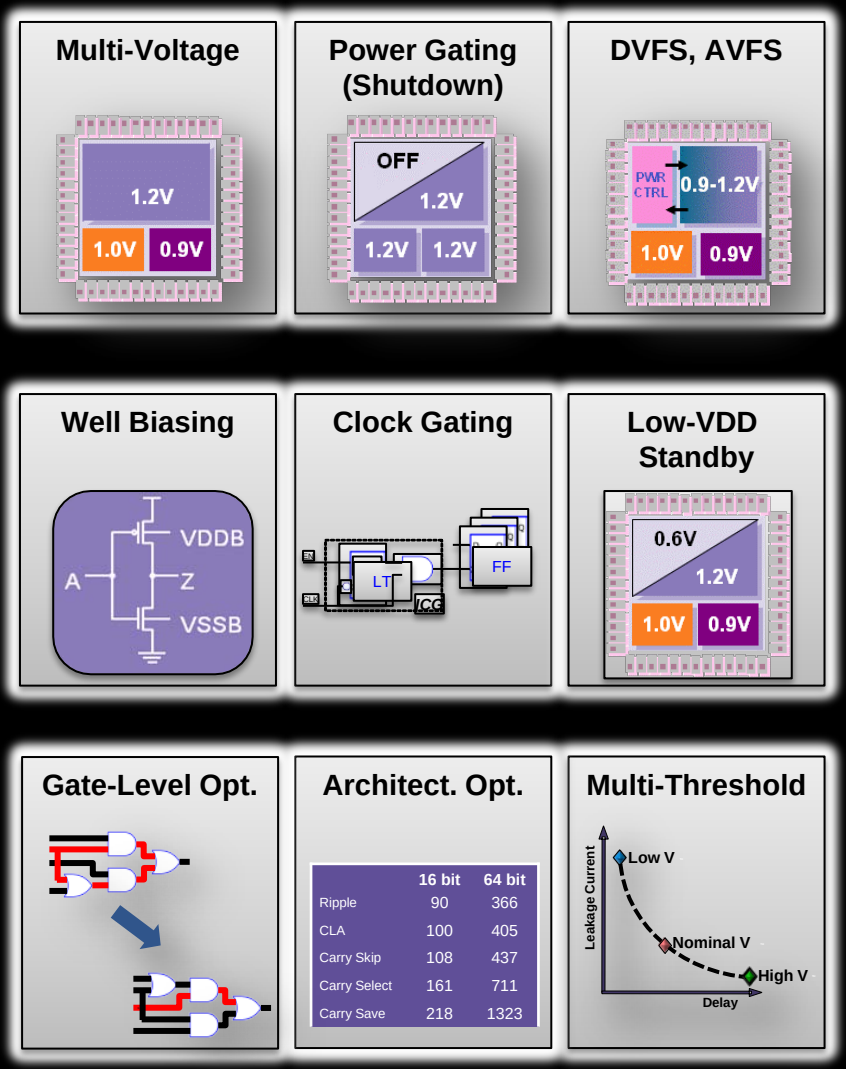


Signoff

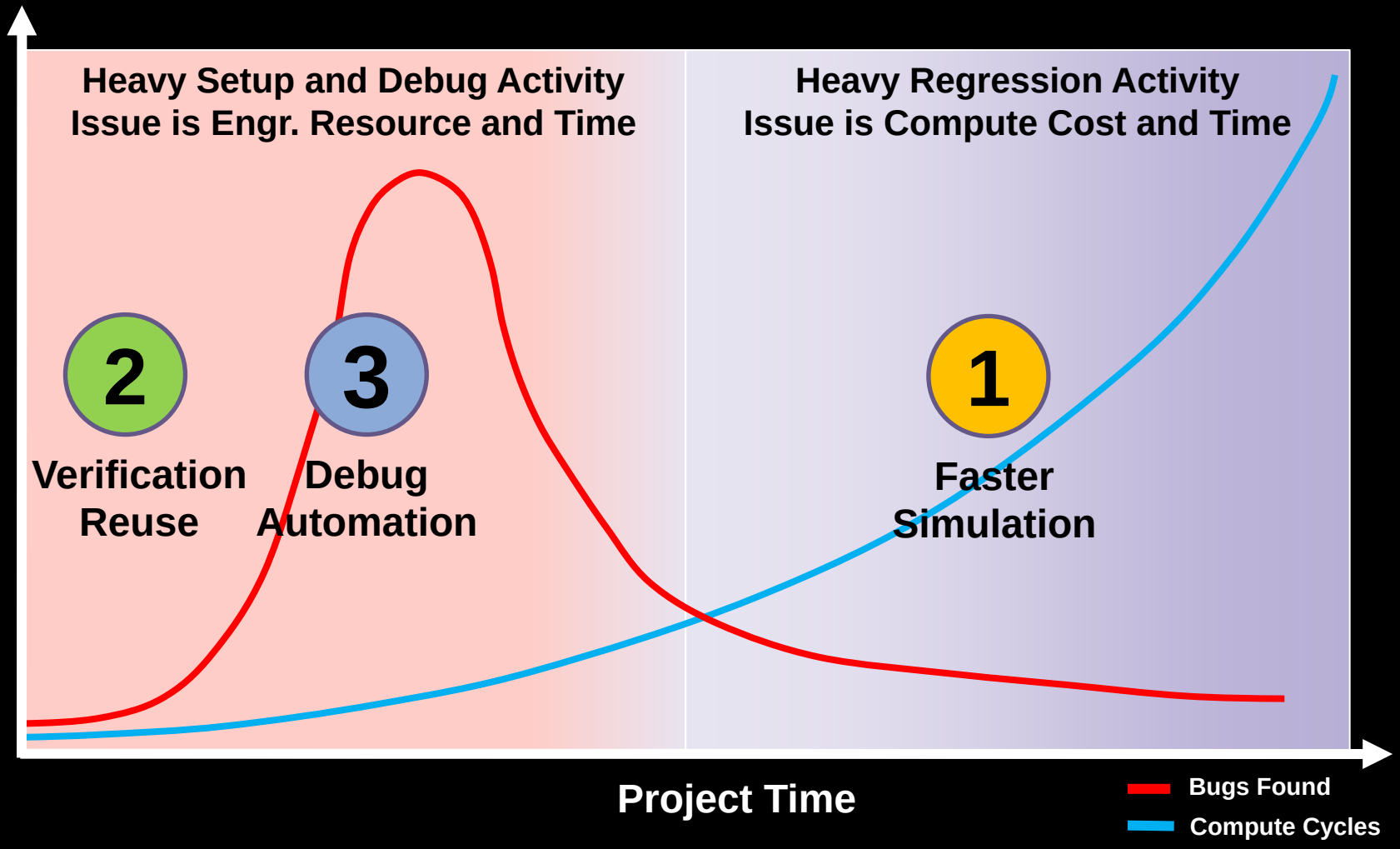
SoC Design Requires Advanced Low Power Techniques



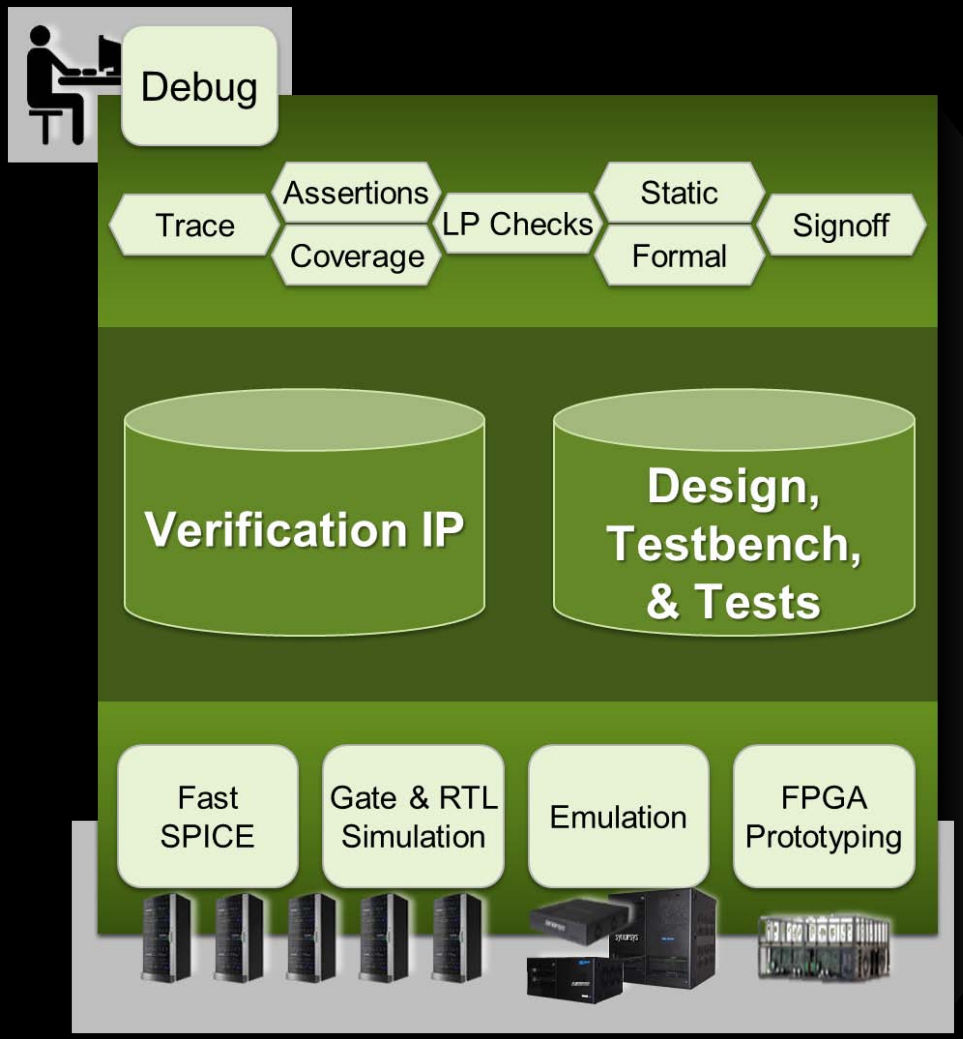
Low Power Design Techniques



The Problem in Verification Is Time & Cost



Comprehensive SoC Verification Platform Manages Time-to-market & Verification Complexity



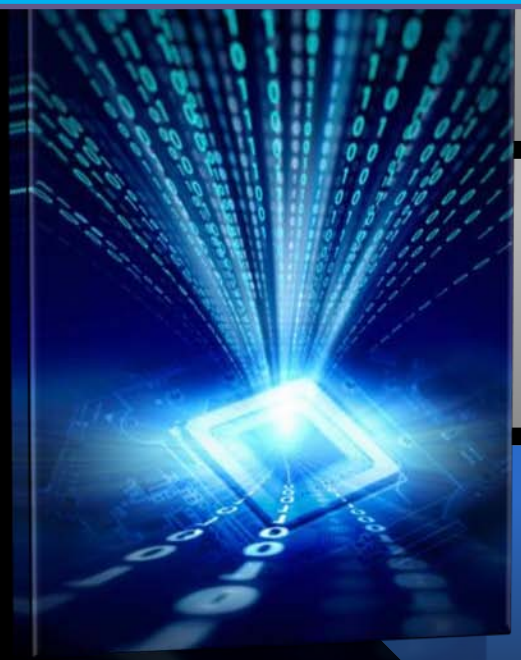
Technology Must Address

- Performance
- Capacity
- Accuracy
- Productivity
- Standards
- Digital
- Low-Power
- AMS
- HW/SW

Accelerating Technology Innovation

Collaboration

1. Industry
2. University
3. Government



Technology

The Future Ahead



Environmental

Legal Ethical

Technology

Economics

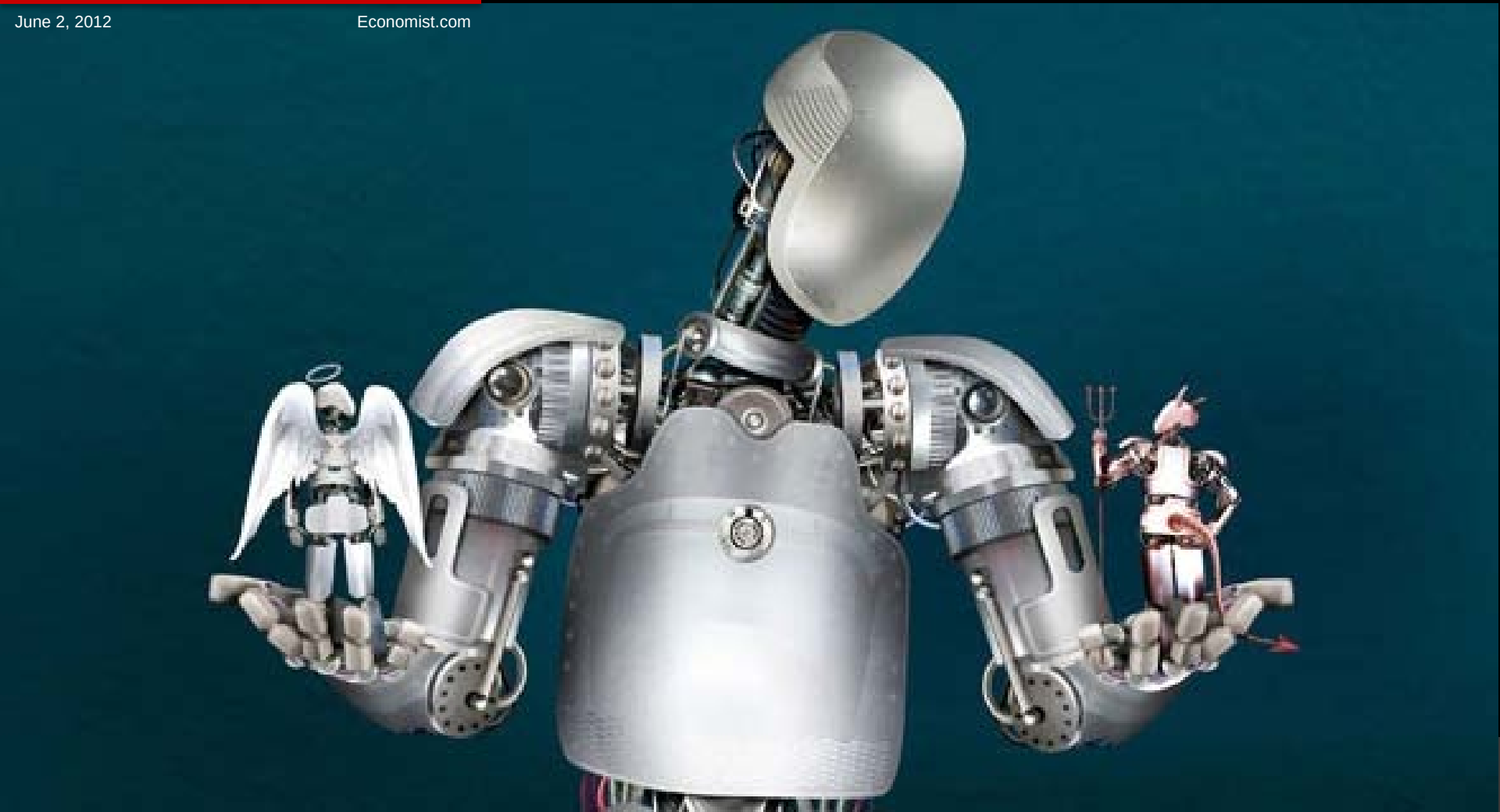
Different Disciplines

The Economist

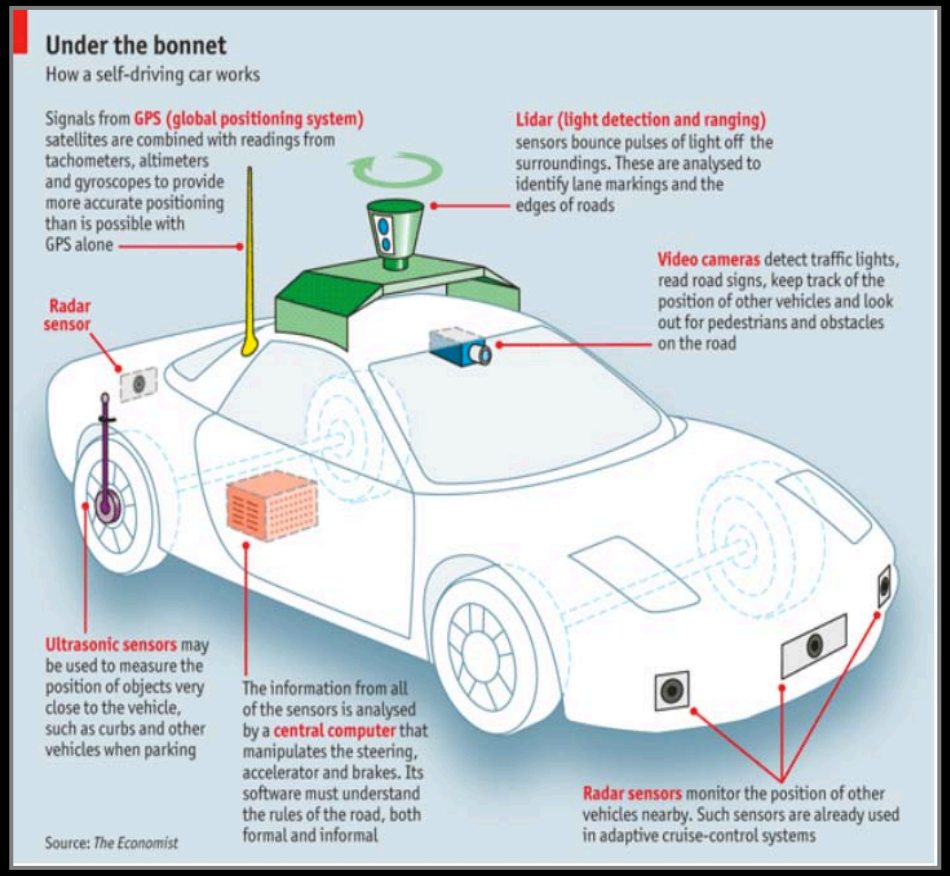
Morals and the Machine

Teaching robots right from wrong

June 2, 2012 Economist.com



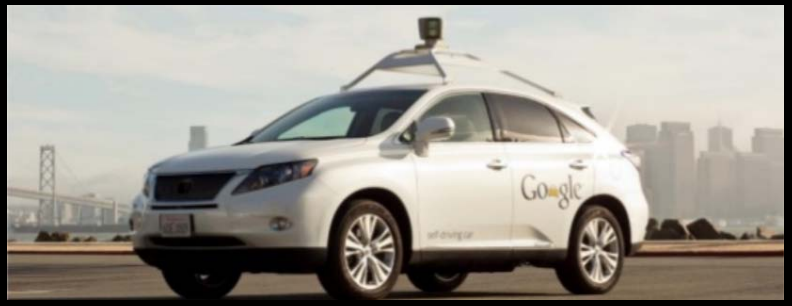
A Car or a Computer on Four Wheels?



California becomes latest state to OK driverless cars

USA TODAY

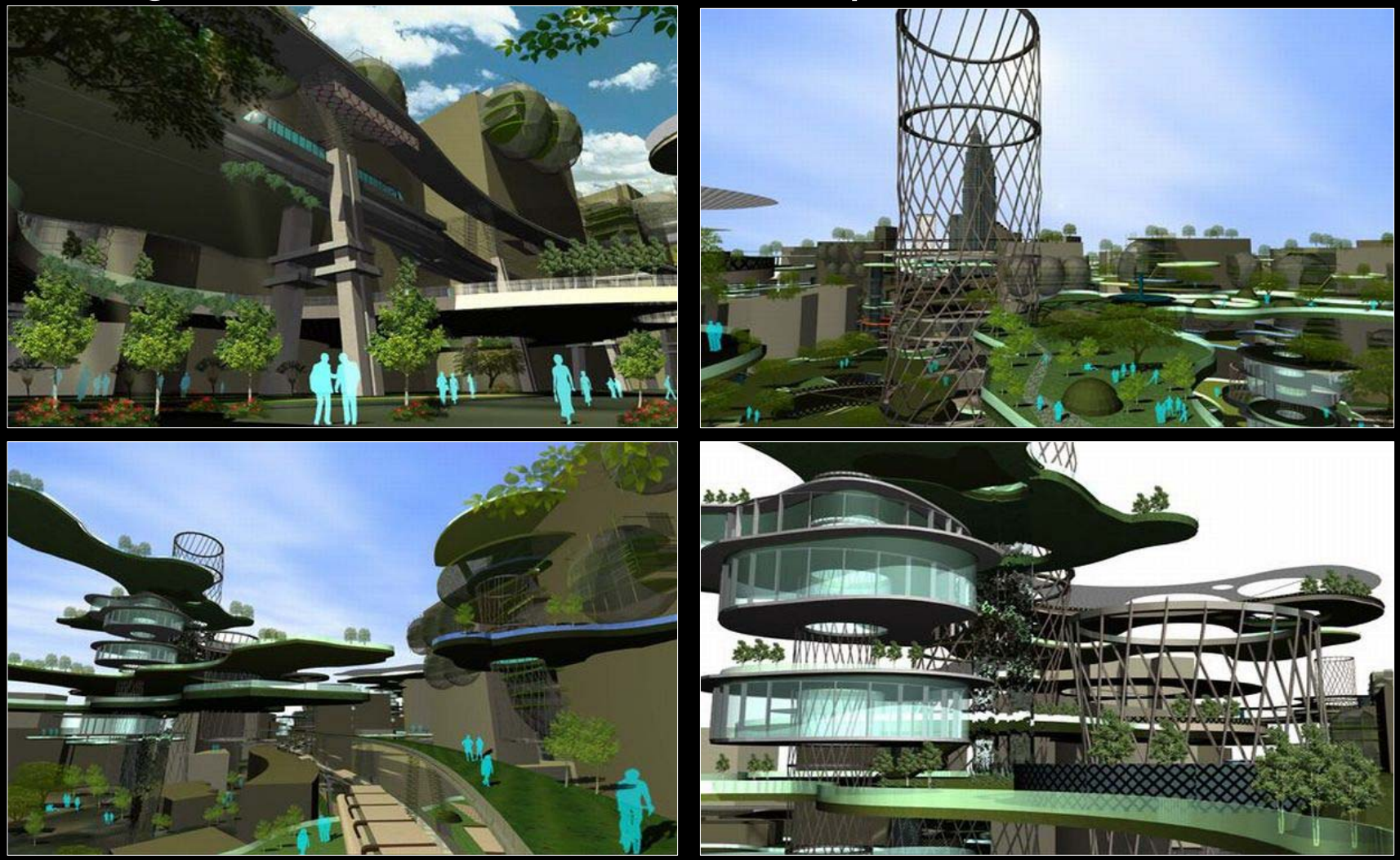
September 25, 2012



Sources: USA TODAY, California becomes latest state to OK driverless cars, September 25, 2012.
The Economist, Look, no hands, September 1, 2012.

The New Green Hub

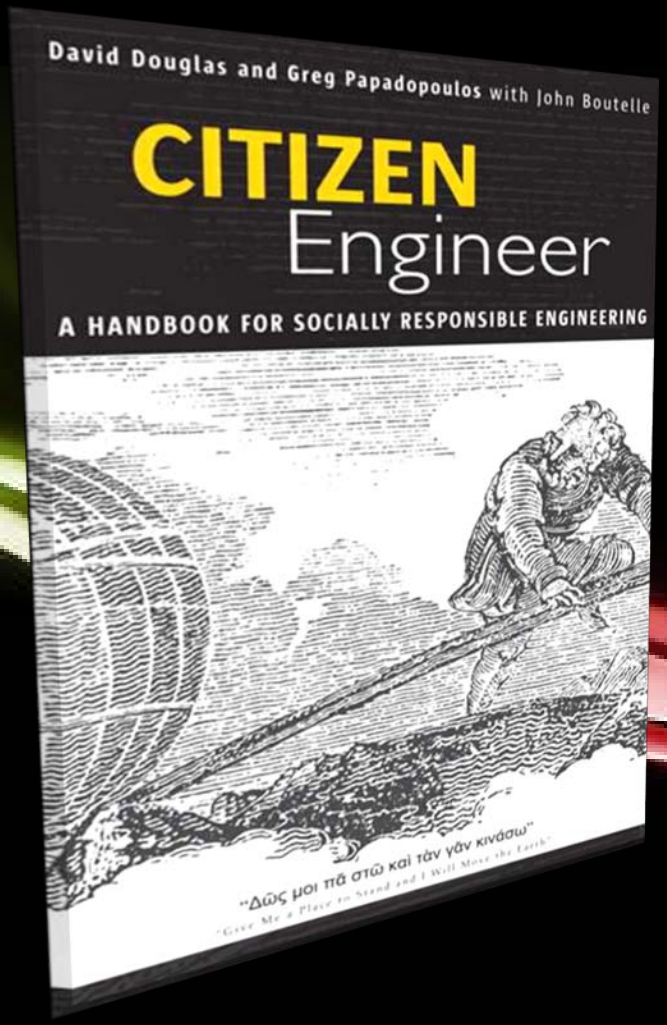
Shifting Gears to Sustainable Development



Source: Ecofriend.com – Urban Reforestation: Sky-bridges & green connectors to give a new skyline to Kuala Lumpur

Purpose + Plan + Our Part

How will we impact the future and accelerate innovation?



Thank You

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Symposium 2013