

A large, abstract graphic dominates the center of the slide. It features a central circular element with a dark blue core and concentric rings of lighter blue and white, resembling a stylized eye or a lens. From this center, a series of glowing blue lines and dots extend horizontally to the right, mimicking the layout of a printed circuit board (PCB) or a data network. The background is a gradient of light blue and white, with a dark blue horizontal band across the middle. The graphic is framed by a thin, repeating diagonal hatched pattern at the top and bottom edges.

STARSS Program: An NSF-SRC Collaboration

About SRC

Created to address

- Growing global competition
- Rising research costs; diminished corporate labs/ in-house research
- Declining government funding of relevant university research; inadequate talent pipeline

Objectives:

- Define relevant research directions
- Explore potentially important new technologies
- Generate a pool of experienced faculty & highly trained students

Erich Bloch



Robert Noyce



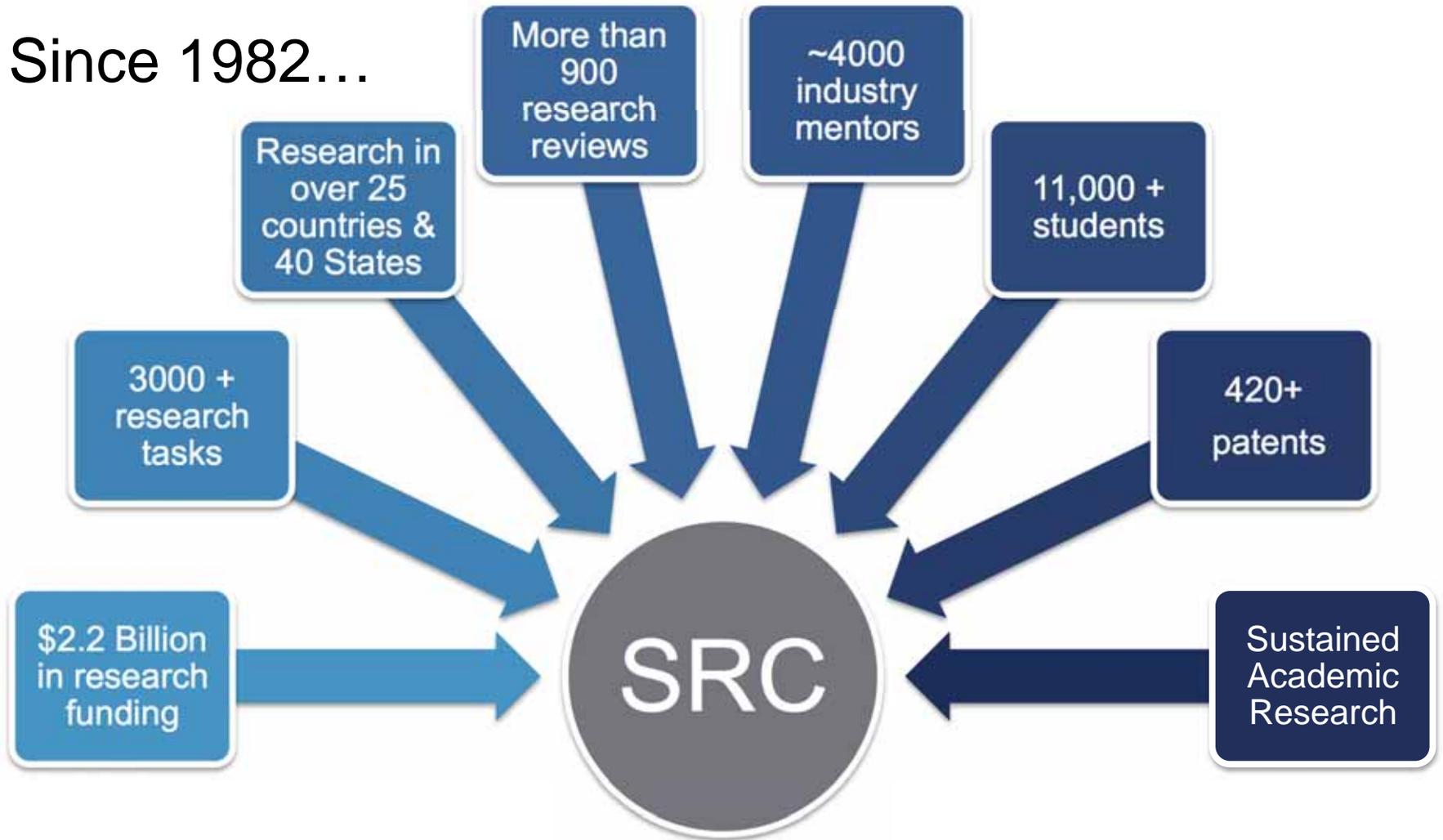
Jack Kilby



SRC Industry & Government Partners



Since 1982...





A Global Research Presence

Essential SRC Features

- ✓ Research direction is set by members/sponsors; \$\$ invested by members
- ✓ Focus on solution-oriented, pre-competitive research*
- ✓ Early and easy access to research results and student resumes
- ✓ All members get nonexclusive royalty-free rights to resulting IP
- ✓ Facilitated industry-university interactions (with PI's and students)
 - ✓ Annual reviews with industry feedback
 - ✓ Webinars throughout the year
 - ✓ Industry Liaisons guide research, mentor students & transfer technology
- ✓ Attracts world-class researchers (faculty & students)



* All research meets the definition of “basic research” for purposes of U.S. export control.

SRC: A Family of Distinct, Related Programs



Global Research Collaboration
Ensuring vitality of current industry



STARnet

STARnet
Early research engagement of long horizon semiconductor challenges



NRI

Nanoelectronics Research Initiative
Beyond CMOS – the next switch and associated architectures



Education Alliance
Attracting and educating the next generation of innovators and technology leaders



T3S: One of 12 GRC Thrusts

- ✓ T3S = Trustworthy and Secure Semiconductors and Systems
- ✓ *T3S Goal: Develop cost-effective strategies and tools to design & manufacture chips and systems that are reliable, trustworthy, secure and resistant to attack or counterfeiting.*
- ✓ Current T3S industry participants: Intel, Qualcomm, Freescale, TI, Mentor Graphics, Analog Devices, IBM, GlobalFoundries
- ✓ Memberships available at the Thrust level

T3S Research

- ✓ Current areas of research
 - Counterfeit Detection and Avoidance
 - Security by Design
 - Verification
 - Attack Aware
- ✓ Includes projects funded by SRC-NSF (STARSS) and by SRC alone
- ✓ Under STARSS, NSF provides 2:1 matching



STARSS: SRC-NSF Partnership:

Secure
Trustworthy
Assured &
Resilient
Semiconductors &
Systems



Example STARSS projects on counterfeits

- **Kenneth Mai (CMU)** Chip odometers with a gauge of use/age and an authentication of provenance for robust differentiation between genuine and counterfeit parts.
- **Michael Orshansky (UT/Austin)** Exploit the stochastic variability in nanometer-scale CMOS to create a superior, ultra low-energy “strong PUF” that is resistant to machine-learning modelling.
- **Keshab Parhi (U. Minnesota)** Develop a hierarchical approach to design for simultaneous authentication and obfuscation.



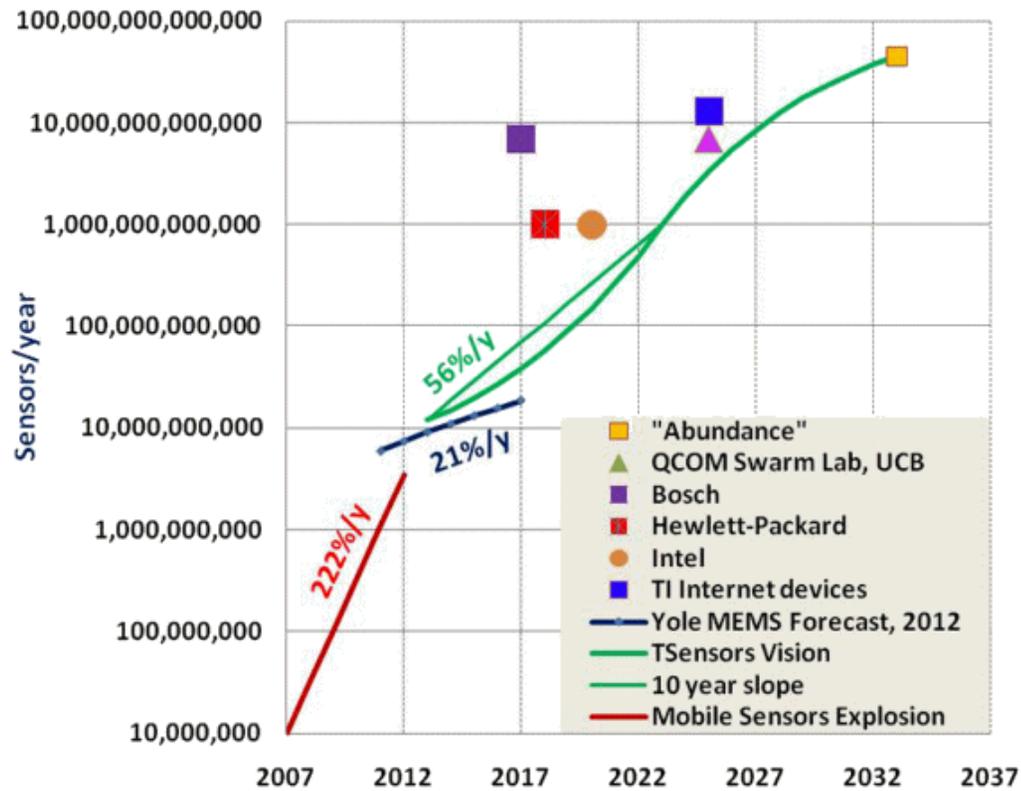
Other STARSS projects

- **Siddharth Garg (NYU)** Defense mechanisms using obfuscation that fortify ICs against computationally powerful attackers.
- **Abhijit Chatterjee (Ga Tech)** Low-cost high-resolution detection and diagnosis of Trojans in advanced mixed-signal and digital IC designs
- **K.-T. Cheng (UCSB)** Detection of hardware Trojans hidden in unspecified design functionality
- **Mark Tehranipoor (U. Florida)** Design Security Rule Check for analyzing vulnerability to various attacks

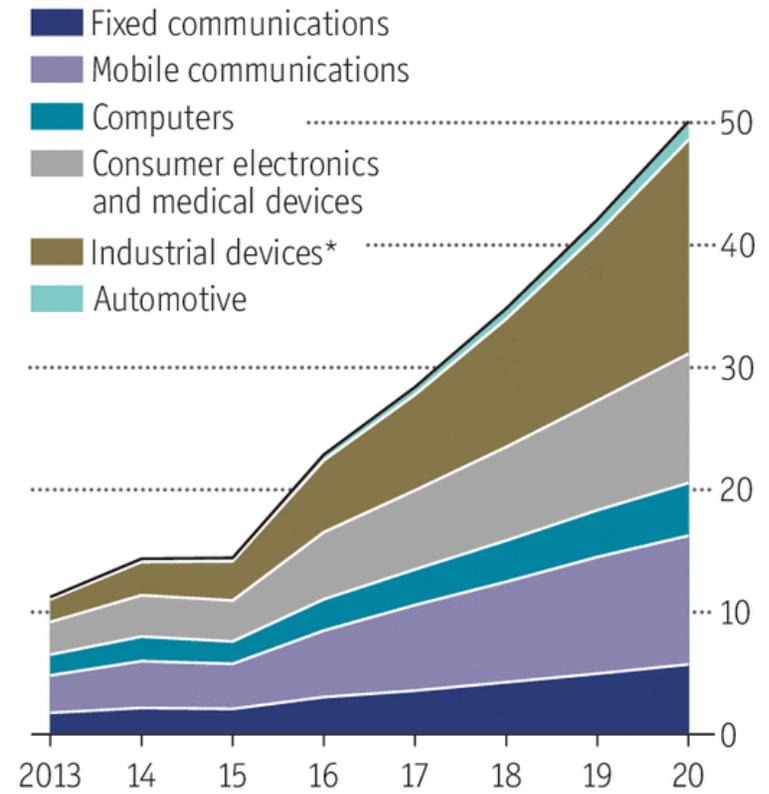


Technology Trends to Watch

Growth in Sensors & IoT



<http://tsensorssummit.org/Resources/Why%20TSensors%20Roadmap.pdf>



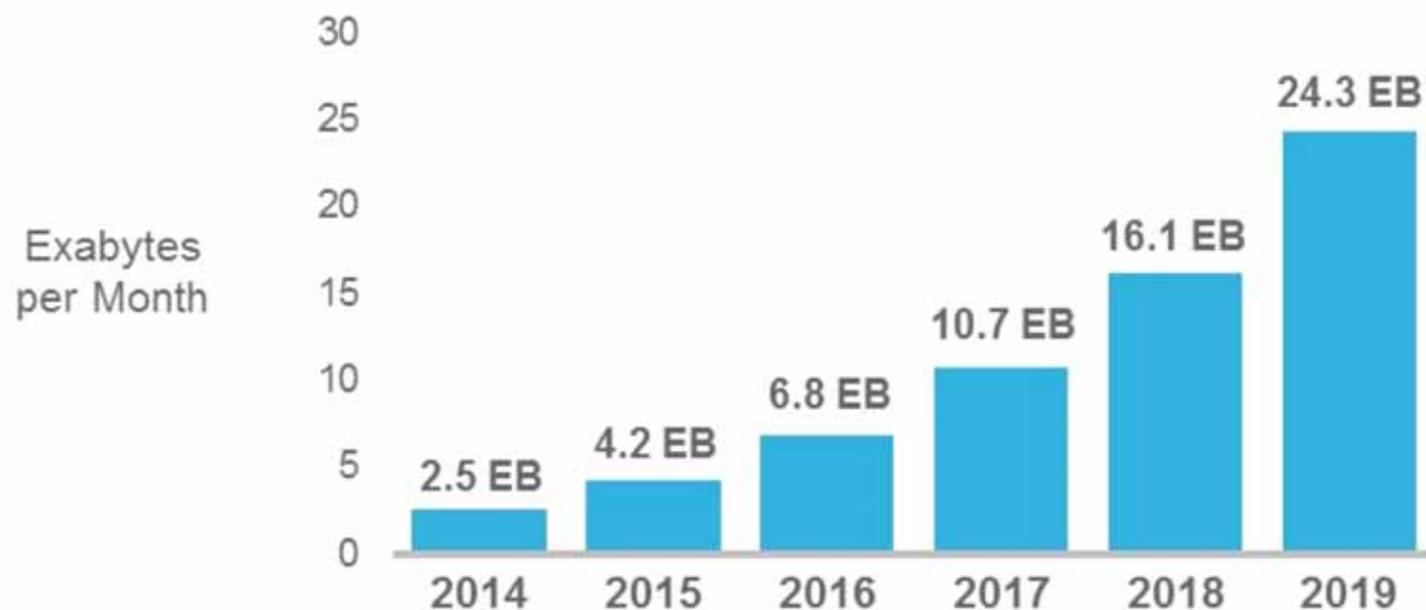
Source: Cisco

*Includes military and aerospace

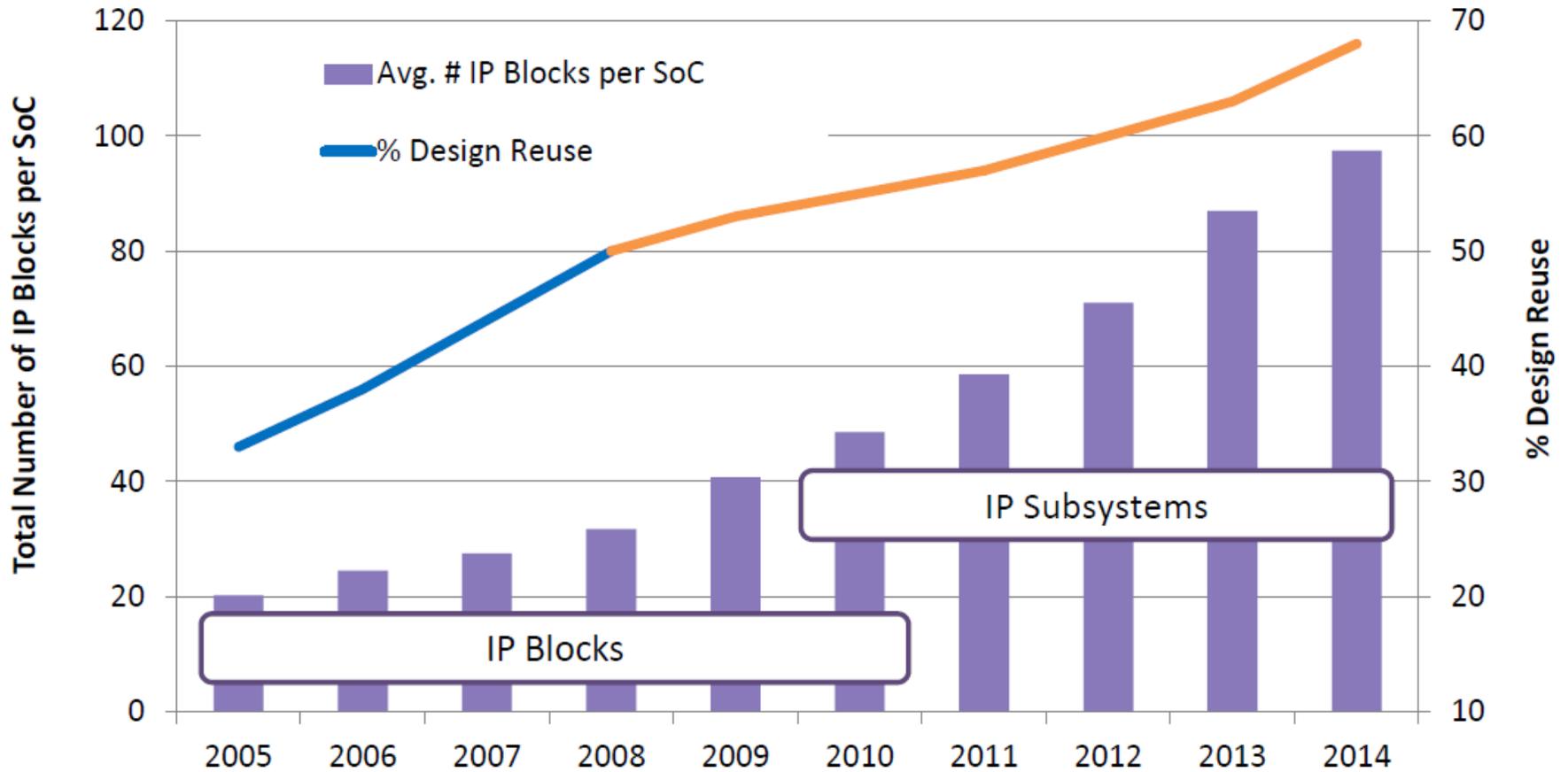
Global Mobile Data Traffic Growth / Top-Line

Global Mobile Data Traffic will Increase 10-Fold from 2014–2019

57% CAGR 2014–2019

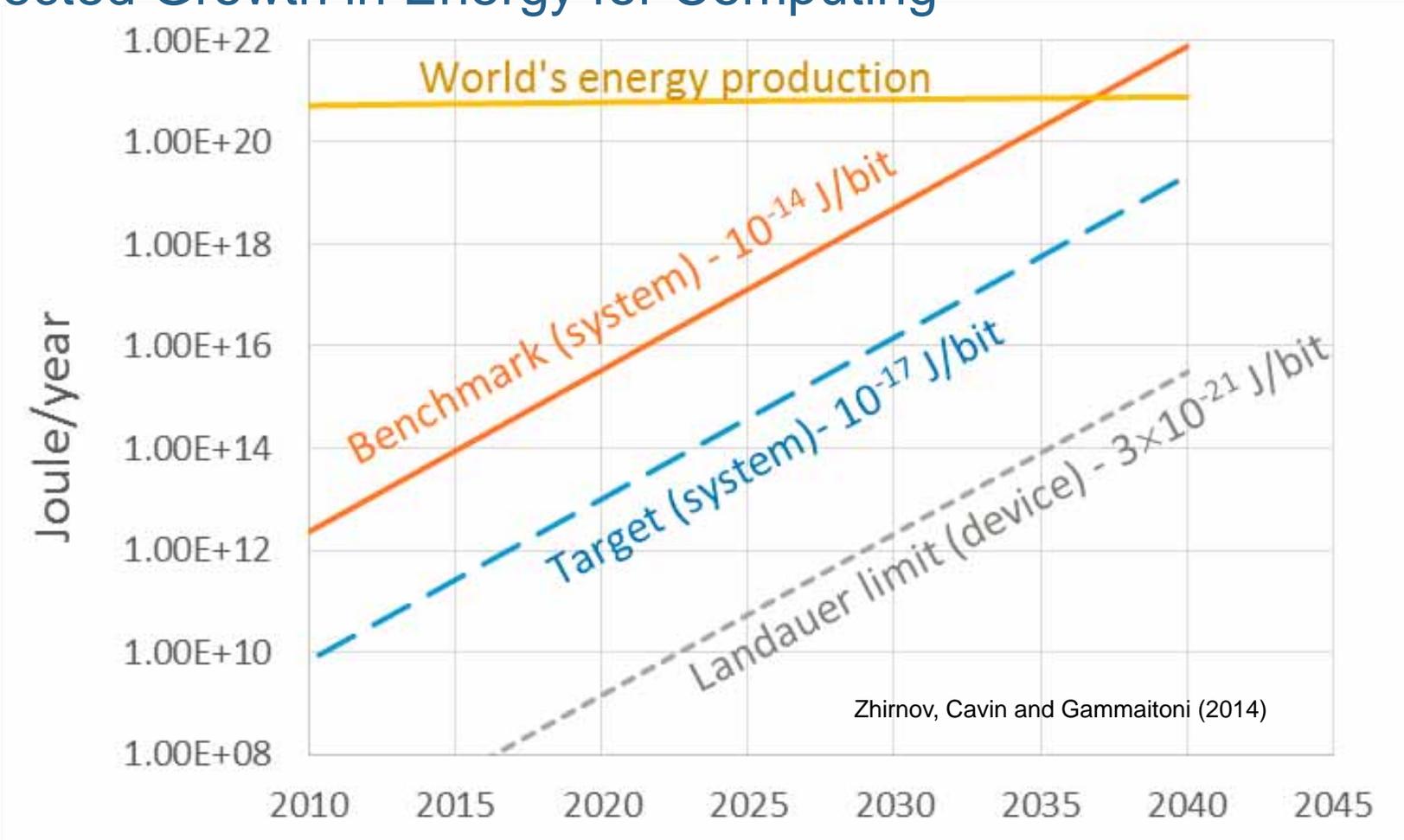


Growth in IP Blocks/SoC and Reuse

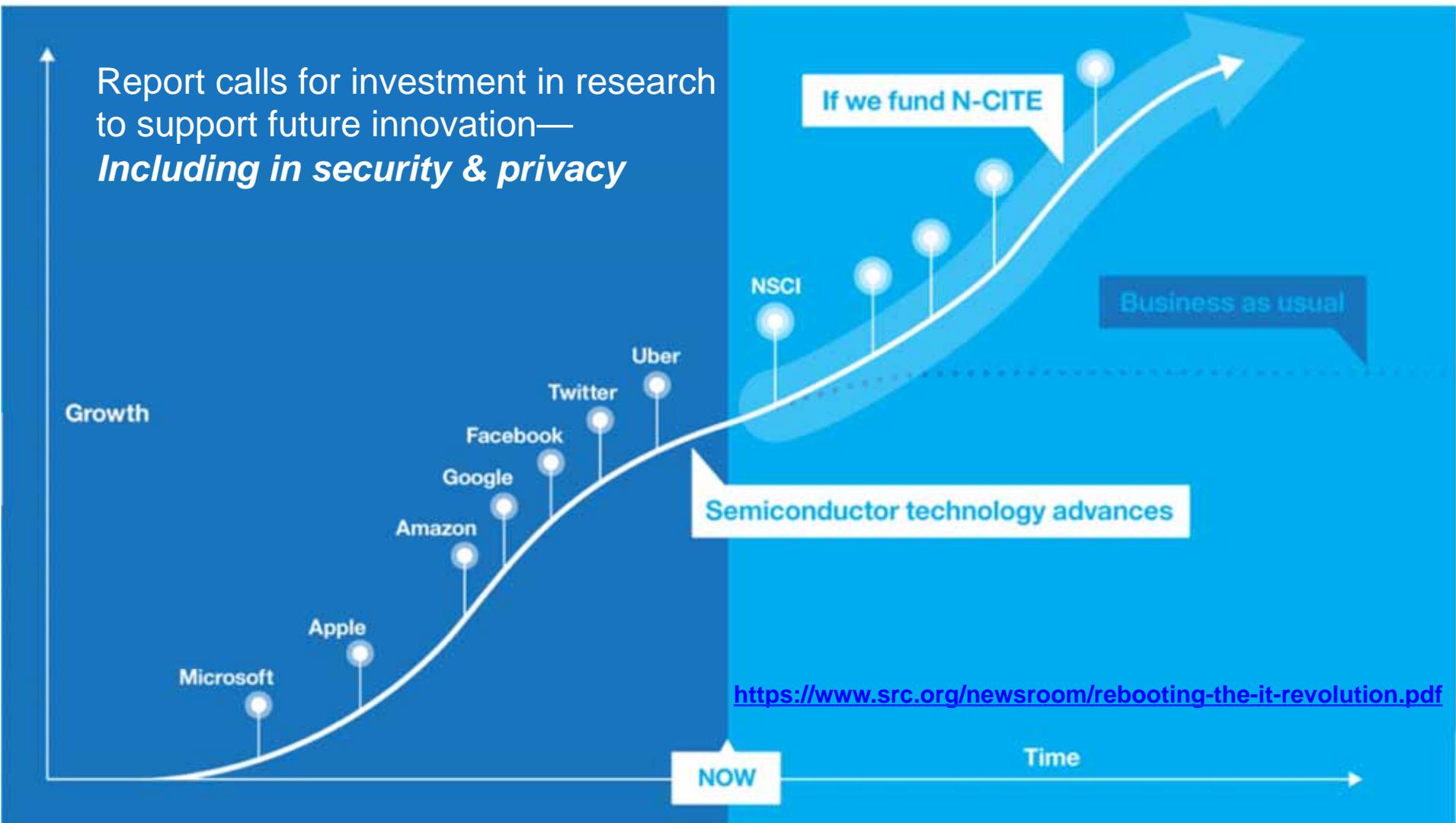


Source: ARM, <http://community.arm.com/groups/embedded/blog/2013/10/03/today-s-software-design-trend-more-acquiring-ip-than-making-ip>

Projected Growth in Energy for Computing

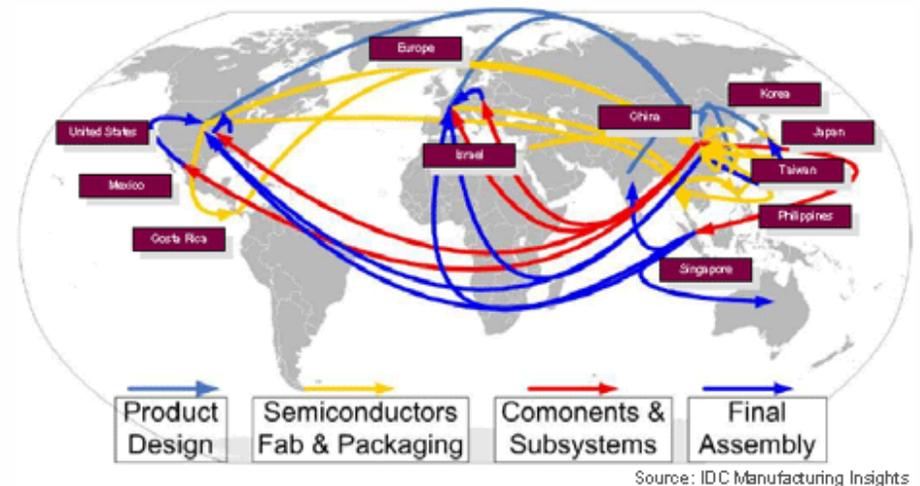


Report calls for investment in research to support future innovation—
Including in security & privacy



Security Challenges

- Security competes with other “features” in terms of cost to design/develop and area/energy/performance overhead on chip.
- Ownership of and responsibility for security of the IoT unclear.
- Hardware is not immune.
- Supply chain continues to diversify.



Thank you



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