CYBER Software sustainability pANEL COMMENTS

Chris Ramming

Director, University Collaboration Office

James.C.Ramming@intel.com

November 11, 2015

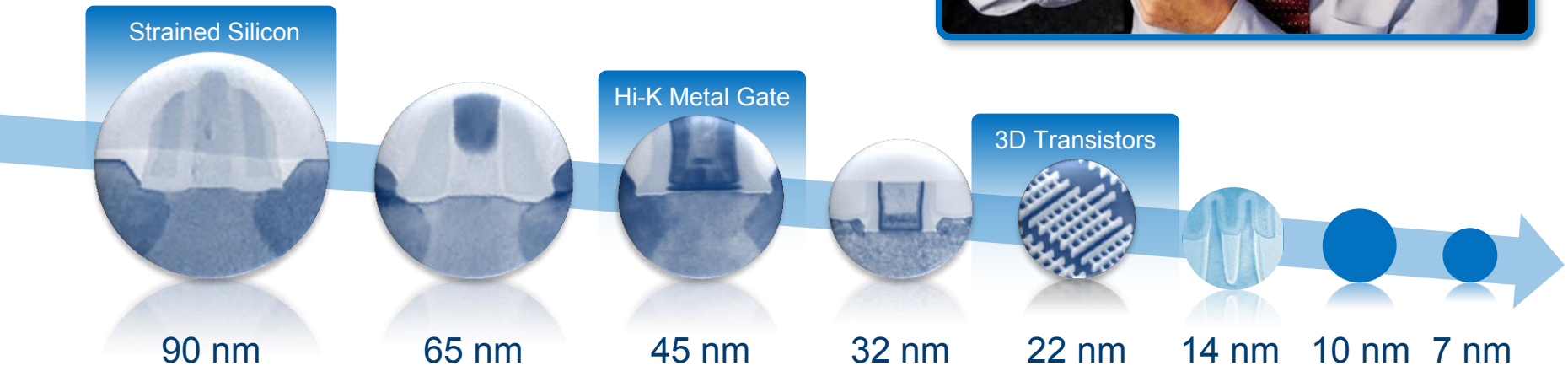
Predictable Silicon Track Record

Executing to Moore's Law

50TH Anniversary

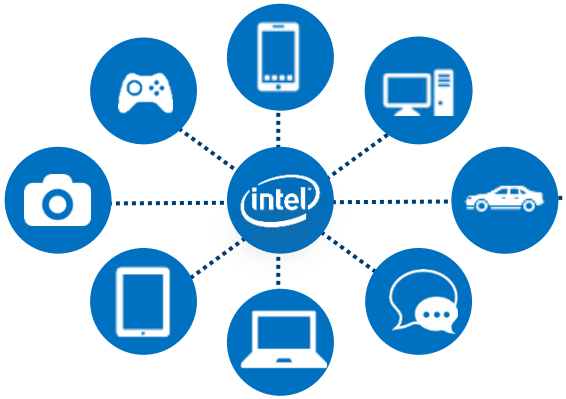
2015

Enabling new devices with higher functionality and complexity while controlling power, cost, and size



Intel Software & Services Group

SSG enhances computing and connectivity for Intel Architecture across the software ecosystem and through our software products and services.



Client Software Platforms

Network Infrastructure

Cloud API Services

Cloud and Data Center Products






Intel Software

Intel Developer Zone

MASHERY An Intel Company

AEPONA An Intel Company

Intel® Expressway Service Gateway

cloudera

Intel’s university engagements

Intel contributes

- Problem formulations
- Industry insight
- Researchers
- Funding
- Equipment

Intel

- Accelerates adoption of the best results and pursues tech transfer from researchers to the innovation ecosystem
- Provides summer internships and hires graduating students (a great form of TTP)
- Evangelizes research results (another form of TTP)

Intel-NSF Partnership

In 2014 Intel and NSF co-authored a solicitation for proposals to research security for cyber-physical systems (CPS)

- 2 grants for $1M/yr each for three years

The solicitation closed on October 31, 2014 with 9 proposals

The NSF review process identified four proposals for further review

In January 2015 NSF and Intel selected two proposals for funding

- Stanford University led “End-to-End Security for the Internet of Things”
- University of Pennsylvania led “Security and Privacy Aware Cyber-Physical Systems”

Both programs launched in late Summer 2015 with dedicated Intel staff

- Two full-time top-flight principal engineers, one focused on the research and one focused on internal TTP
- A (formative) “champion network” of part-time people to engage with the university researchers

Success stories of software sustainability and TTP at the industry-academic boundary

XYZ (TTP to Intel and its customers)

- Intel often works with faculty on foundational ideas, but later builds production software on its own regardless of how mature the academic software is

PlanetLab → GENI → SDN/NFV (TTP to academia, industry)

- Intel contributed 6 full-time programmers and engineers to help build the initial PlanetLab software infrastructure

Universal Parallel Computing Research Centers (TTP to the general parallel programming community)

- Intel contributed full-time staff to prove out key ideas like SEJITS
- Intel evangelized successful research ideas through curriculum programs

GraphLab/GraphBuilder (TTP to a startup, TTP to Intel)

- Guestrin team created GraphLab (open source), Intel contributed GraphBuilder (open source)
- “Public dedication” principles for the collaborative results

Lessons learned

Industry-academic collaborations should begin early enough to create shared intellectual context

- Bidirectional insight transfer
- Share successful ideas AND Dead-ends

Industry can shoulder the load of figuring out how a technology would be relevant

- Frees up academics to do what they do best

Work from the get-go to define a mutually relevant research agenda

- Shape solicitations, co-develop the research themes, collaborate on project definitions

Possibly interesting discussion points?

Industry structure insight is critical

- Health care, education, IOT, security

SBE context is critical

- Much security/privacy research is about technology, but the problem at its root is people
- There is an adversary with its own industry structure
- It is a “non-functional requirement” on most products

Open source transparency/security hypothesis

- Is open source the right mechanism for Cyber TTP independent of TTP?

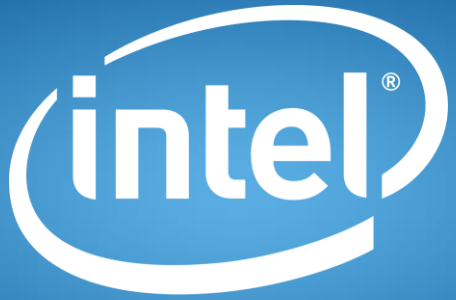
Novel organizational approaches?

- Software centers of excellence (e.g. JPL role in DARPA XDATA)
- Grow the systems research community (exampleP Dina Katabi as a TTP agent for the information theory community)
- Software infrastructure as scientific infrastructure (e.g. GENI)

Modern (social) networking infrastructure as a novel TTP foundation?

- Mechanical turk, kickstarter for research, prize authorities

What if there is a TTP success disaster that shortchanges basic research?



experience
what's inside™

Donald Stokes' framework of researcher motivation