

# Research@Intel 2011

**Justin Rattner**

Chief Technology Officer  
Intel Corporation



# Update on Intel Labs

*Delivering Breakthrough Technologies to Fuel Intel's Growth*

## Strong Research Partnerships

### INDUSTRY



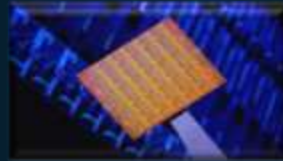
### GOVERNMENT



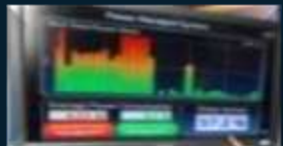
### UNIVERSITIES



## World Class Research



Processing & Programming



Energy & Sustainability



Security & Virtualization



Electronics & Photonics



User Experience & Interaction

*...and much more!*

## Efficient Technology Transfer

### INTEL PRODUCT GROUPS



### OPEN SOURCE SOFTWARE



# New Open Source Software Releases



## Distributed Scene Graph

for OpenSim multiplies the number of participants in 3D web apps (virtual worlds) by over 20x

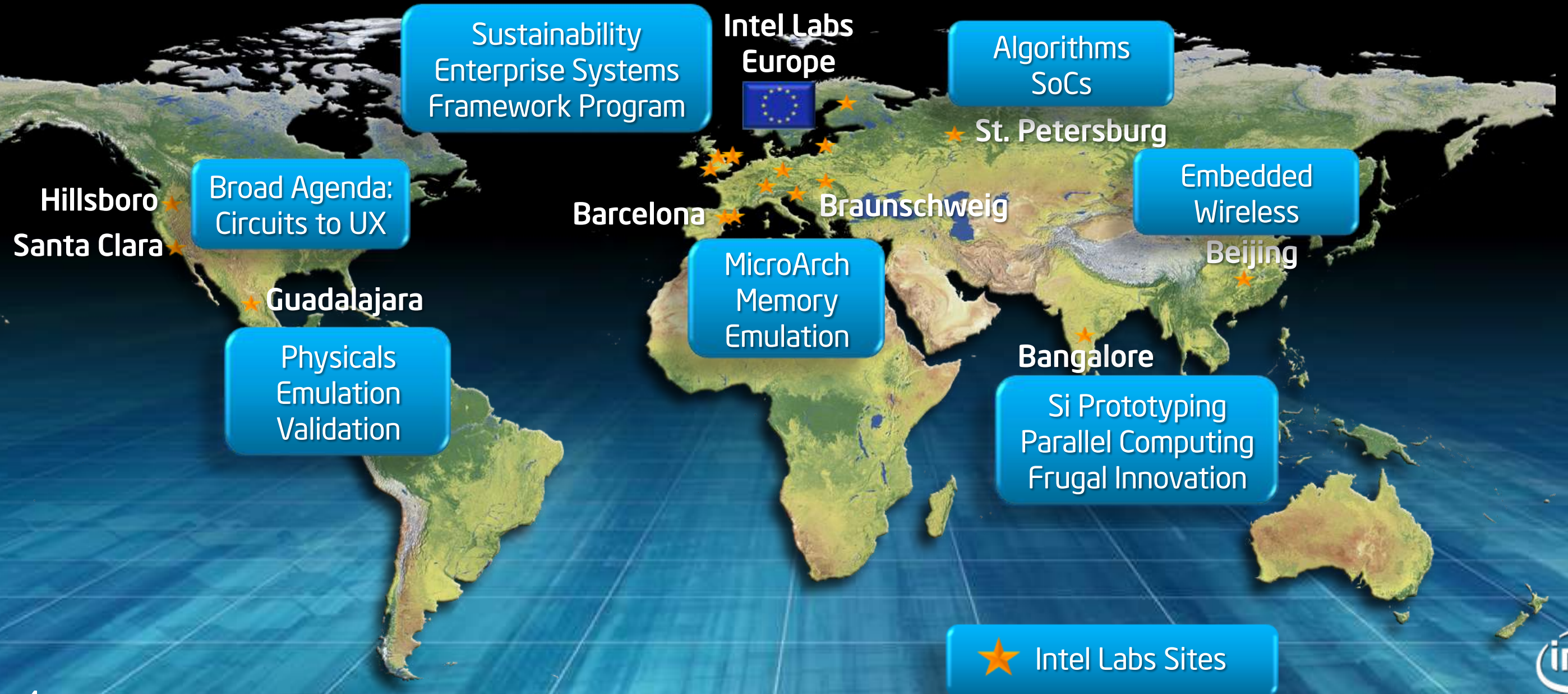


## Offline Ray-Tracing Kernels

speed photorealistic graphics rendering on IA by up to 2x

# Intel Labs Research Global Footprint

## 1000 People Worldwide



*“In the long history of humankind...  
those who learned to collaborate and  
improvise most effectively have  
prevailed.”*

- Charles Darwin



Performance ...  
Simplicity ...  
Flexibility.



Other brands and names are the property of their respective owners.



# DARPA Extreme Scale Computing Program

20MW - Exa



20KW - Peta



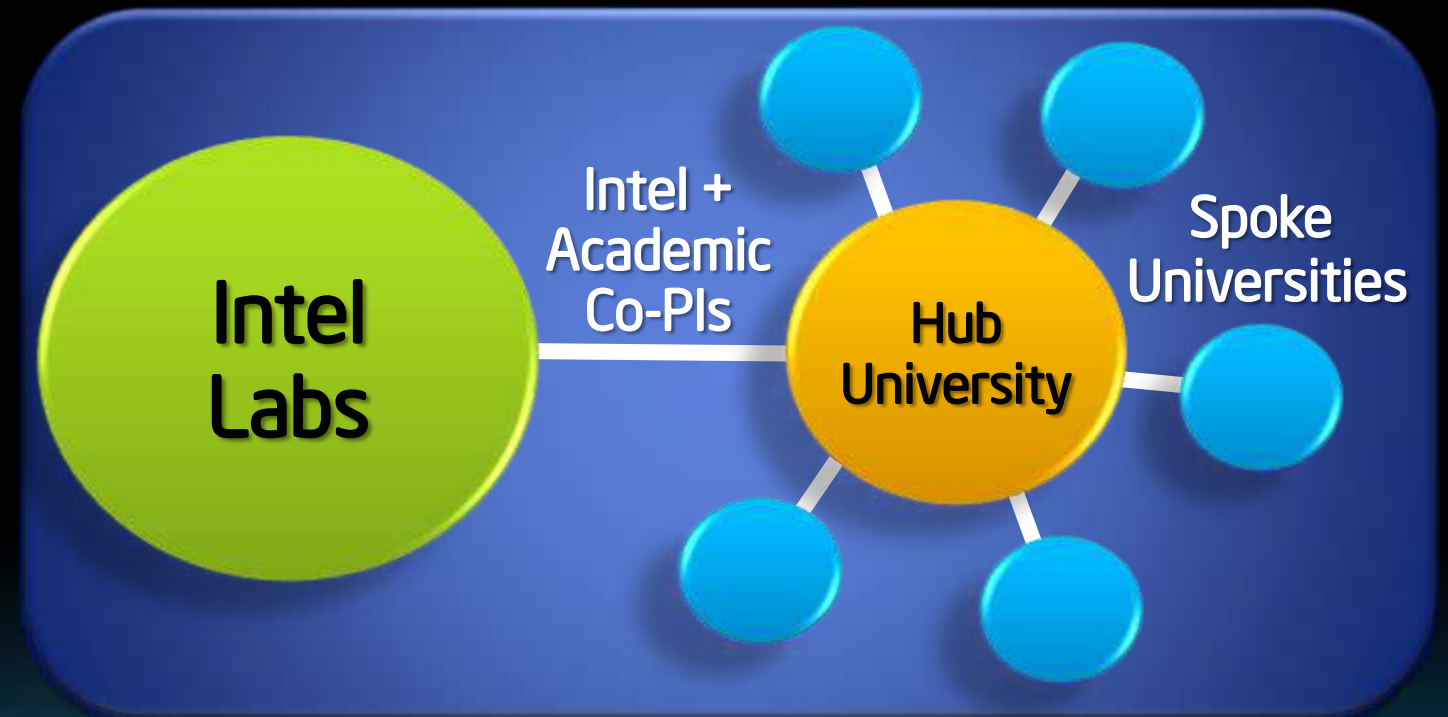
20W - Tera



- The Challenge: 1000x improvement in performance with a 10x increase in power → 20 pJ/FLOP (at the system level)
- Requires system-wide breakthroughs in new circuit topologies, new chip and system architectures, and new programming techniques

# Breaking Barriers to Academic Collaboration

## Intel Science & Technology Centers (ISTCs)



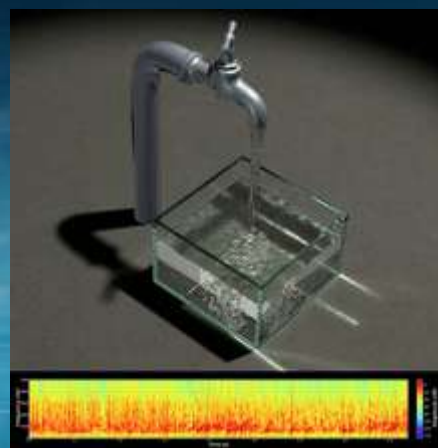
- ISTCs funded for 3+2 years and span multiple institutions
- Encourage collaboration among the best researchers in the field
- Four Intel funded researchers per center work on-campus
- Encourage collaboration between Intel and academia
- Public domain IP and open source software increase impact



# The ISTC for Visual Computing

Content creation, scalable real-time simulation, rich user-experiences

30 faculty + 50 graduate students  
+ Intel researchers



*"Recent events have given us all a wake-up call on security..."*

*I've given our company a charter to make this job one."*

**- Paul Otellini**

Interview with Charlie Rose  
February 26, 2010



# Announcing the Intel Science and Technology Center for Secure Computing



**David Wagner**

UC Berkeley  
Professor of Computer Science  
ISTC-SC Academic PI



**John Manferdelli**

Intel Labs  
Sr. Principal Engineer  
ISTC-SC Intel PI



# ISTC-SC: Community of Talented Security Researchers

## *Faculty, Graduate Students, & Intel*



# ISTC-SC Research Agenda

*Secure Computing Research for User Benefit ("SCRUB")*

## RESEARCH THRUST

## USER BENEFIT

Thin intermediation layer

Secure clients

Safe third party apps

Secure smartphones

Data centric security

Personal data privacy

Secure network architectures

Safe data transport

Secure analytics

Preventative measures



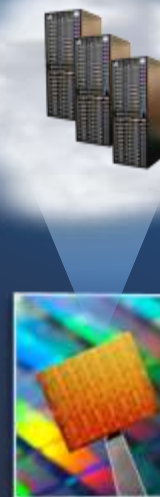
# R@I Technology Zones & Highlights

## Security



- Crypto acceleration with Intel® Processor Graphics
- Authentication of the Future

## Cloud



- Many-Core Applications Research Community
- Faster Web Apps with Data-Parallel JavaScript

## User Experience



- Steerable sound with spherical loudspeakers
- Automatic collaboration with Classmate PCs

## Visualization



- Offline photorealistic ray-tracing engine
- Magic Mirror shopping experience

# R@I Technology Zones & Highlights

## Personal Energy



- Wireless Energy Sensing Technology (WEST)
- Eco-Sense Buildings: Reimagined IT

## Platform Innovations



- 550 GOPS/Watt NTV Register File
- Variation Aware Dynamic Adaptation (V-ADAPT)

## Perceptive Edge



- Perceptive environments with low-power Wi-Fi
- Intelligent advertising framework

