

# OPEN INNOVATION @ HP LABS

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# WORKSHOP AGENDA

## – INTRODUCTION: Open Innovation @ HP Labs

- HP Labs Innovation Research Program
- Open Cirrus™ Cloud Computing Testbed
- NSF-ASEE Innovation Fellowship Program

## – GROUP DISCUSSION

- Open Innovation @ [Your Institution]
- Potential Barriers to OI and Overcoming Them



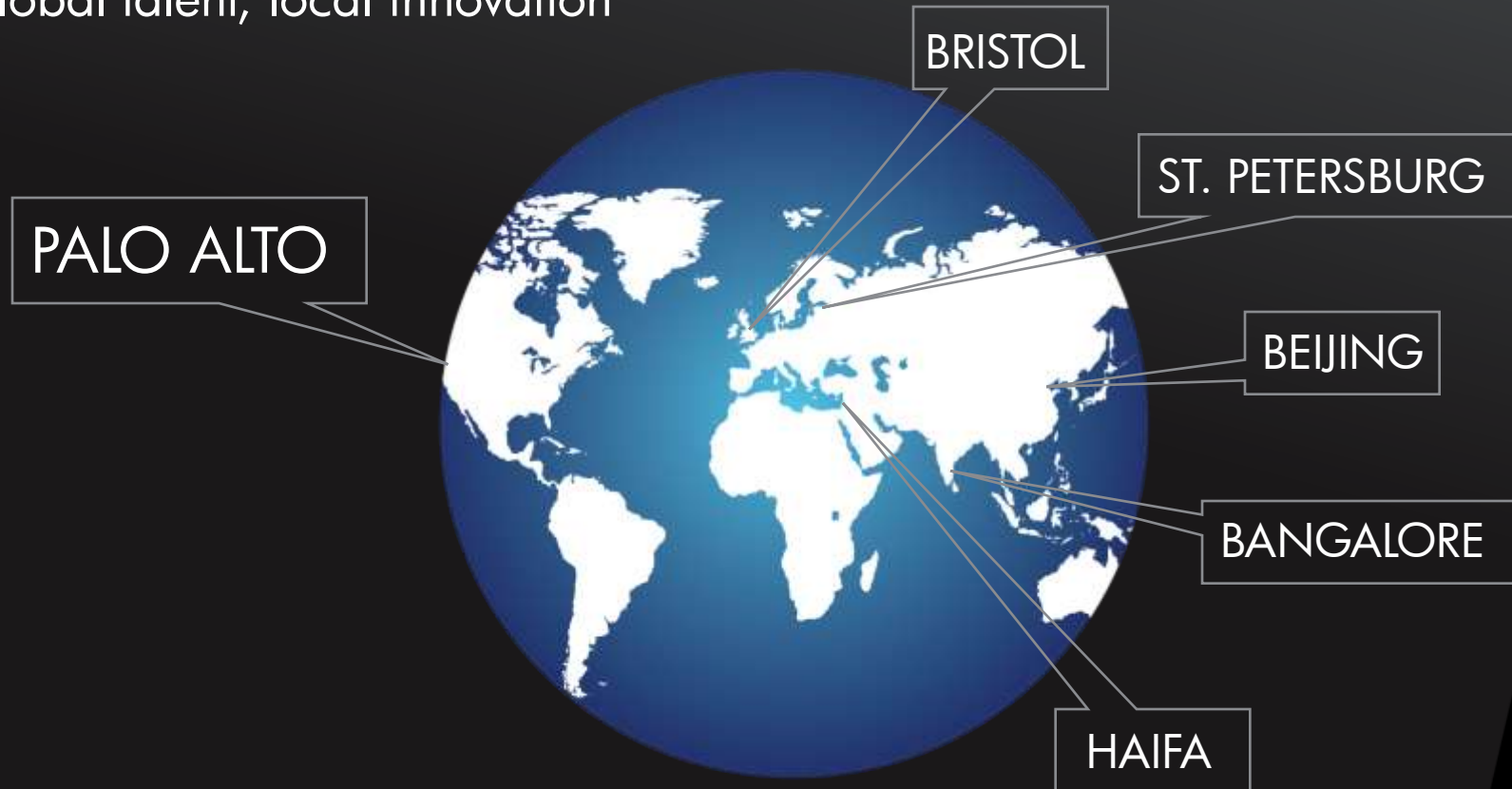
# HP LABS RESEARCH OVERVIEW

Subtitle Placeholder



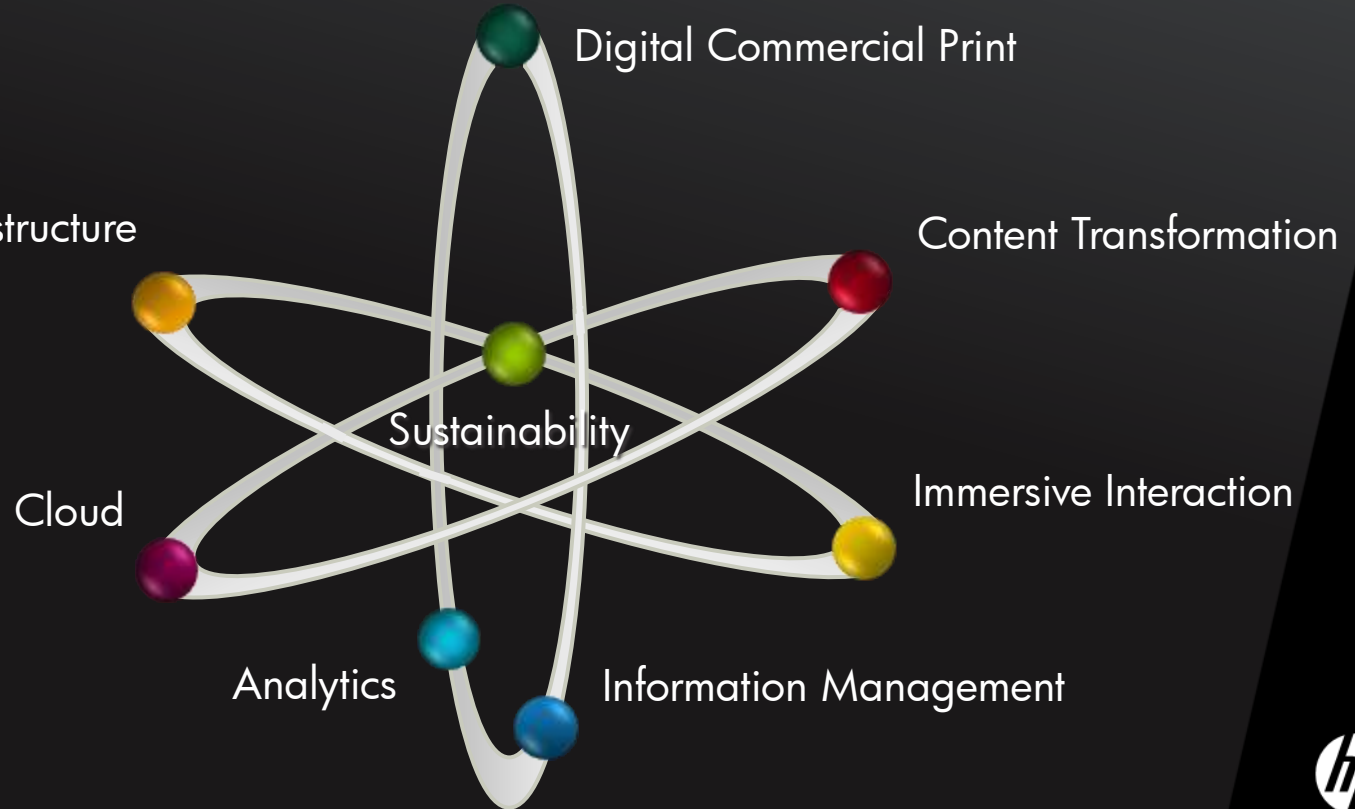
# HP LABS AROUND THE WORLD

Global talent, local innovation



# HP LABS RESEARCH PORTFOLIO

The next technology challenges and opportunities



# DIGITAL COMMERCIAL PRINT

**END STATE:** Flexible, customized, on-demand printing that replaces the traditional distribution of mass-produced materials

**HP LABS' RESEARCH CONTRIBUTION:** Breakthrough technology to accelerate the transformation to digital commercial printing

## BIG BETS:

PRINTING PROCESSES FOR  
DIGITAL COMMERCIAL PRINT

Print engine,  
high-performance materials

COMMERCIAL PRINT  
AUTOMATION

Web-based printing, intuitive  
color, creative workflow,  
quality assurance



# ● CONTENT TRANSFORMATION

**END STATE:** Complete convergence of physical and digital information

**HP LABS' RESEARCH CONTRIBUTION:** Technologies to transfer content seamlessly from paper to digital and access digital content wherever paper is used today

## **BIG BETS:**

### **DOCUMENT LIFECYCLE**

Secure, authentic; Fluid flow of information from physical to digital, and back

### **AUTOMATED PUBLISHING**

Intuitive, personalized organization; Intelligent content extraction

### **NEXT-GENERATION DISPLAYS**

Digital with the look and feel of paper; Interactive surfaces



# ● IMMERSIVE INTERACTION

**END STATE:** Intuitive human interaction through and with technology

**HP LABS' RESEARCH CONTRIBUTION:** Radically simplify the user experience to make technology more useful, intuitive and pervasive

## **BIG BETS:**

INTUITIVE AND RICH  
USER EXPERIENCES

Natural, multi-modal,  
interactions; Personal  
paradigms

SEAMLESS  
COLLABORATION

Immersive multimedia  
communication – anytime,  
anywhere – with no  
physical barriers





# ● INFORMATION MANAGEMENT

**END STATE:** The vast universe of enterprise information transformed into immediate, business-relevant insight

**HP LABS' RESEARCH CONTRIBUTION:** Redefine the twin tasks of taming and exploiting information to revolutionize enterprise decision making

## **BIG BETS:**

**TAMING THE INFORMATION EXPLOSION**

Superior analysis, extraction and delivery of enterprise content

**LIVE BUSINESS INTELLIGENCE**

Transform massive-scale, real-time data into operational business intelligence

**IT INFORMATICS**

Intelligent understanding of computer interaction

# ANALYTICS

**END STATE:** Application of mathematic and scientific methodologies create better run businesses

**HP LABS' RESEARCH CONTRIBUTION:** Drive secure, informed, highly effective decision-making

## BIG BETS:

**AUTOMATING SECURITY**  
Techniques and tools to rationalize IT security decision-making

**ANALYTICS FOR OPERATIONS**  
Enhance automation of business processes

**ANALYTICS FOR PERSONALIZATION**  
Intuitive, customized experience with information across devices



# CLOUD

**END STATE:** Everything as a Service: A world of information, opportunities and experiences, delivered wherever, however and whenever you need it

**HP LABS' RESEARCH CONTRIBUTION:** Develop an integrated cloud ecosystem, from infrastructure to services

## **BIG BETS:**

### ENTERPRISE CLOUD PLATFORM

From computing resources to human skills

### SOCIAL COMPUTING

Extracting knowledge from collective intelligence

### CLOUD SERVICES

Rich, dynamic services;  
New business models



# INTELLIGENT INFRASTRUCTURE

**END STATE:** Capture more value via dramatic computing performance and cost improvements

**HP LABS' RESEARCH CONTRIBUTION:** Radical, new approaches for collecting, storing and transmitting data to feed the exascale data center

## BIG BETS:

### NEXT-GENERATION DATA CENTERS

Exascale, photonic interconnects

### NETWORKING

Open, flexible, programmable wired and wireless platform

### NEXT-GENERATION SCALABLE STORAGE

Cloud-scale, dynamic, secure

### NON-VOLATILE MEMORY AND STORAGE

Memristor

### CeNSE

Nano-scale sensors creating a Central Nervous System for the Earth



# ● SUSTAINABILITY

**END STATE:** An IT industry with a light carbon footprint that drives the reduction of carbon emissions throughout the global economy

**HP LABS' RESEARCH CONTRIBUTION:** Displace conventional supply chains with sustainable IT ecosystems

## **BIG BET:**

### SUSTAINABLE DATA CENTERS

Integrated, end-to-end management of compute, power & cooling resources from cradle to cradle



# GOALS FOR HIGH-IMPACT RESEARCH

Commercializing innovation

Technology transfers, incubations, IP licensing

Engaging customers and partners

Richer relationships with HP

Advancing the state-of-the-art

Publications and intellectual property

Raising the profile of HP Labs

Connecting Labs' innovation to the HP brand



# OPEN INNOVATION HIGHLIGHTS



# SEVERAL “OBVIOUS” FACTS REGARDING INNOVATION

- All the innovative people in the world do not work for your organization
- Invention does not necessarily lead to innovation
- Financial resources are limited
- Market pressures require ever decreasing cycles of innovation
- Without sufficient profit margins or government funding in the short-term, long-term innovation may not be viable
- Multi-disciplinary approaches more likely to result in significant technology disruptions





# OPEN INNOVATION FRAMEWORK

Leveraging HP's world-class innovation network to discover and nurture new opportunities to improve business and life

- Assembling experts from around the world to advance thinking and foster discovery
- Leading collaboration on ground breaking programs
- Identifying the next set of technology breakthroughs



# HP LABS INNOVATION RESEARCH PROGRAM

## Program Intent

- IRP creates opportunities for breakthrough collaborative research between HPL and university researchers WW
- Goals for our RFP program
  1. Provide opportunities for HPL researchers to collaborate with current partners and explore new research relationships
  2. More actively leverage external funding to support our own investments in universities
  3. Provide stewardship over our university investments in collaborative research as a portfolio, and not just a collection of ad-hoc projects



# HP LABS INNOVATION RESEARCH PROGRAM

## Overview & Characteristics

- [http://www.hpl.hp.com/open\\_innovation/irp/index.html](http://www.hpl.hp.com/open_innovation/irp/index.html)
- Open, competitive, global call for proposals
  - NOT a “by invitation only” program – anyone interested can apply
- Annual program
  - Launched in 2008
  - Program size increased in 2009 vs. 2008
  - 2009: [60 professors](#) received Innovation Research Awards
- Proposals solicited against a specific set of targeted research topics spanning HPL’s research agenda
- Single IP framework for all projects
- Awards range \$50-\$100K per year, up to 3 year projects
  - Designed to support a professor and graduate student



# 2009 HP LABS INNOVATION RESEARCH AWARDS

60 professors, 47 universities, 12 countries

- North Dakota State University
- Purdue University
- University of Illinois at Chicago
- University of Illinois at Urbana-Champaign
- University of Michigan, Ann Arbor
- University of Michigan, Dearborn
- University of Toronto
- University of Wisconsin-Madison

- Stanford University
- University of California, Berkeley
- University of California, Davis
- University of California, Santa Barbara
- University of California, Santa Cruz
- University of California, San Diego
- University of Southern California
- University of Washington

**Americas**

- Arizona State University
- Brown University
- Emory University
- Georgia Institute of Technology
- Virginia Tech
- Carnegie Mellon University
- New Jersey Institute of Technology
- State University of New York at Buffalo
- Rochester Institute of Technology
- Worcester Polytechnic University
- Wright State University

- Imperial College London, England
- University of Bristol, England
- University of Leeds, England
- University of Newcastle, England
- University of Surrey, England

- Humboldt Universitaet zu Berlin, Germany
- Konstanz University, Germany
- Technische Universitaet Berlin, Germany
- Technische Universitaet Muenchen, Germany
- University of Koblenz-Landau, Germany
- Universidade do Minho, Portugal
- Russian Academy of Sciences, Russia
- University of Saint-Petersburg, Russia

- Bilkent University, Turkey
- Technion, Israel Institute of Technology, Israel

**EMEA**  
Europe, Middle East  
& Africa

- Indian Institute of Technology, Bombay, India

- Peking University, China
- Tsinghua University, China
- Korea Advanced Institute of Science and Technology, Korea

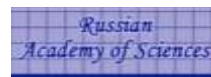
**APJ**  
Asia-Pacific & Japan

- University of Canterbury, New Zealand

# ● OPEN CIRRUS CLOUD RESEARCH TESTBED

Open innovation with industry, academic, government partners

- Multi-datacenter, multi-geography, multi-tenant
- Open, secure, internet-scale  
1000-4000 cores  
Petabyte of storage
- Centers of Excellence around the globe



# ASEE-NSF INDUSTRY RESEARCH FELLOWS

<https://aseensfip.asee.org/>

- Opportunity for recent engineering PhD recipients to conduct postdoctoral research in a corporate setting
- Research fellows receive a stipend of at least **\$75,000**
  - Host companies provide a minimum of \$27,500 and other non-cash support
  - With generous support from the National Science Foundation (NSF), this program will support 40 positions for a one-year appointment



# CASE STUDY: POST DOCS AT IQSL



## OBJECTIVE

Contribute to HPL's exploratory research agenda in Information and Quantum Systems, including information theory, quantum mechanics, photonics, and nano-electronics.

## OUTCOMES

- “The really excellent post docs not only do a great job on the projects assigned to them, but they are the ones who start up a project of their own that winds up being a part of our portfolio. Thus, **the post docs we hire into IQSL create their own jobs.**”
- ...post-docs at HP Labs learn an important skill not usually taught in academia: **writing high-quality patent applications.**” – *Stan Williams, Director IQSL*
- IQSL has been recognized in recent years for the quality of its IP portfolio, to which post-docs have made significant contributions.

# CASE STUDY: POST DOCS AT IQSL

## OBJECTIVE

Contribute to HPL's exploratory research agenda in Information and Quantum Systems, including information theory, quantum mechanics, photonics, and nano-electronics.

### Key outcomes:

- Post-docs since 1995: 42
- At IQSL in 2009: 16
- Number obtaining permanent positions at HP: 9
- Number now research professors: 9 (5 tenured)
- Number starting new company with technology licensed from HP: 1

### Publications and Presentations:

- Number of papers in refereed journals co-authored by post-docs: over 250
- Highest number by a single post-doc: 17
- Number of major conference presentations by post-docs: over 100
- Several best paper and best poster awards
- Hundreds of US Patent Applications filed with post-docs as inventors/co-inventors



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# GROUP DISCUSSION

Talk amongst yourselves...  
(I'll give you a topic)



# OPEN INNOVATION @ [YOUR INSTITUTION]

- Topic 1: Open Innovation @ your home
  - Share what initiatives you have underway
  - Brainstorm about new initiatives
- Topic 2: Potential Barriers to Open Innovation
  - Identify potential barriers to success
  - Share experiences and best practices



# LESSONS LEARNED FROM COLLABORATING WITH EXTERNAL ORGANIZATIONS

- Shared risk partnership (it's all about relationships)
- Complementary expertise and experience
- New perspectives from other industries
- Clear requirements and dependencies
- Start small
- Technical papers and not PowerPoint
- Reasonable IP terms
- “Short term” attitude often largest hurdle to innovation



THANK YOU!

