OPEN INNOVATION THE HP LABS WAY

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HP Labs Strategy and Innovation Office
ASEE ERC – March 15-18 2010

PRESENTATION AGENDA

– Open Innovation @ HP Labs

– HP Labs Innovation Research Program

– Open Cirrus™ Cloud Computing Testbed

– NSF-ASEE Industry Fellowship Program

– Lessons Learned

– Final words

– Invitation

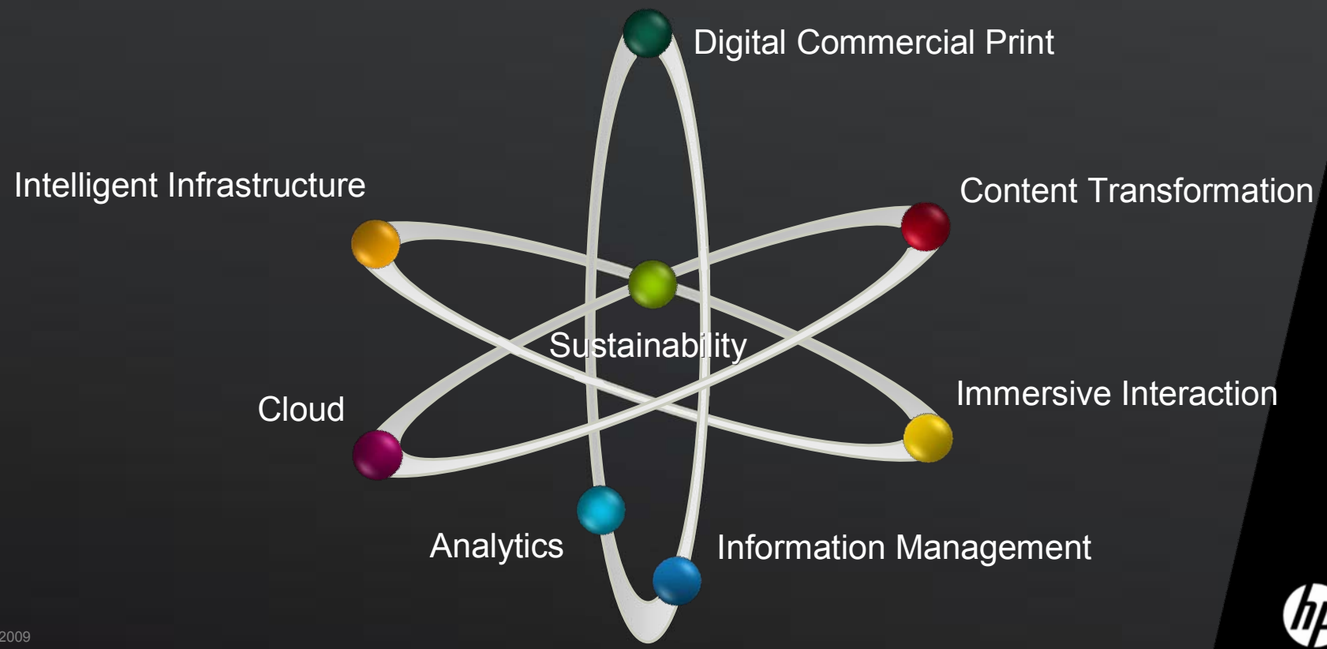
HP LABS RESEARCH OVERVIEW

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

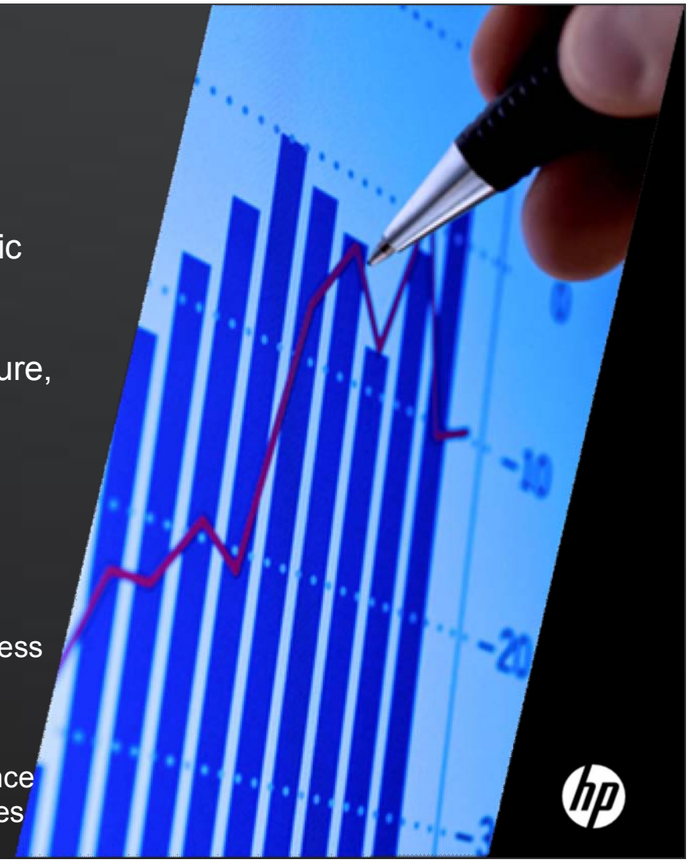
HP LABS' RESEARCH CONTRIBUTION: Drive secure, informed, highly effective decision-making

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 INFRASTRUCTU

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

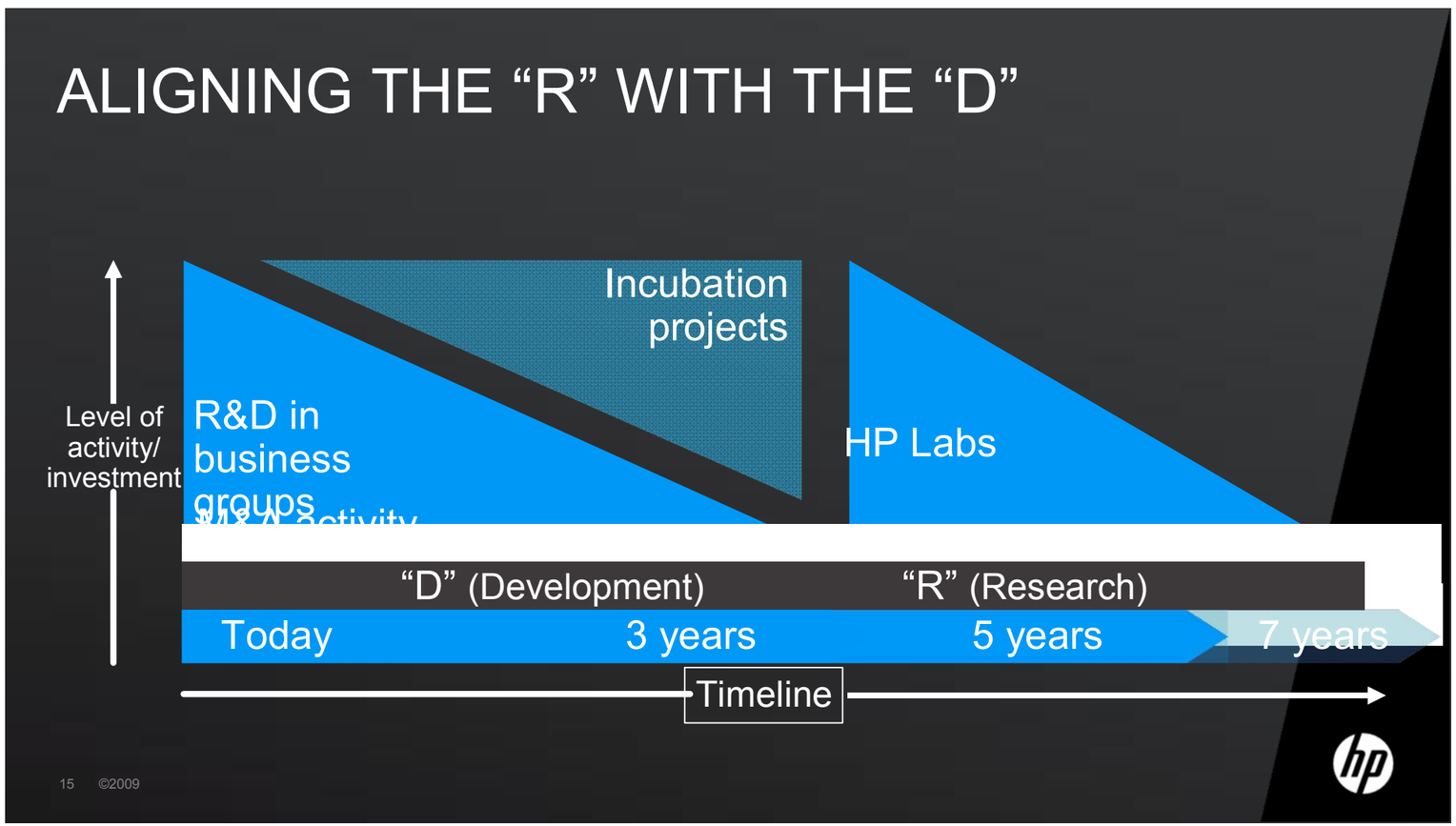
BIG BET:

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

GOALS FOR HIGH-IMPACT RESEARCH

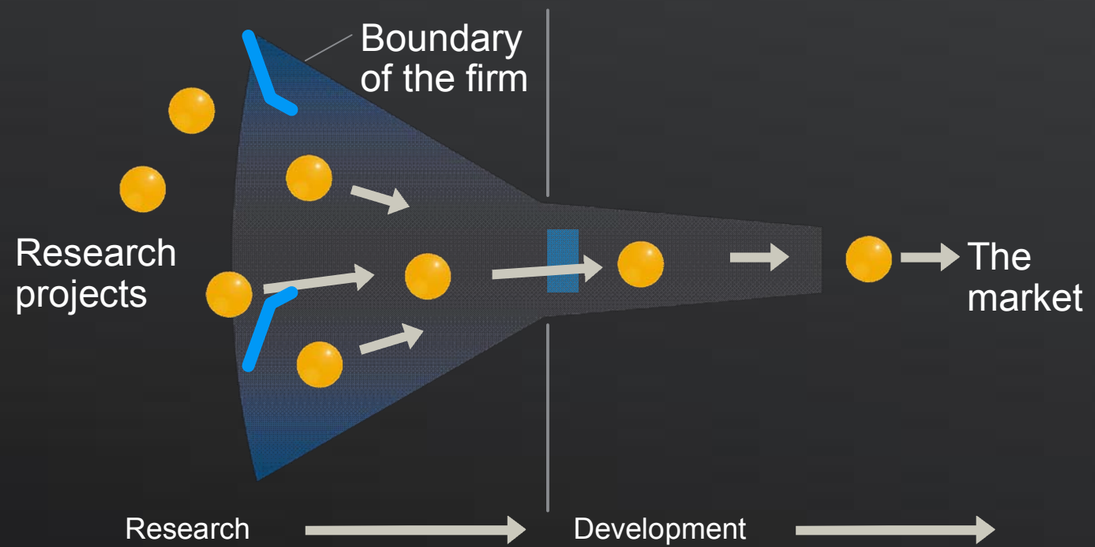
Commercializing innovation	Technology transfers, incubations, IP licensing
Engaging customers and partners	Richer relationships with HP
Advancing the state-of-the-art	Publications and intellectual property
Raising the profile of HP Labs	Connecting Labs' innovation to the HP brand

ALIGNING THE “R” WITH THE “D”



THE CLOSED INNOVATION MODEL

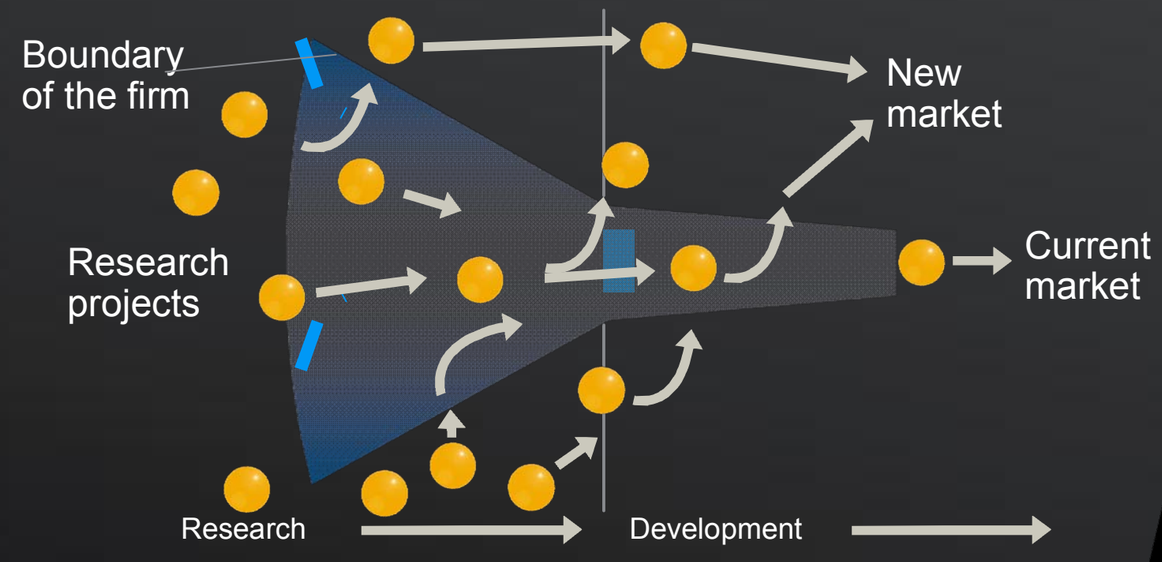
The classic research lab



Source: Henry W. Chesbrough 'The Era of Open Innovation', MIT Sloan Review, Spring 2003

THE OPEN INNOVATION MODEL

Successful companies require partnerships



Source: Henry W. Chesbrough 'The Era of Open Innovation', MIT Sloan Review, Spring 2003

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 @ HP LABS

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

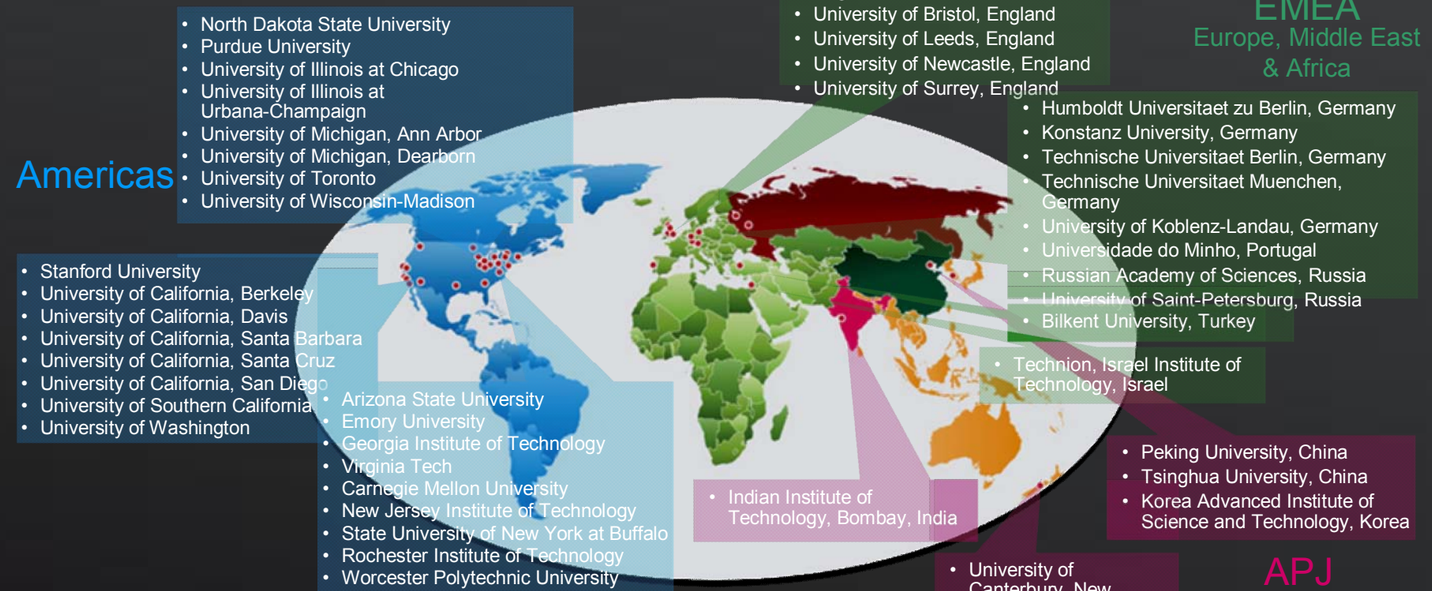
HP LABS INNOVATION RESEARCH PROGRAM

Overview & Characteristics

- http://www.hpl.hp.com/open_innovation/irp/index.html
- 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 awards, 46 universities, 12 countries



Americas

- 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
- Arizona State 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

EMEA

Europe, Middle East & Africa

- 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
- Indian Institute of Technology, Bombay, India

APJ

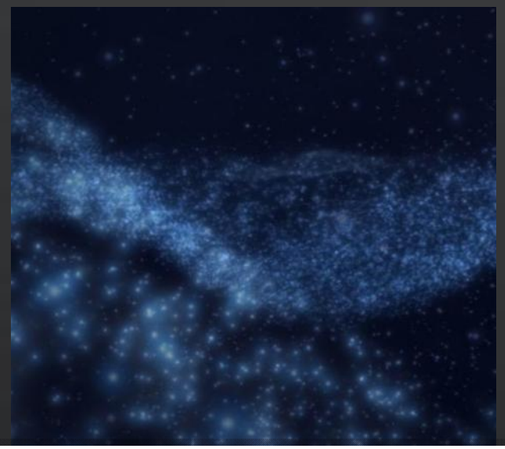
Asia-Pacific & Japan

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



https://opencirrus.org

OPEN INNOVATION AND TALENT EXPERIENCES

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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ASEE-NSF INDUSTRY RESEARCH FELLOWS

https://aseensffs.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

PROGRAM DETAILS

- "First come – first served" process
- ASEE website
  - For applicants to submit their info (résumés, areas of interest, credentials, etc)
  - For industry research labs to post their hosting opportunities (labs, projects, research contacts, etc)
- Industry hosts review applicants' profiles and select those to be interviewed
  - Corp labs tell potential candidates about program so they may apply

https://aseensfip.asee.org

OUTCOMES @ MARCH 12TH 2010

- Of 40 available positions, more than 50% are already spoken for
  - 11 fellowships have already begun
  - 8 are in the process of being finalized with start dates of June 1st
  - 5 “matches” are progressing toward the agreement stage
- More than 100 qualified fellowship candidates have not yet been matched with jobs and just over 100 posted positions have not yet been filled
- Hewlett Packard and General Motors hosting fellows as well as spin-off corporations from the engineering schools at MIT, Drexel, and Georgia Tech, among others
  - 47 Companies from 21 states
- The range of the research undertaken is richly varied
  - From work on high-tech prosthetics to synthetic biology to sustainable energy & water delivery systems to nanotechnology to networks and cloud computing

47 COMPANIES @ MARCH 12TH 2010

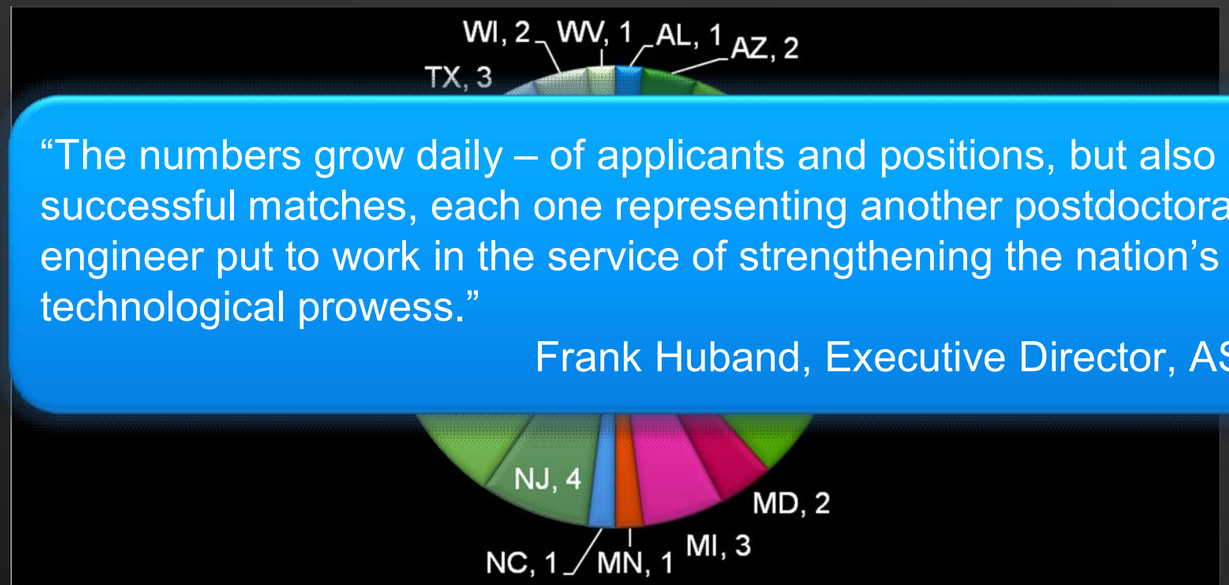
1. A. O, Smith Corporation
2. Advanced Dynamics Corporation
3. Alcoa, Inc.
4. Alcatel-Lucent
5. Alias-i Inc.
6. American S
7. Amethyst R
8. Aprecia Pha
9. Axion Biosy
10. Bentley Sys
11. BioCee, Inc.
12. Brainstorm Technology LLC
13. Bristol Myers Squibb Co
14. Cohera Medical, Inc.
15. CorInnova, Inc.
16. Covidien
17. Engineering and Scientific Research Associates
18. Ford Motor Company
19. General Motors Global R&D
20. General Motors LLC
28. MathWorks
29. Microfluidic Innovations
30. Momentive Performance Materials
31. Niagara Bottling, LLC
32. PARC
33. PMC Group, Inc
34. Praxair
35. SABIC Innovative Plastics
44. The Procter & Gamble Company
45. Valmont Newmark
46. Weidlinger Associates, Inc.
47. Y-Carbon, Inc.

"We are very supportive of the initiative. We have a long tradition of hosting Post Docs and know the great value that it brings to the Post Doc and to us. Any support that the NSF can provide to allow for growth of this mechanism will be, in our opinion, of great benefit to society and industry."

Debasis Mitra Chief Scientist's Office,
Vice President Bell Labs, Alcatel-Lucent

STATE DISTRIBUTION

@ MARCH 12TH 2010



"The numbers grow daily – of applicants and positions, but also of successful matches, each one representing another postdoctoral engineer put to work in the service of strengthening the nation's technological prowess."

Frank Huband, Executive Director, ASEE

"Such a program would be good for R&D workforce development and recovery. We worry a lot about the corporate R&D environment, as this is a primary market for our tools, and scientists as described in the program are our primary customers."

Cleve Moler, Chief Scientist at The MathWorks

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

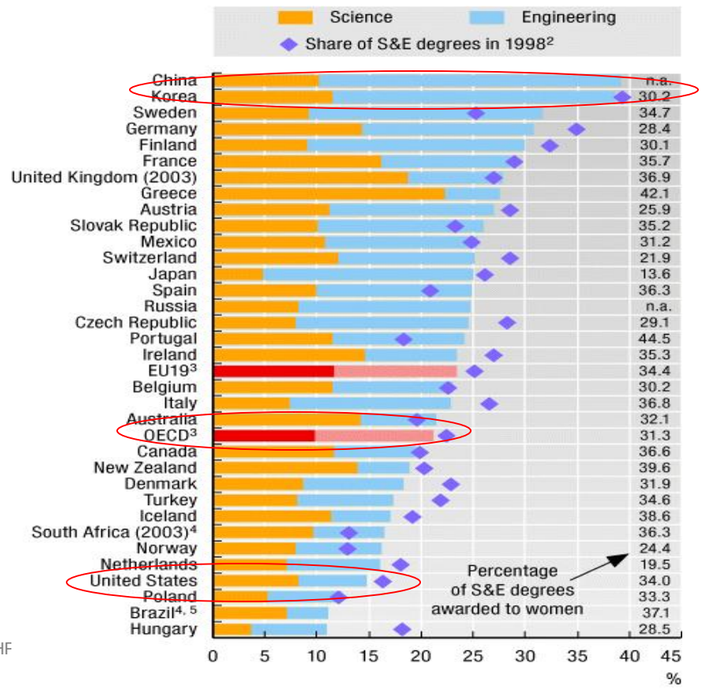

CONCLUDING REMARKS

THE COMPETITIVE EDGE OF THE UNITED STATES ECONOMY HAS ERODED SHARPLY OVER THE LAST DECADE

- The recent report of the Information Technology and Innovation Foundation states that*:
  - United States ranks sixth among 40 countries and regions, based on 16 indicators of innovation and competitiveness
  - America's lead in science and technology is "eroding at a time when many other nations are gathering strength."
  - Recommendations include
    - Federal incentives for American companies to innovate
    - Programs to improve workforce skills of local people

* NY Times Feb 25 2009; Information Technology and Innovation Foundation, a non partisan research and educational institute/think tank, whose mission is to formulate and promote public policies to advance innovation and productivity, internationally, in the US and the US States www.itif.org

COUNTRIES ALL OVER THE WORLD ARE BETTING ON THEIR S&E TALENT FOR ECONOMIC DEVELOPMENT



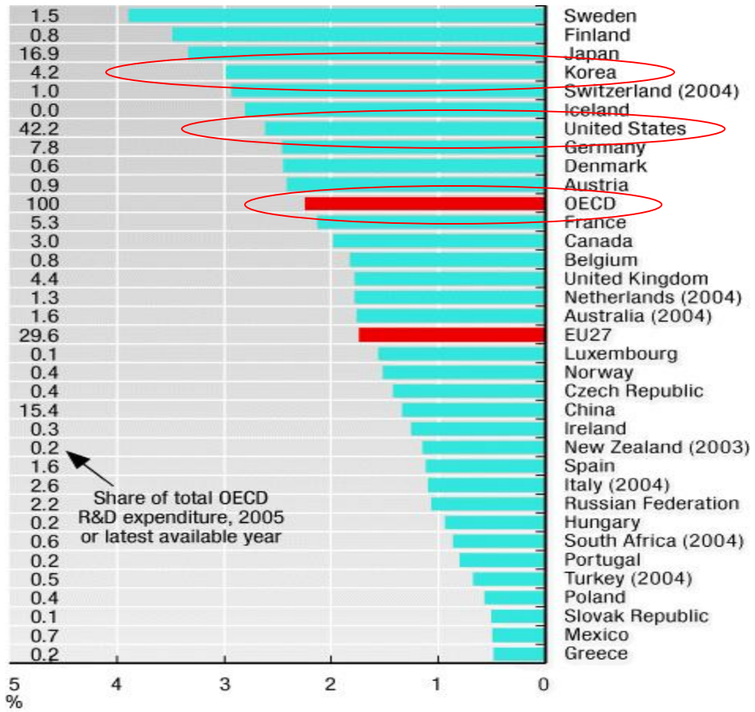
SCIENCE AND ENGINEERING DEGREES, 2004, AS A PERCENTAGE OF TOTAL NEW DEGREES

Notes:

1. 2003 for doctoral degrees in science and engineering.
2. 1999 instead of 1998 for the Slovak Republic and Denmark; 2000 for Portugal and Belgium. These four countries as well as Greece and Luxembourg are excluded from the calculations of EU19 and OECD in 1998.
3. Excludes Luxembourg. 2003 data for the United Kingdom.
4. ISCED 5B programs are included with ISCED 5A/6.
5. Share of S&E degrees awarded to women is for 2003.

Source: OECD Science, Technology and Industry Scoreboard 2007

… AND ON INNOVATION



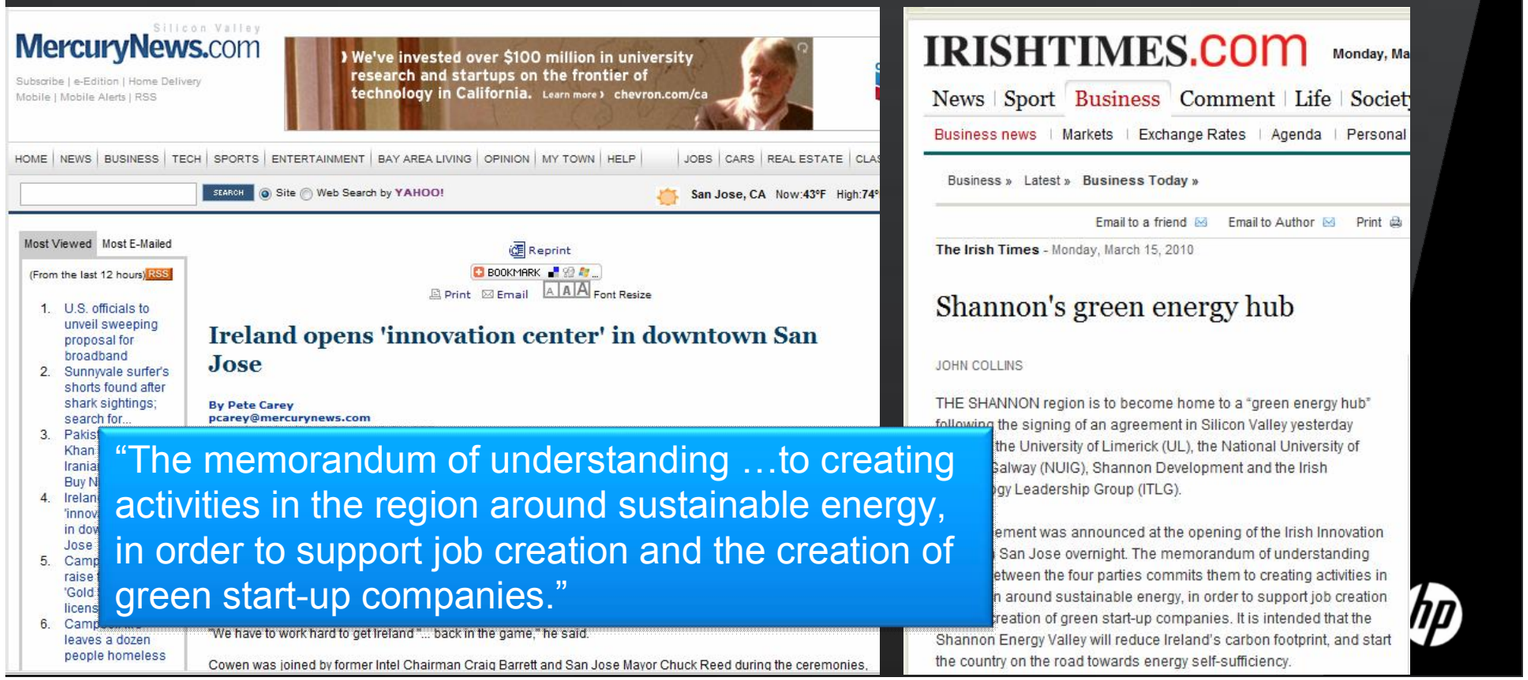
R&D INTENSITY, 2005

Notes:

1. Gross domestic expenditure on R&D as a percentage of GDP.
2. Data are adjusted up to 1995.
3. USD of 2000 in purchasing power parity (PPP).

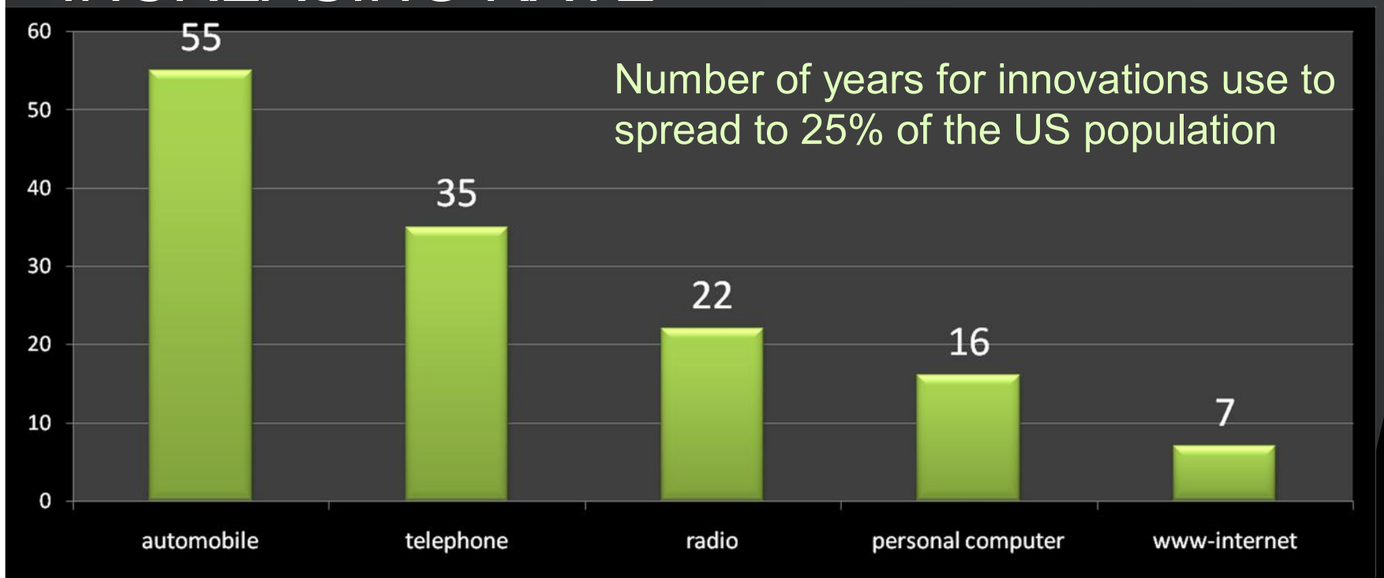
Source: OECD's Science, Technology and Industry Scoreboard 2007

IRELAND – MARCH 15TH 2010



"The memorandum of understanding …to creating activities in the region around sustainable energy, in order to support job creation and the creation of green start-up companies."

INNOVATION IS DIFFUSING AT AN EVER-INCREASING RATE



Source: Innovate America, a 2004 report from the Council on Competitiveness

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NEED TO ENHANCE PUBLIC-PRIVATE RESEARCH PARTNERSHIPS IS VITAL

"U.S. support and rewards system for R&D and technology-based innovation has become inconsistent and fractured, while several countries around the globe have created an environment that promotes collaboration and innovation.

…enhancing engagement of the private sector, including companies and foundations, with researchers in academia and government laboratories is increasingly vital to the health of the U.S. R&D enterprise and our technology-based economy".

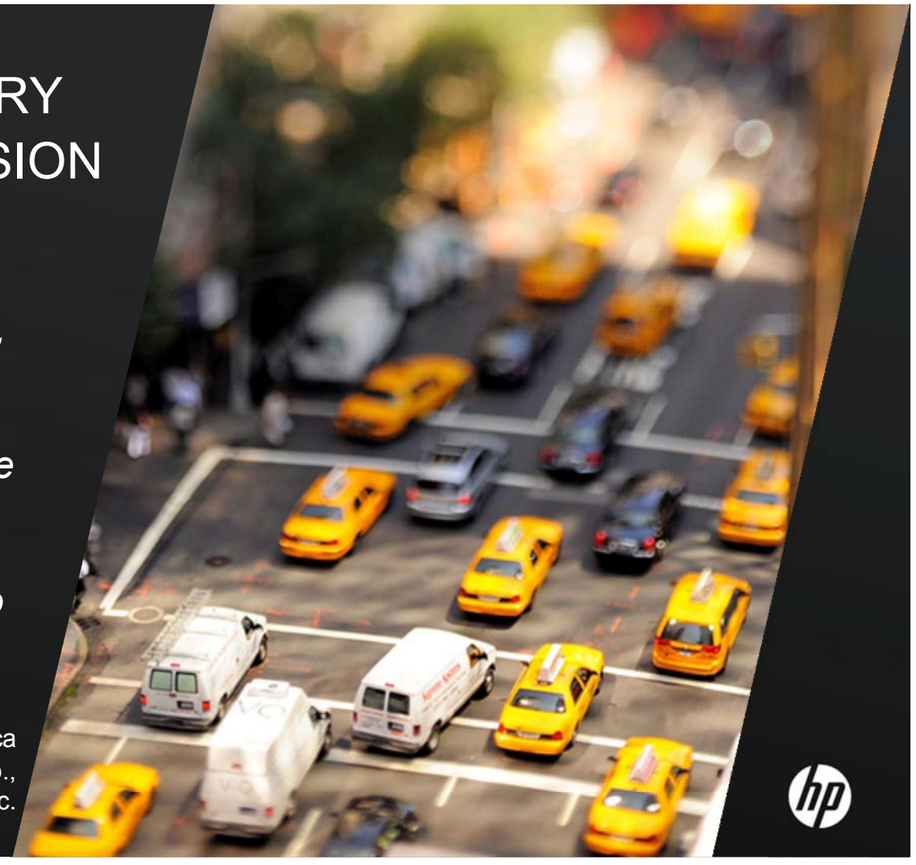
Source: President's Council of Advisors on Science and Technology (PCAST) report, "University-Private Sector Research Partnerships in the Innovation Ecosystem", http://www.ostp.gov/galleries/PCAST/past_research_partnership_report_BOOK.pdf

ENGINEERING IS A VERY DEMANDING PROFESSION

"…for students to succeed as engineers, they must acquire skills that go far beyond theories, simulations and exam-taking

...there is absolutely no substitute for the hard edged technical and business skills that are required to bring products and projects to market."

Bernard M. Gordon, founder of NeuroLogica Corp., founder & former chair of Analogic Corp., and co-founder of Epsco Inc.



WORLD ENGINEERING EDUCATION FORUM (WEEF)

Oct 17-22 2010 - Singapore

How can innovation and global collaboration in engineering education address Grand Challenges for Engineering?

Something for Everyone! Engineering Deans, Faculty, Students, Industry, Government

5 Events

1st Global Conference of the Global Engineering Deans Council

9th Annual ASEE Global Colloquium

12th IACEE/WCCEE Meeting

4th IFEES Summit

7th Global Student Forum

HTTP://WEEF2010.WORDPRESS.CO

About WEEF 2010

Search

Thank you for your interest in the World Engineering Education Forum! Conceptualized by the American Society for Engineering Education (ASEE) and the International Federation of Engineering Education Societies (IFEES), the WEEF will be a rare opportunity to meet and have discussion with stakeholders from all stages of the engineering education pipeline. Read on for more detailed information.

World Engineering Education Forum

"Effective Collaborations Addressing Common and Global Challenges"

17th – 22nd October 2010

Singapore

SUMMARY

A global gathering of engineering education stakeholders to improve the field through enhanced dialogue on the major challenges and through increasing the effectiveness of global partnerships, harnessing the expertise and commitment of the international community and of the local and regional players.

BACKGROUND

Pages

- About WEEF 2010
  - Global Engineering Deans Council
  - WCCEE (IACEE)
  - ASEE Global Colloquium
  - Global Student Forum
  - IFEES Summit
- Forum Hosts and Venue
- Important Documents
- Photos of Singapore
- Registration Information

Blogroll

- Economist Article on the Demand for Green Engineers
- Foreign Affairs Article on Geoengineering
- WordPress.com
- WordPress.org

Categories

- Program Grid Updates (7)
- Uncategorized (20)

THANK YOU!