

Innovation in the 21st Century

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New blueprint for research

- High-impact research
- **Open innovation**
- Technology transfer



History of innovation

HP first laser printer

HP Indigo Digital Press

Thermal Inkjet Printing

Memory Spot Chip

Anti-counterfeiting

HP's first computer: the HP 2116a

RISC Architecture

HALO Life Size Collaboration

Dynamic Smart Cooling

HP-35, the first scientific handheld calculator

Product Tracking

"SHREK-2" Flexible Computing

Visualization Pixel bar chart

Social Networking Email Spectroscopy

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

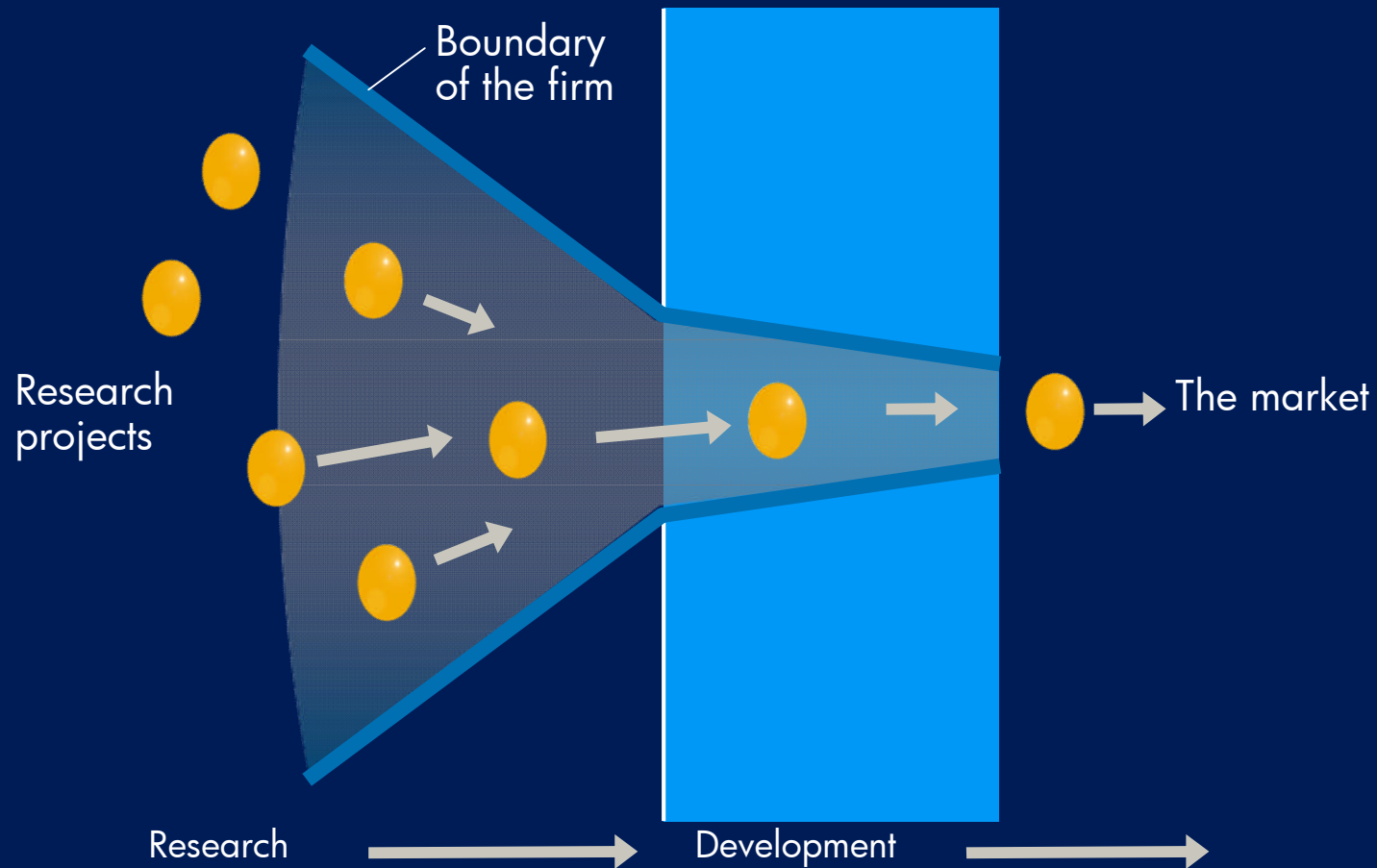
Open Innovation Defined

“Open innovation is the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively. [This paradigm] assumes that firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as they look to advance their technology.”

-Henry Chesbrough

The Closed Innovation Model

The classic research lab

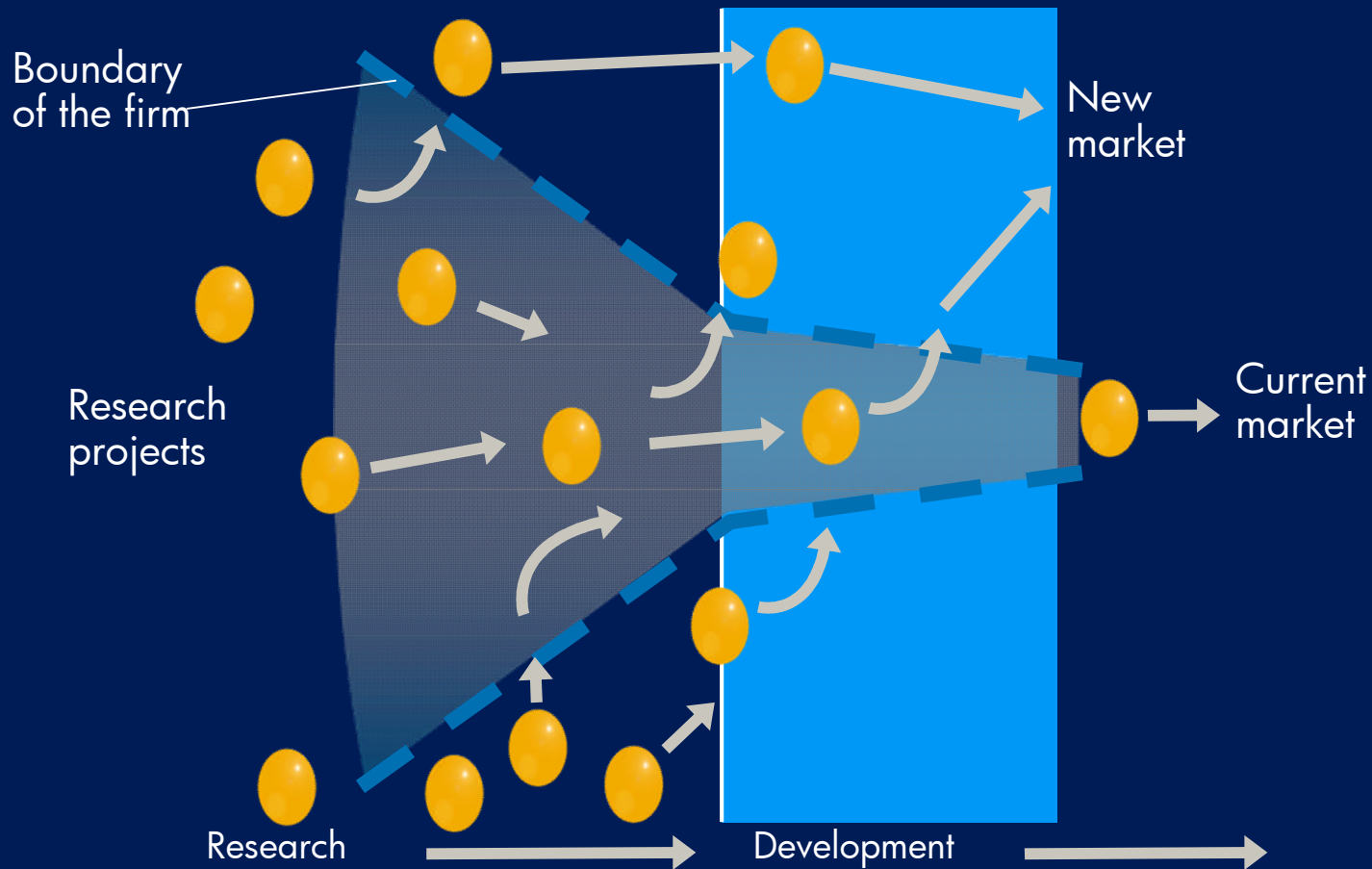


Source: Henry W. Chesbrough 'The Era of Open Innovation', MIT Sloan Review, Spring 2003

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The Open Innovation Model

Successful companies require partnerships



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Open innovation framework at 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
- www.hpl.hp.com/open_innovation/



Open Innovation Principles

- Focus with Strategic Intent
- Ambitious not Incremental
- Quality, not Quantity
- Discover New Ideas



Open innovation

Collaboration with academia, government and companies

- HP Labs Innovation Research Program
- HP, Intel, Yahoo! Cloud Computing Research Test Bed
- HP IdeaLab



2008 HP Labs Innovation Research Awards

41 awards, 34 universities, 14 countries, 1 world

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

- University of Toronto
- Carnegie Mellon University
- Massachusetts Institute of Technology
- State University of New York at Buffalo
- Rochester Institute of Technology

- University of Edinburgh, Scotland
- University of Bath, England
- University of Leeds, England
- University of Bristol, England

- Konstanz University, Germany
- Technische Universitaet Muenchen, Germany
- Vrije Universiteit Amsterdam, Netherlands
- Universidade do Minho, Portugal

- Russian Academy of Sciences, Russia
- University of Saint-Petersburg, Russia

- Bilkent University, Turkey

- Technion, Israel Institute of Technology, Israel

- National Institute of Informatics, Japan

- Peking University, China
- Tsinghua University, China

- Nanyang Technological University, Singapore

- Indian Institute of Technology, Madras, India
- Indian Institute of Technology, Bombay, India

EMEA
Europe, Middle East & Africa

APJ
Asia-Pacific & Japan

Americas

- University of Illinois at Urbana-Champaign
- University of Michigan
- University of Wisconsin-Madison
- Purdue University
- Georgia Institute of Technology

12 August 2008

HP/Intel/Yahoo! Global Cloud Computing Research Test bed

- An *open, scalable, secure, resilient* internet scale global testbed for cloud computing research
 - Collaborative research focused on data center management and cloud services
 - Scalable, multi-continent, multi-datacenter, cloud computing system
- A loose federation of “Centers of Excellence” around the globe
 - UIUC, Singapore, IDA, KIT: 3 initial CoE
 - HP, Intel, Yahoo: 3 initial sponsors with CoE
 - Common research theme
 - Specific research germane to each region
- Each center: 1000-4000 cores and up to 1-2PB storage
 - With experimental cloud management services
- Platinum Sponsors
 - HP Labs, Intel Research, Yahoo

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InformationWeek
BUSINESS INNOVATION POWERED BY TECHNOLOGY

HP, Intel, Yahoo Join Government, Academia In Cloud Computing Research

Each of the founding members will host a cloud-computing infrastructure largely based on HP computers and Intel processors in six data centers.

By Antonio Gonsalves, [InformationWeek](#)
July 29, 2008
URL: <http://www.informationweek.com/story/showArticle.html?articleId=209800448>

Hewlett-Packard, Intel, and Yahoo on Tuesday said they have joined government and academia in launching a global, multi-data center test bed for experimentation and research in cloud computing, which many experts believe will be the dominant IT delivery model of the future.

The initiative aims at building a computing network comprised of six data centers spanning three continents. The idea is to have a large-scale platform for testing all technology – hardware and software – related to delivering application services over the Internet.

“This is a global collaboration that spans the industry, spans academia and government,” Prith Banerjee, senior VP for research at HP, told reporters during a teleconference held by the three founding companies.

LABS hp

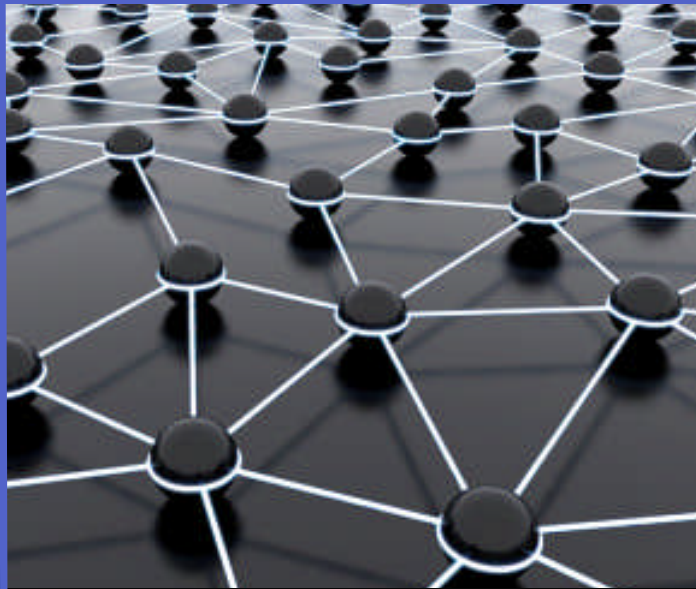
HP IdeaLab

<http://www.hp.com/idealab>

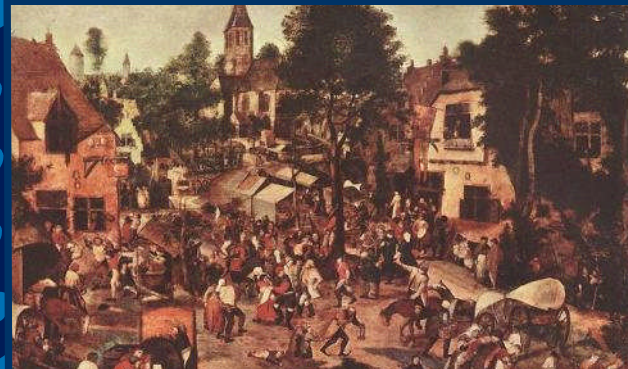


Innovation: from Atoms to the Cloud

From quantum
electronics



To extracting
knowledge from
collective
intelligence



Sustainability

Information
Explosion

Cloud
services

Content
transformation

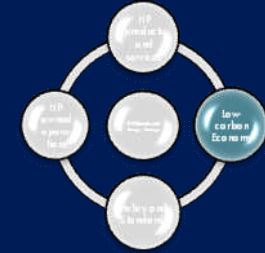
Intelligent
infrastructure

Sustainability

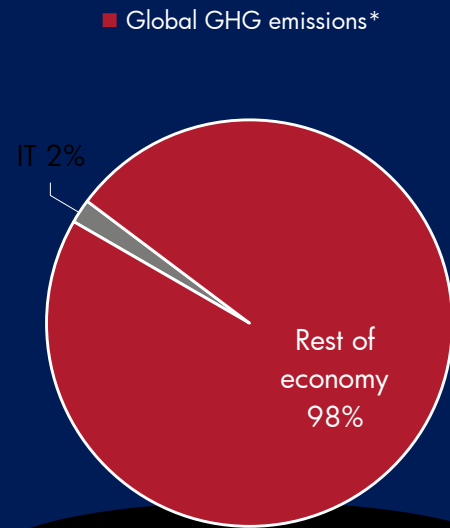
Creating technologies, IT infrastructure and business models for the lower-carbon economy – that save money and leave a lighter footprint.



IT solutions to reduce the footprint of the rest of the economy



IT enables:



* Source: Gartner



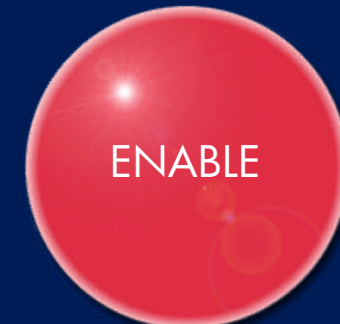
Reduce energy intensity and carbon footprint

- Smart buildings, power grid, appliances...
- Energy intelligence in industrial equipment to increase manufacturing energy-efficiency
- Digital publishing, print-on-demand, digital paper to reduce paper use



Substitute carbon-intensive processes by low-carbon ones

- Telepresence to reduce business travel
- Web services such as eCommerce and eBanking to replace physical transactions



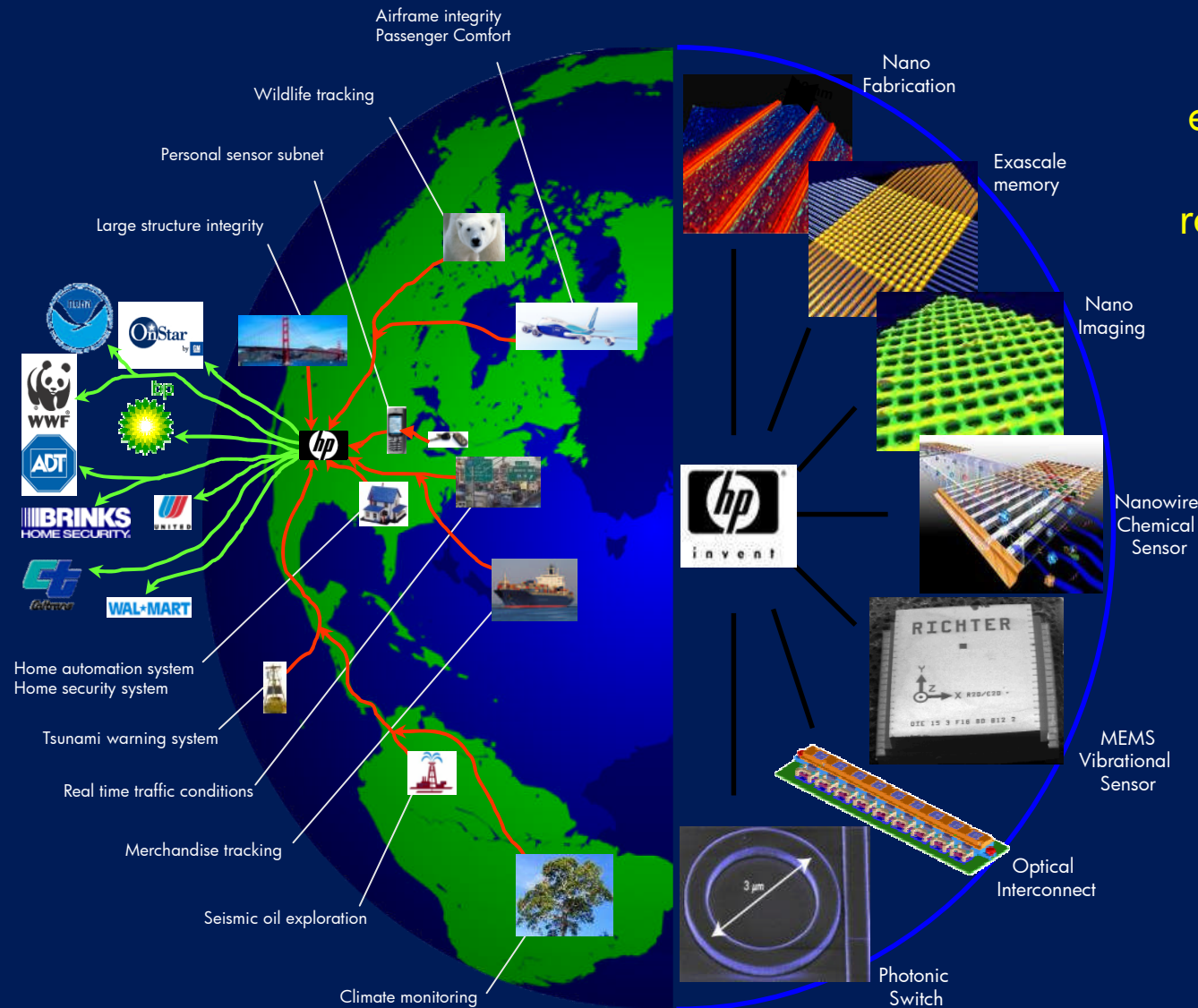
Enable low-carbon economy management

- Carbon trading platforms
- Carbon monitoring and reporting software
- Deforestation monitoring infrastructure

CeNSE: The Central Nervous System for the Earth

Revolutionize human interaction with the earth as profoundly as the internet has revolutionized personal and business interactions

One trillion nanoscale sensors and actuators will need the equivalent of 1000 Internets: the next huge demand for computing!



Conclusions

- *IT is one of the most powerful tools available to move us to a sustainable world*
- *Sustainability should be the number one priority of every educated person on this planet*
- *IT provides us with the capability to collect information, understand how we work and play and how that is affecting the planet, and act to move toward more sustainable behaviors*
- *Our imperative is to act immediately and assertively to form a critical mass of research teams to unlock the power of IT in this context*

Opportunity to collaborate with HP Labs

- *We are 'diverging' to consider all possibilities*
- *Contact us with your ideas*
- *We have ideas we will surface with you*
- *We will converge on the opportunities that provide the most value to all partners and society*
- *We look at today as a beginning so we look forward to working with you*

