



Fostering Practical Innovation at Microsoft Research

Jack Breese
Director, MS Research Redmond
<http://research.microsoft.com>



Microsoft Research 2004

- ✱ Goal: pursue strategic technologies for MS
- ✱ Founded in 1991
- ✱ Staff of approx 700 WW in over 50 areas
- ✱ Internationally recognized research teams
- ✱ Small % of \$7.9 Billion R&D spend at MS
- ✱ Research locations :
 - ✱ Redmond, Washington
 - ✱ San Francisco, California
 - ✱ Mountain View, California
 - ✱ Cambridge, United Kingdom
 - ✱ Beijing, People's Republic of China



Microsoft Research Mission

★ Research Excellence

- ★ Participation in global research community
- ★ Keep apprised of trends/breakthroughs
- ★ Identify and recruit top talent

★ Provide Technology to Microsoft

- ★ Compelling functionality and features for existing products
- ★ Drive entry into new businesses
- ★ Collaboration: Consultations, algorithms, components, strategic direction



MRS In the 21st Century:

★ *Human-Computer Interaction*

- Natural language, Speech, Vision
- Sensors, Devices

★ *Information analysis, management and retrieval*

- Databases, Data mining, Scalable computing, Internet Search, Document Understanding

★ *Collaboration*

- Distributed meetings, Social Computing, Communities

★ *Mobility*

- Adaptive systems, Wireless computing

★ *Rich Media*

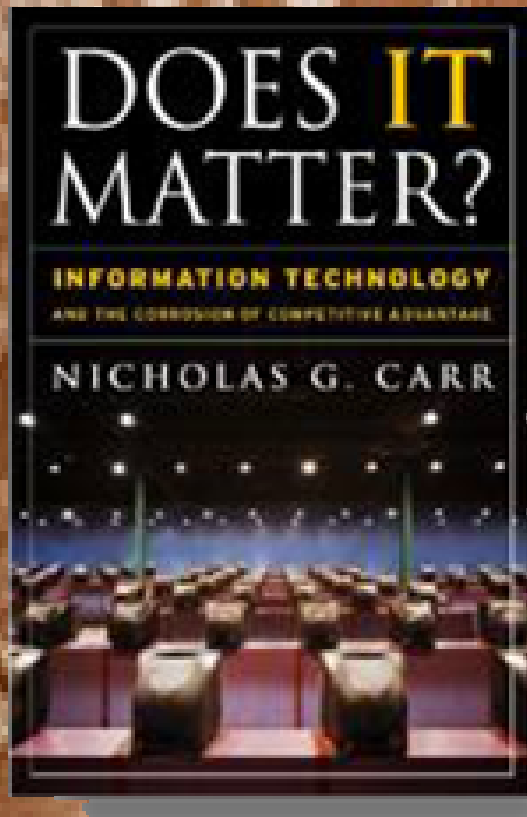
- 3D-Models, Interactive Images, Signal processing

★ *Software Development*

- Specifications, Programming languages
- Compilers
- Trustworthy Computing

★ *Systems*

- Systems Management
- Security, Privacy
- Distributed Computing



The End of Computing Science?

EDSGER W. DIJKSTRA

IN academia, in industry, and in the commercial world, there is a widespread belief that computing science as such has been all but completed and that, consequently, computing has matured from a theoretical topic for the scientists to a practical issue for the engineers, the managers, and the entrepreneurs. That is, mostly people who can accept the application of science for the obvious benefits, but feel rather uncomfortable with its creation because they don't understand what the doing of research, with its intangible goals and its uncertain rewards, entails. This widespread belief, however, is only correct if we identify the goals of computing science with what has been accomplished and forget those goals that we

Insight > Comment > Peter Judge

Tuesday 21st October 2003



Have we reached the end of IT history?

Peter Judge, Tech Update UK

ZDNet UK

October 08, 2002, 10:22 BST



**TALK
BACK!**

Tell us your opinion!

Peter Judge: The leaders of the flagships of the UK's IT industry admit that technology just isn't magic any more.



Hardware Innovation



PC Software
Ecosystem



Power

- ✦ Riding Moore's Law
- ✦ Scale up and out
- ✦ 64-bit, 64-way
- ✦ Next Generation Secure Computing Base

Convenience

- ✦ Wireless networking
- ✦ Always on
- ✦ Always with you



Personal Computer in 2006

- CPU: 4-6 GHz; multi-processor
- Memory: 2+ GB
- Disk: 1+ TB
- GPU: 3x today
- Net: 1Gb, 54Mb wireless



Continuing Software Innovation



PC Software Ecosystem



Bigger

- ✦ Global scale enterprise software systems
- ✦ Global scale federated databases



Richer Experiences

- Multimedia: Video, Audio, Images
- Richer communications: VOIP, IM, Blogs
- Richer connectivity: Broadband, Wireless
- New communication paradigms

Smaller

- ✦ Intermittent connectivity
- ✦ Windows Mobile
- ✦ Tiny CLR and Compact framework



A New Future

- ★ The industry and Microsoft are facing significant new challenges and opportunities
- ★ Technical, social, and organizational issues are driving changes in innovation management
- ★ Where are we going, and what type of university/industry partnerships are important?

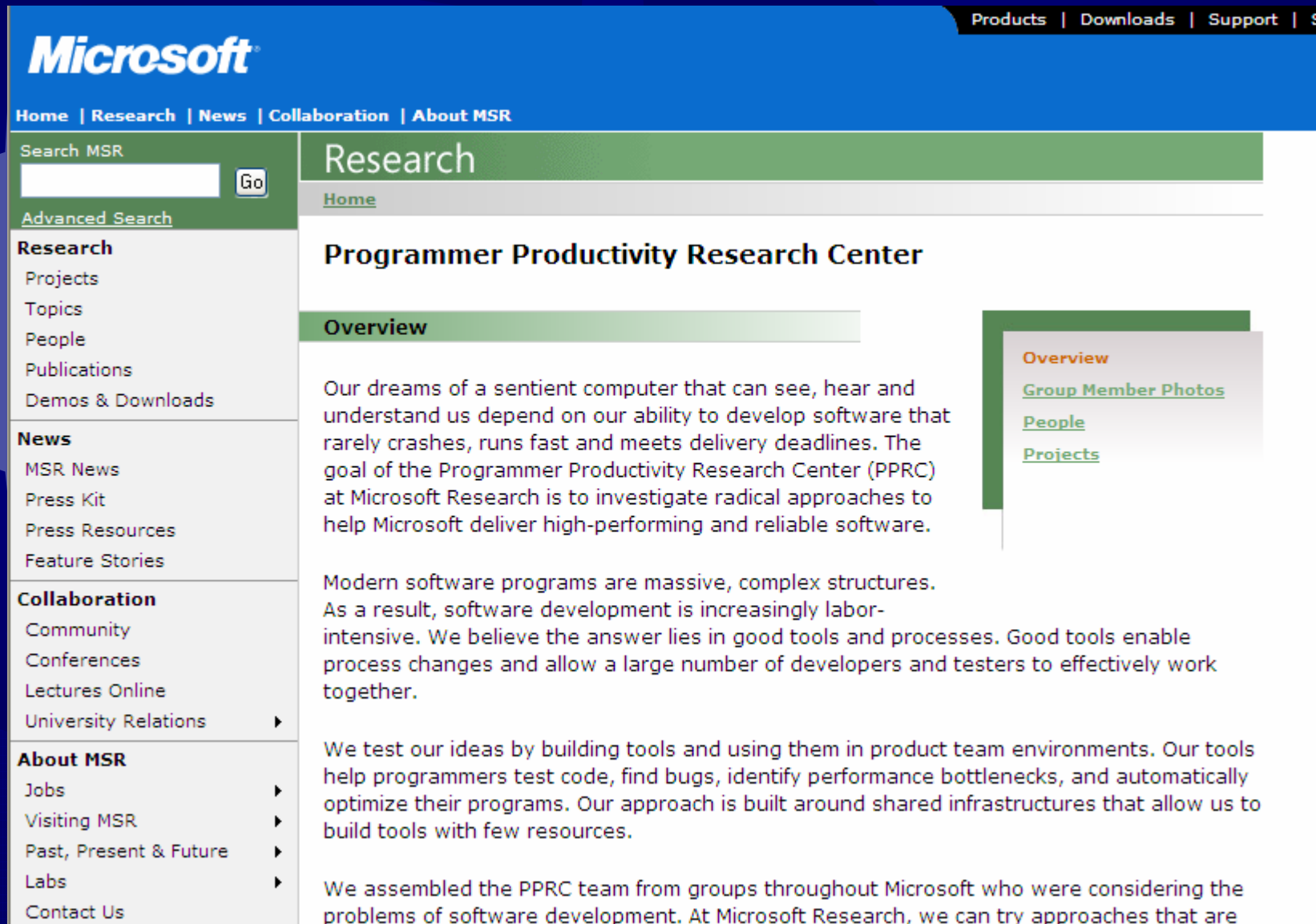


Top Technical Challenges/Opportunities

- ✱ Security/Software Productivity
- ✱ Systems Management
- ✱ Social Computing
- ✱ Information Management
- ✱ Data Intensive Computing



Software Development/Security



Microsoft Products | Downloads | Support | S

Home | Research | News | Collaboration | About MSR

Search MSR

[Advanced Search](#)

Research

- Projects
- Topics
- People
- Publications
- Demos & Downloads

News

- MSR News
- Press Kit
- Press Resources
- Feature Stories

Collaboration

- Community
- Conferences
- Lectures Online
- University Relations ▶

About MSR

- Jobs ▶
- Visiting MSR ▶
- Past, Present & Future ▶
- Labs ▶
- Contact Us

Research

[Home](#)

Programmer Productivity Research Center

Overview

Our dreams of a sentient computer that can see, hear and understand us depend on our ability to develop software that rarely crashes, runs fast and meets delivery deadlines. The goal of the Programmer Productivity Research Center (PPRC) at Microsoft Research is to investigate radical approaches to help Microsoft deliver high-performing and reliable software.

Modern software programs are massive, complex structures. As a result, software development is increasingly labor-intensive. We believe the answer lies in good tools and processes. Good tools enable process changes and allow a large number of developers and testers to effectively work together.

We test our ideas by building tools and using them in product team environments. Our tools help programmers test code, find bugs, identify performance bottlenecks, and automatically optimize their programs. Our approach is built around shared infrastructures that allow us to build tools with few resources.

We assembled the PPRC team from groups throughout Microsoft who were considering the problems of software development. At Microsoft Research, we can try approaches that are

Overview

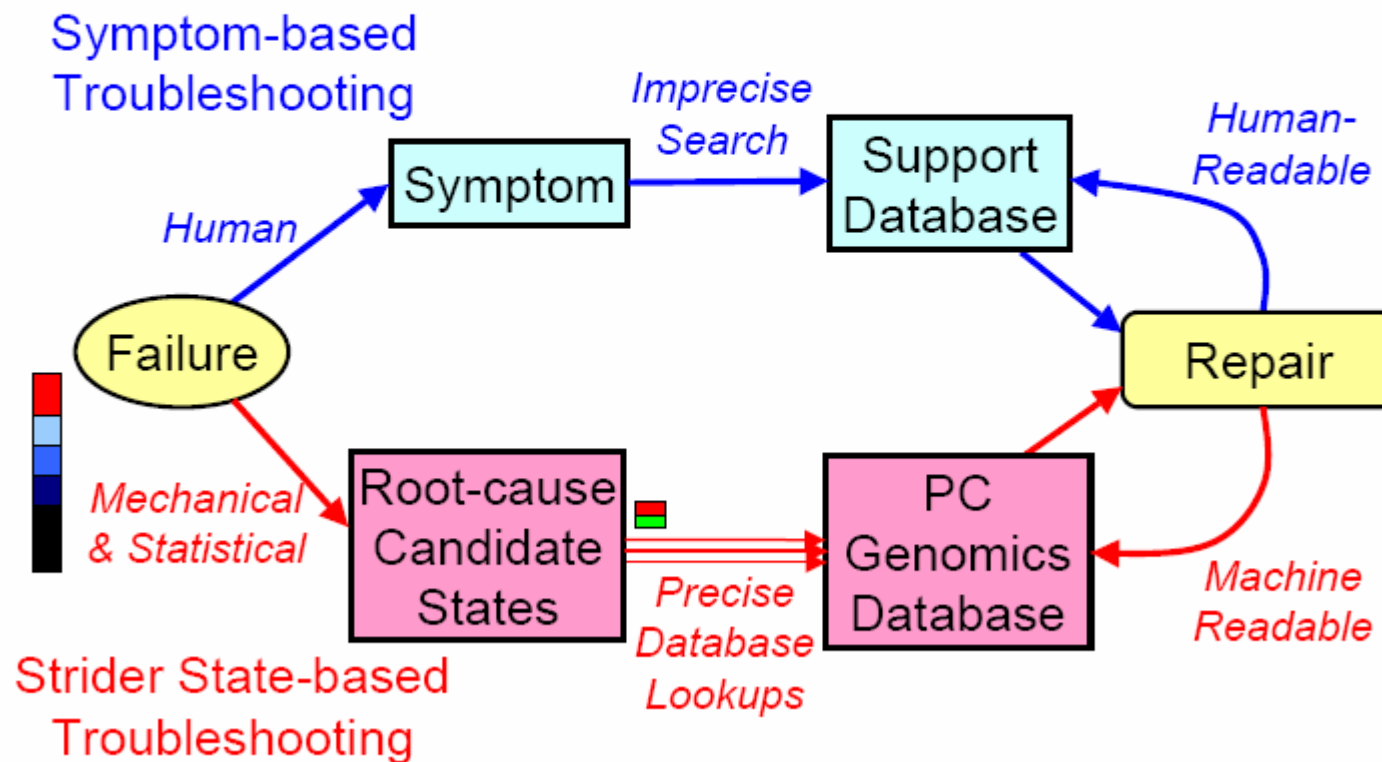
- [Group Member Photos](#)
- [People](#)
- [Projects](#)



Systems Management: Strider

Diagnostics through Genomics

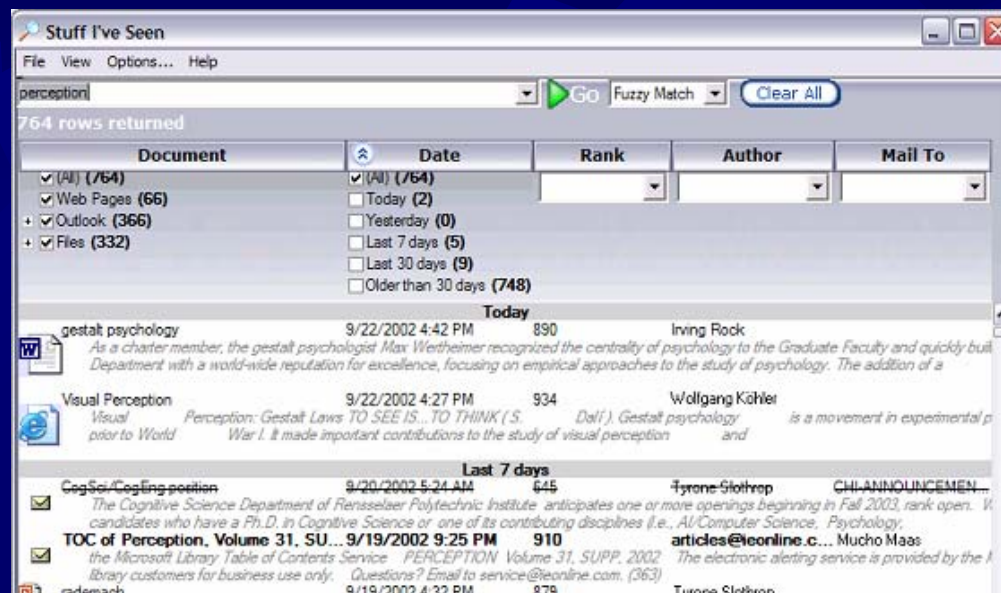
First-level decomposition: Mechanical, Statistical, & Database



Yi-min Wang et al. "**STRIDER: A Black-box, State-based Approach to Change and Configuration Management and Support**," in *Proc. Usenix LISA* Oct. 2003.

Information Management

★ Stuff I've Seen (Dumais)



★ ASKMSR (Brill)

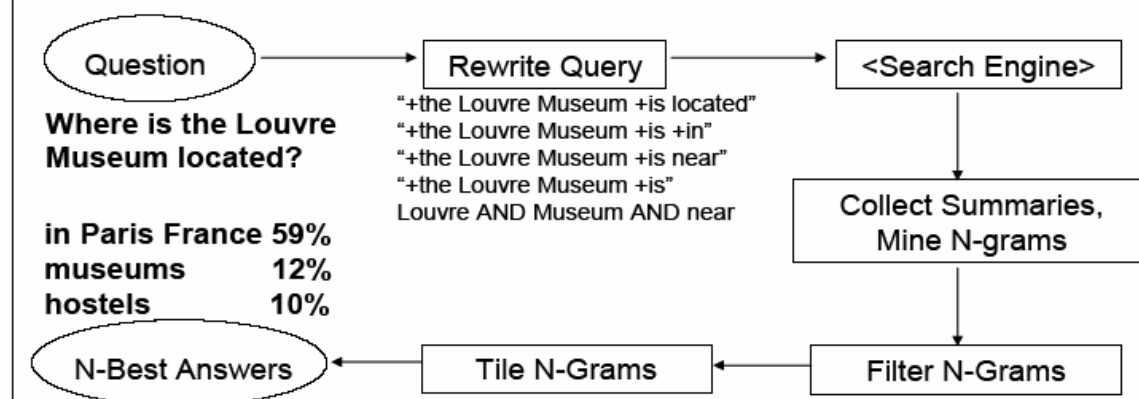






Figure 1. System Architecture



Data Intensive computing (Gray)



Sloan Digital Sky Survey / SkyServer



[Home](#) [Tools](#) [Projects](#) [Astronomy](#) [SDSS](#) [SkyServer](#) [Credits](#) [Download](#) [Help](#)

Welcome!!!

This website presents data from the Sloan Digital Sky Survey, a project to make a map of a large part of the universe. We would like to show you the beauty of the universe, and share with you our excitement as we build the largest map in the history of the world.

News

The site now contains data from the SDSS Data Release 1 (DR1).






[More...](#)

For Astronomers


A separate branch of this website for professional astronomers (English)

[More...](#)

SDSS is supported by



Powered by



SkyServer Tools

- Famous places
- Get images
- Scrolling sky
- Visual Tools
- Explore
- Search
- Object upload

Science Projects




- Basic
- Advanced
- Challenges
- For Kids
- Games and Contests
- Teachers
- Links to other projects

Info Links

- About Astronomy
- About the SDSS
- About the SkyServer
- The EDR SkyServer
- SDSS Data Release 1
- SDSS Project Website
- SkyQuery

Help

- Getting Started
- FAQ
- How To
- Glossary
- Schema Browser
- Introduction to SQL
- Expert Background



Region	Start	Stop	Start	Stop	Description
SDSS-DR1	0.0	1.0	0.0	1.0	DR1 Data Release
SDSS-DR2	1.0	2.0	1.0	2.0	DR2 Data Release
SDSS-DR3	2.0	3.0	2.0	3.0	DR3 Data Release
SDSS-DR4	3.0	4.0	3.0	4.0	DR4 Data Release
SDSS-DR5	4.0	5.0	4.0	5.0	DR5 Data Release
SDSS-DR6	5.0	6.0	5.0	6.0	DR6 Data Release
SDSS-DR7	6.0	7.0	6.0	7.0	DR7 Data Release
SDSS-DR8	7.0	8.0	7.0	8.0	DR8 Data Release
SDSS-DR9	8.0	9.0	8.0	9.0	DR9 Data Release
SDSS-DR10	9.0	10.0	9.0	10.0	DR10 Data Release

Site Traffic
Privacy Policy

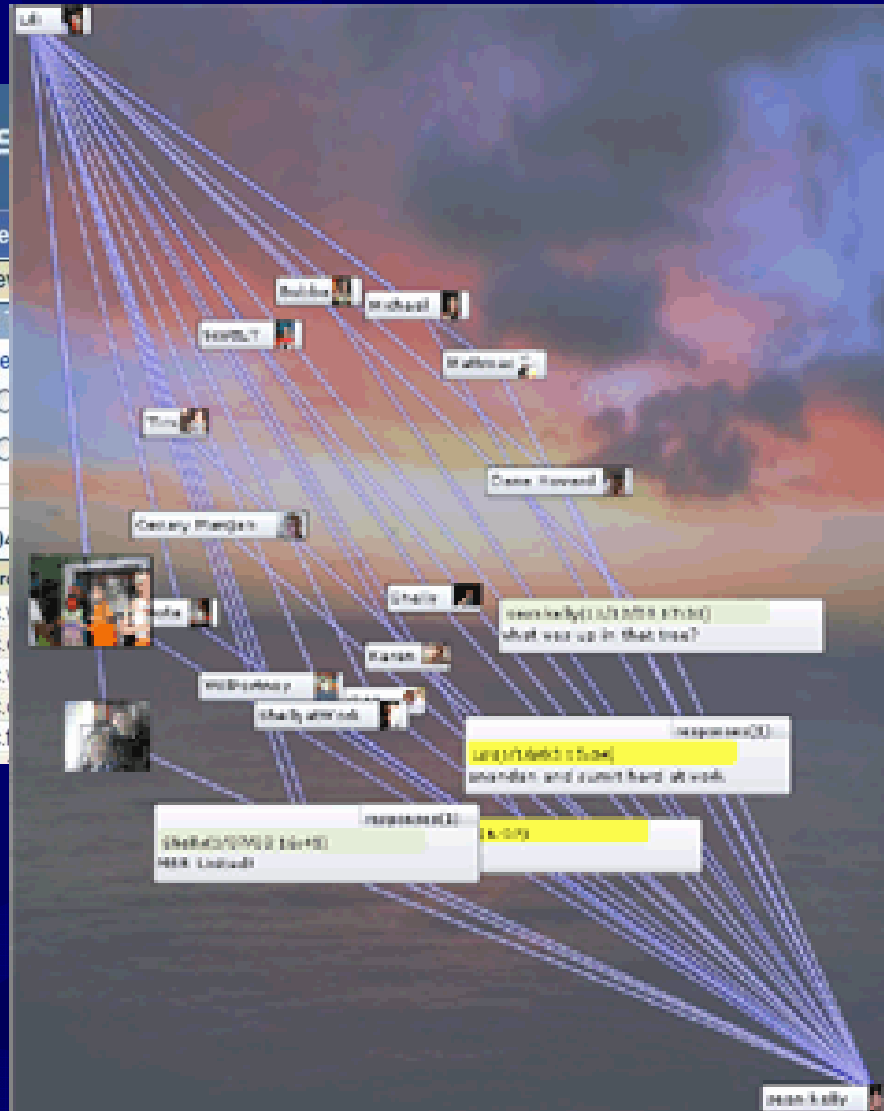


Social Computing

★ Netscan
(Smith)

★ Wallop
(Cheng)

Netscan | My Use
Please visit our new
Report
Select a Time
☐ Day
☐ Quarter
Results for 5/1/2004
102 Newsgroups On
microsoft.public.
microsoft.public.
microsoft.public.
microsoft.public.
microsoft.public.



Cross Post | About | Help
Netscan.
Each data is updated daily
Search
What's New?
URS AdjURS AvgLineCt
67 1052 810 24
79 1352 492 113
61 971 667 16
68 77 58 27
73 320 300 26
55 278 255 16



Follow the Data

✦ We are taking a data driven approach in all of these areas

- ✦ Collect

- ✦ Label

- ✦ Learn

- ✦ Apply

✦ Driven by

- ✦ Availability of Data

- ✦ Substantial progress in scalable data mining and machine learning algorithms



Never bet against the Hardware

- ✦ Aura: Marc Smith, Community Technologies Group, Redmond
- ✦ Magic Pen, Jian Wang, MSR Asia
- ✦ Many others
 - ✦ Large Displays
 - ✦ Sensecam (Williams, MSR Cambridge)
 - ✦ Sensor enhanced Mobile devices (Hinckley)

Take AURA shopping...

Aura v2 7:17

Code: 010106000050859 S C

Order of resolution services:

- Microsoft Art Collection
- Amazon ISBN Lookup Service
- UPC Lookup by ServiceObjects
- Amazon Music UPC Lookup

U D

Show Details Add... Remove

Status: Scanned UPC: 010106000050859

File Help Submit

SvcObjUPC 7:19

UPC: 038000045301

Desc: Kellogg's Cracklin' Oat Bran Cereal

Mfr: Kellogg's

Size/Weight: 17 OZ

Mfr Code: 038000

Refresh

Status: <no error>

File About

Internet Explorer 7:19

http://www.google.com/search?hl

Google

Web Images Groups Directory News

Searched the web for Kellogg's Cracklin' Oat Bran Cereal

Kellogg USA Has Recalled Kellogg's® Cracklin' Oat Bran® and ...

... The Food and Drug Administration (FDA) said that Kellogg USA has recalled a limited number of Kellogg's® Cracklin' Oat Bran® cereal products because they may

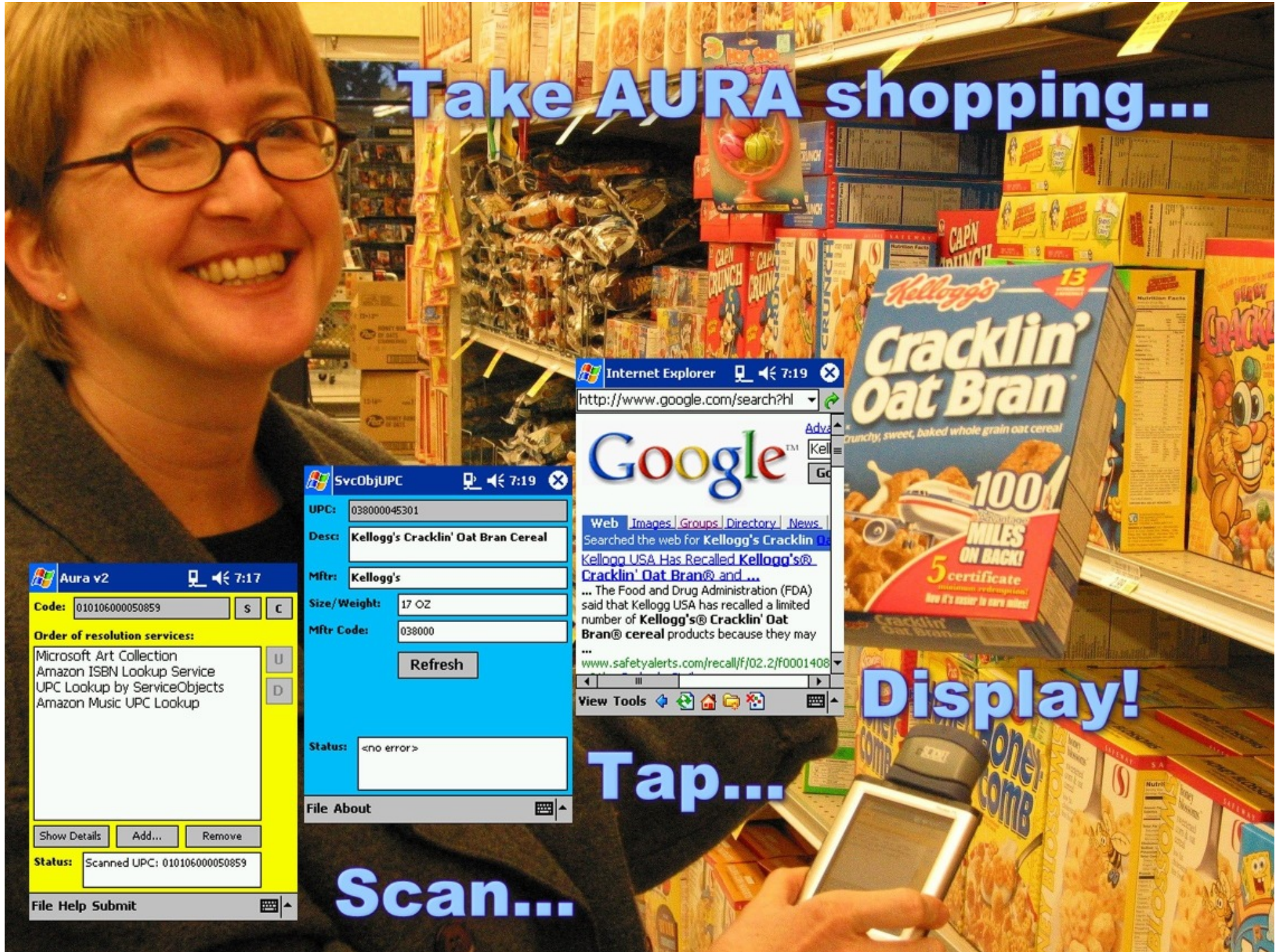
www.safetyalerts.com/recall/f/02.2/f0001408

View Tools

Display!

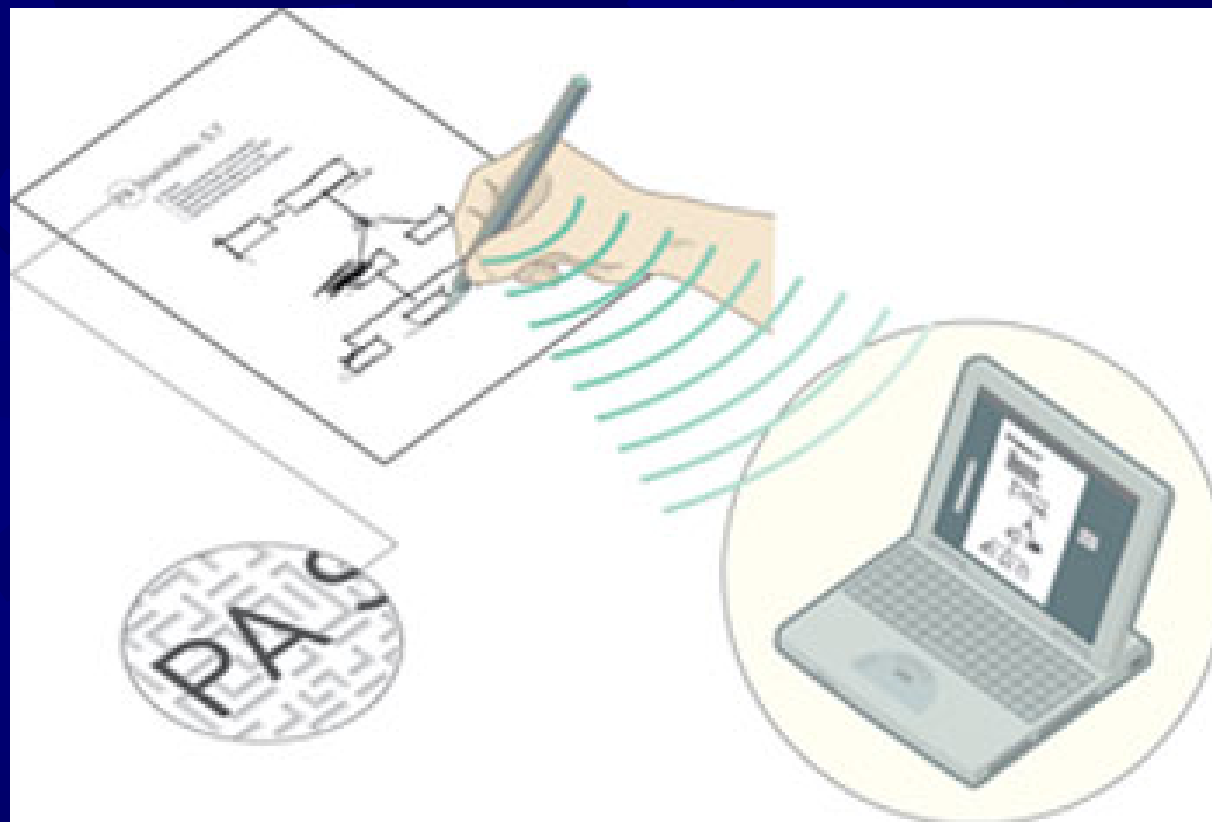
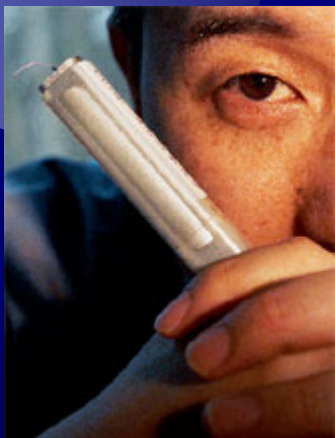
Tap...

Scan...





MSRA Magic Pen



Jian Wang, MSR Asia



Globalization of Research

**AN MIT ENTERPRISE
TECHNOLOGY
REVIEW**
BUSINESS • OPPORTUNITY • IMPACT

SEARCH:

■ 2 FREE ISSUES
■ FREE NEWSLETTER
■ CUSTOMER SERVICE
■ FREE DIGITAL ISSUE

**2 FREE
TRIAL ISSUES**

HOME | CURRENT ISSUE | ARCHIVE | COLUMNS | WEBLOG | PREDICTIVE MARKETS | RESEARCH NEWS

LOG IN
E-mail:
Password:
[Help](#)

TOPICS
Biotech / Healthcare
Business
Computing
Energy
Nanotech
Security
Software
Telecom / Internet
Transportation
[Expanded List](#)

▼ ADVERTISEMENT ▼

→ **TOPIC > BUSINESS > RESEARCH & DEVELOPMENT**

The World's Hottest Computer Lab

Microsoft's six-year-old Beijing lab has already paid dividends in speech recognition, graphics, wireless multimedia—and the training of future executives.

By Gregory T. Huang
June 2004

Print Version
 Get PDF
 Order Reprints
 Forums
 Respond

Half a world away from the calm beauty of Seattle and Puget Sound, there's a lab where software dreams come true. At Microsoft Research Asia, the drive to succeed is as intense as the traffic that roars by the front door in unbridled, chaotic fury. If Microsoft's other facilities around the globe seem idyllic, this one, in Beijing, China, is pure street. Nearby high-rises compete with smokestacks for skyline supremacy. Run-down buildings sit next to bustling consumer electronics markets and the Beijing Satellite Manufacturing Factory, where China conducts its spaceflight research. Microsoft's mantra: work hard to get in the door; work harder to survive; then work even harder because the real work—that of an information technology world leader—is just beginning.

Face to face: Keman Yu demos handheld video phones.
(Photographs by Kevin Lee)

WEBLOG



Integrated R&D Center

[Microsoft.com Home](#) | [Site Map](#)



Search Microsoft.com for:

PressPass - Information for Journalists

[PressPass Home](#) | [PR Contacts](#) | [Fast Facts About Microsoft](#) | [Site Map](#) | [Advanced Search](#)

Microsoft News
[Products & Issues](#)
[Consumer News](#)
[International News](#)
[Legal News](#)
[Events](#)

Microsoft Executives
[Exec Bios/Speeches](#)
[Board of Directors](#)
[Bill Gates Web Site](#)
[Executive E-Mail](#)

Other Corporate Info
[Investor Relations](#)

Microsoft Research -- Asia Establishes Advanced Technology Center

At Five-Year Anniversary Celebration, Beijing Lab Announces New Division To Focus on Incubating Technologies, Creation of Core Product Concepts

REDMOND, Wash. -- Nov. 3, 2003 -- Microsoft Research -- Asia (MSRA) today announced the founding of the Advanced Technology Center (ATC) in Beijing, a new division in MSRA that will focus on further developing innovations produced in the lab. The ATC will enable MSRA to work with a larger number of technologies and accelerate technology transfer to Microsoft® product groups.

The division will grow to 80 engineers and developers in its first

Related Links

Feature Story:

- [Maturing Fast: Microsoft Research Asia Exceeds Expectations Early and Often - Nov. 3, 2003](#)



70 out of 120,000

The screenshot shows the homepage of the English version of the People's Daily website. The main headline is "Microsoft says it is hard to recruit 100 software engineers in China". The article text states that Microsoft has found it difficult to satisfy its goal of recruiting 100 software engineers in China, according to sources with the Microsoft Research Asia Advanced Technology Center (ATC). The article was last updated on Wednesday, March 31, 2004. The website features a navigation menu on the left with categories like CHINA, BUSINESS, OPINION, WORLD, SCI-EDU, SPORTS, LIFE, FEATURES, and PHOTO GALLERY. There is also an "INTERACTIVE" section with links to Message Board, Feedback, Voice of Readers, and China Quiz. A "Related News" section on the right lists other articles, such as "Microsoft introduces new Windows security features" and "Chin'a Kingsoft to challenge Microsoft with new office software". A "Hot Discussions" section at the bottom right shows topics like "Israel's killing of Yassin fuels conflict" and "How the US could improve its image abroad".

People's Daily Quickest News About China
<http://english.peopledaily.com.cn>

English Home | Help | Sitemap | Archive | Advanced Search | Mirror in USA | 中文版 | 日本語版 | FRANCAIS | ESPAÑOL

Home >> Sci-Edu

Last updated at: (Beijing Time) Wednesday, March 31, 2004

Microsoft says it is hard to recruit 100 software engineers in China

Microsoft has found it difficult to satisfy its goal of recruiting 100 software engineers in China, sources with the Microsoft Research Asia Advanced Technology Center (ATC) said.

Microsoft has found it difficult to satisfy its goal of recruiting 100 software engineers in China, sources with the Microsoft Research Asia Advanced Technology Center (ATC) said.

To satisfy the demand of its ongoing ten programs, the ATC hoped that it could recruit about 100 software managers, architects and testers before this July. It has received more than 120,000 resumes, mainly from college students, after it released the advertisements through the media.

Related News

- [Microsoft introduces new Windows security features](#)
- [Chin'a Kingsoft to challenge Microsoft with new office software](#)

Hot Discussions

- [Israel's killing of Yassin fuels conflict: Commentary](#) (2 Messages)
- [How the US could improve its image abroad](#) (14 Messages)
- [US urged not to fingerprint Chinese](#) (10 Messages)
- [China hunts corrupt officials who abscond](#)

ABOUT CHINA

- [China At a Glance](#)
- [Constitution of the PRC](#)
- [State Organs of the PRC](#)
- [CPC and State Leaders](#)

PRINT | DISCUSSION | CHINESE | SEND TO FRIEND



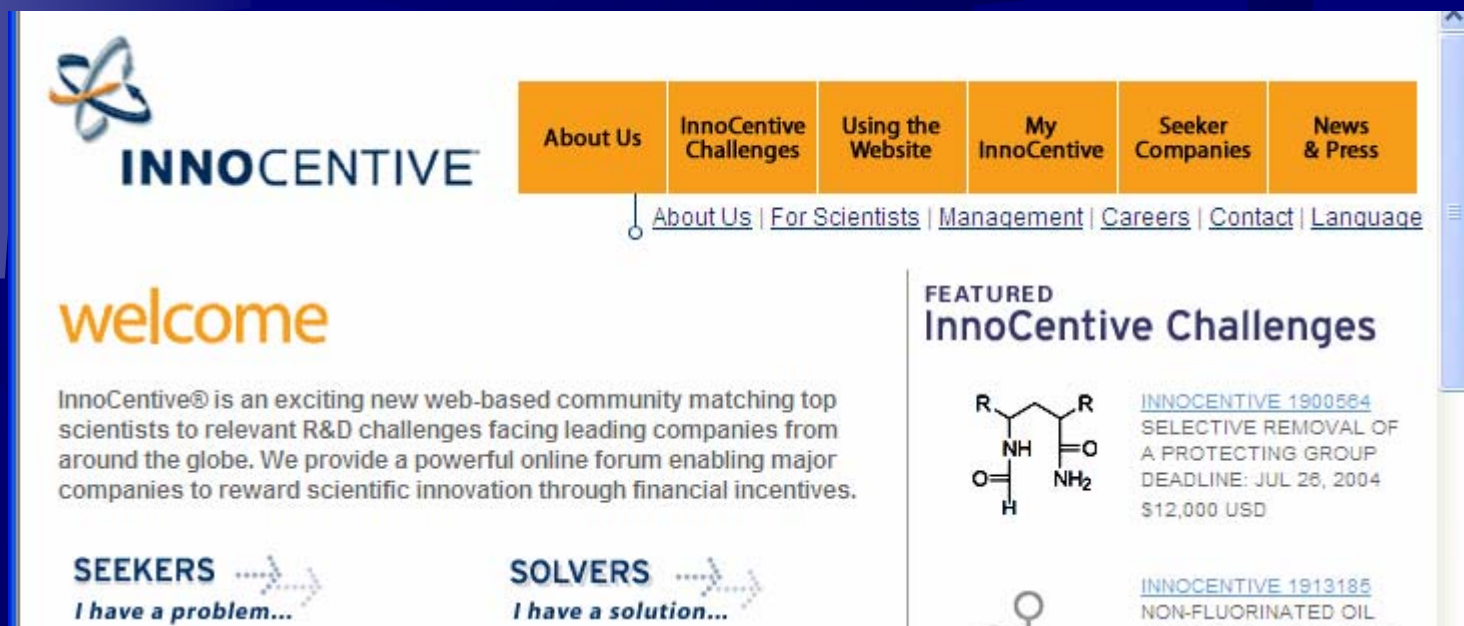
What is Changing

- ✱ Excellent university preparation in mathematics and science
- ✱ Global access to technical information
- ✱ Local technical ecosystem: labs, university, large and small companies
- ✱ Access to capital
- ✱ Local intellectual property rights??



Result

- ✦ Global market for intellectual property creation
- ✦ New models and economics



The screenshot shows the InnoCentive website interface. At the top left is the InnoCentive logo, which consists of a stylized orange and blue atom-like symbol above the word "INNOCENTIVE" in blue capital letters. To the right of the logo is a horizontal navigation bar with six orange buttons: "About Us", "InnoCentive Challenges", "Using the Website", "My InnoCentive", "Seeker Companies", and "News & Press". Below this bar is a secondary navigation bar with links: "About Us", "For Scientists", "Management", "Careers", "Contact", and "Language".

The main content area is divided into two columns. The left column has a large orange "welcome" heading, followed by a paragraph: "InnoCentive® is an exciting new web-based community matching top scientists to relevant R&D challenges facing leading companies from around the globe. We provide a powerful online forum enabling major companies to reward scientific innovation through financial incentives." Below this paragraph are two sections: "SEEKERS" with the subtext "I have a problem..." and "SOLVERS" with the subtext "I have a solution...". Both sections have a right-pointing arrow icon.

The right column is titled "FEATURED InnoCentive Challenges". It contains two challenge listings. The first listing is for "INNOCENTIVE 1900564" titled "SELECTIVE REMOVAL OF A PROTECTING GROUP" with a deadline of "JUL 26, 2004" and a prize of "\$12,000 USD". To the left of this text is a chemical structure diagram of a molecule with two R groups, an NH group, and a carbonyl group. The second listing is for "INNOCENTIVE 1913185" titled "NON-FLUORINATED OIL".



Oxygen for the Research Engine: University engagement

★ Funding:

- ★ Strategic Initiatives (\$ and software)
- ★ Relation based
- ★ Industrial Affiliates

★ Internships/Fellowships

★ Faculty Summit



University Licensing

- ✶ Ideas are
- ✶ Not typical
- ✶ Often no
- ✶ Negotiated





Preferred Scenarios

- ✱ Non-exclusive, non-transferable, worldwide, royalty-free license*
- ✱ Option for an exclusive license
- ✱ Not one size fit's all:
 - ✱ Consider impact
 - ✱ Level of investment involved

*Computing Research Association (CRA) "Best Practices Memo: University-Industry Sponsored Research Agreements" Moore, Snyder, Bernstein



Innovation Dilemma at MSR

- Many more ideas than we can fully fund and explore with product groups

University

- Basic Research
- Training

Entrepreneur

Startup

- Adv Development
- Initial productization
- Rapid deployment and rework

Acquire

MSFT

- Industrial Dev
- Global distribution
- Integration & Standardization

- New outbound licensing



Some MSR Contributions. . .

Windows 95 and Office 95

- ✦ Performance optimization
- ✦ Answer Wizard (Office)

Office 97

- ✦ English grammar checker
- ✦ Japanese stemmer and segmenter

Windows 98

- ✦ Chinese Input Method Editor (IME)
- ✦ Intelligent Troubleshooters
- ✦ Windows Media™ Player audio and video codecs

Windows NT®

- ✦ Alpha channel compositing algorithms
- ✦ Cryptography libraries

Windows XP

- ✦ ClearType® display technology
- ✦ Windows Media™ Player
- ✦ IPv6
- ✦ Source code analysis tool
- ✦ Performance optimization tool



Some MSR Contributions. . .

Office XP

- ★ Smart tags technology
- ★ Grammar checker improvements, more languages.
- ★ Outlook® mobile manager (notification system, IntelliShrink™)
- ★ Antipiracy technologies
- ★ Development tools
- ★ SharePoint™ information retrieval technologies
- ★ Speech recognition engines
- ★ Mandarin Chinese data entry

Office 2000

- ★ Improved answer wizard
- ★ New grammar checker languages

Office 2003

- ★ Junk mail filter
- ★ Multi-monitor and large screen enhancements
- ★ Security enhancements



Some MSR Contributions. . .

Microsoft SQL Server

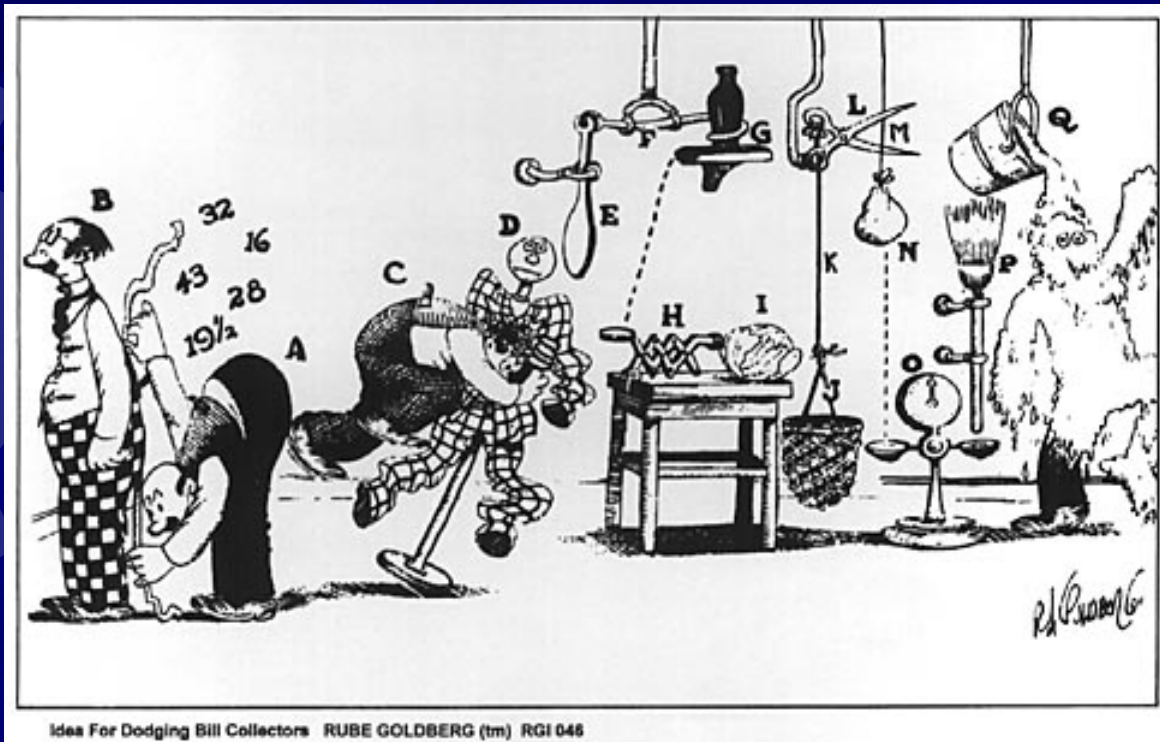
- ✱ Test tools (e.g. complex query generation)
- ✱ Auto admin tools
- ✱ Key range locking
- ✱ Multilevel recovery
- ✱ Multiple storage organizations
- ✱ New OLE DB extensions for data-mining components
- ✱ New data-mining techniques

Tablet PC

- ✱ Concepts and people from MSR
- ✱ Digital Ink technology
- ✱ Handwriting and sketch recognition
- ✱ Asian character recognition
- ✱ Compression techniques for annotation



Tech Transfer is not...



It is a *fundamentally social process* for managing key technology assets



Dynamics of Tech Transfer

Trust
Communication
Risk Sharing
Feedback

**Strategic
Partner**

Feature Owner

Co-developers

Co-designers

Technical reviewers

Consultants

**Multiple
Product
Releases**



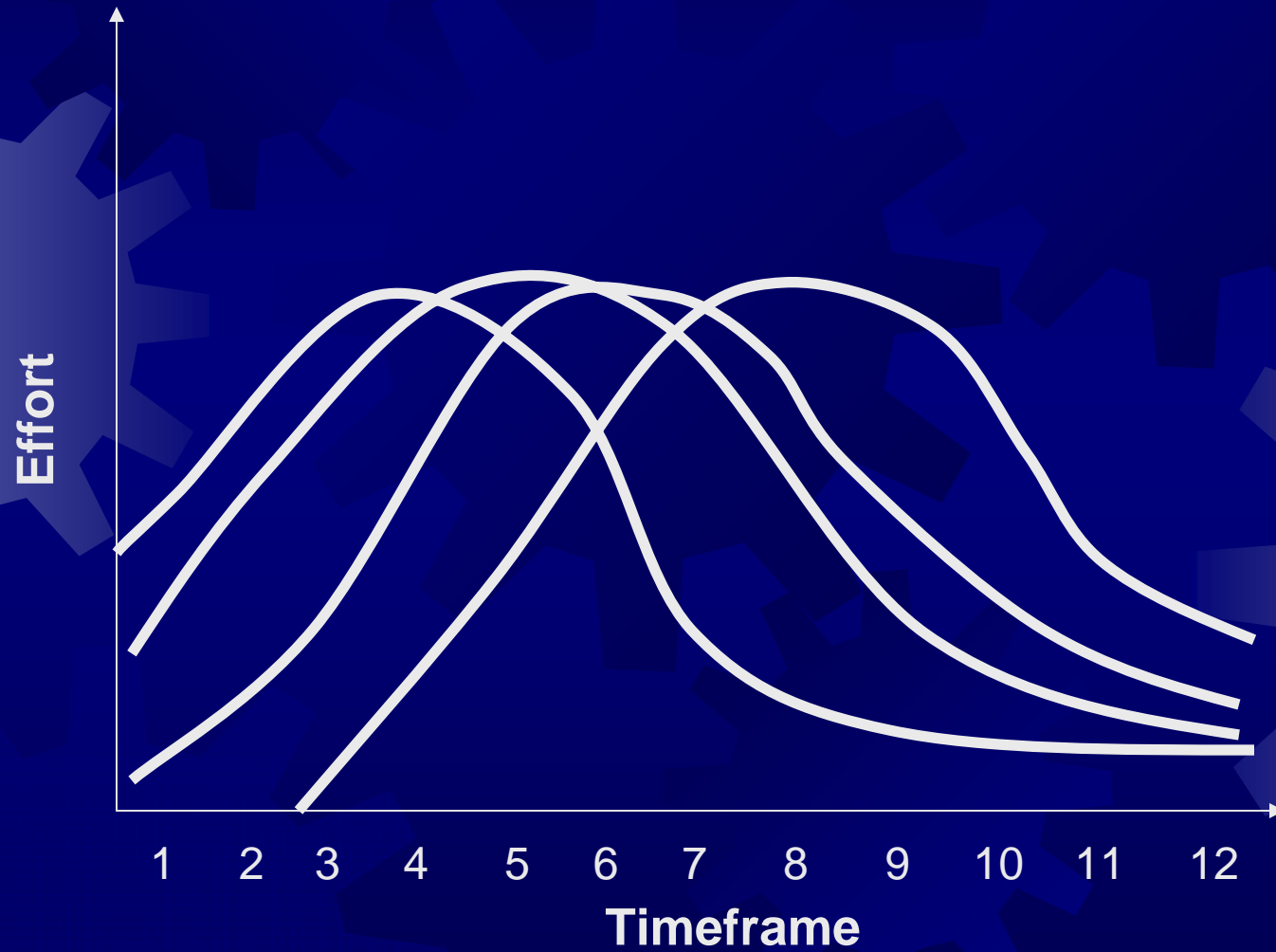


Tactics

- ✱ Recruiting: Hire the best people who also want to have an impact
- ✱ Cost sharing: management attention is a critical resource
- ✱ Recognize contributions: compensation, promotions, “ship-its”
- ✱ Team building: Theorists and software development engineers are critical team members.



Manage the portfolio





IT does matter!

- ★ Challenges and opportunities are substantial
- ★ Research – industry, government and university- is a global enterprise
- ★ We need a rich ecosystem of innovation involving licensing, startups, acquisitions, and human capital.



Microsoft Research

- ✦ Investigating a wide range of topics in computer science
 - ✦ Software
 - ✦ Hardware
 - ✦ Algorithms
- ✦ Continuing to invest globally
- ✦ Focus on innovation for Microsoft products
- ✦ More information:
<http://research.microsoft.com>