Managing Innovation at Microsoft Research

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Outline

- The “what” and “why” of computing science research
- Microsoft Research: “why” and “how”
- Some research successes
What is (Computing) Research?

- “Basic” vs. “Applied”?
- “Relevant” vs. “Blue-sky”?
- “Short-term” vs. “Long-term”?
- “Practical” vs. “Theoretical”?

➢ There’s no simple definition!
Research: Reward/Risk

• Researchers (and their management) must answer these questions:
  – How likely is it to succeed? [Risk]
  – If it does, will it have value for my organization? [Reward]
    • How?
    • How much?
    • When?
University Research

Focus:
- Broad, government-supported, public-domain
- Determined by faculty/funding agency interest
- Education vehicle for students (perpetuate system)

Success metric (reward):
- Publications
- Faculty reputation (tenure track decision)

Needs in order to succeed:
- Funding agency approval
Small company research

Focus:
- Short-term; bounded risk. Advanced development

Success metric (reward):
- Artifacts transferred to product organizations

Needs in order to succeed:
- Medium-term management support
- Close co-operation with receiving organizations
Big company research

Focus:
Long-term; varying breadth.
Riskier than small company research.
Costlier than university research.

Success metric (reward):
Enhance existing businesses; create new ones.

Needs in order to succeed:
Highly creative people
Long-term management support
Organizational stability
Challenges for Research (big company)

- Focus
  - long-term *but* relevant

- Payoff
  - big gains come infrequently and unpredictably

- IP: a two-edged sword
  - protective *but* can induce isolation

- Management commitment in hard times
Challenges Managing Research

• Staying ahead (keeping enough risk)
  – the comfort zone
  – the competition
• Technology transfer (getting reward)
  – hazards are well known (Christensen; Moore)
  – eternal vigilance and creativity
• Metrics
  – Patents? Publications? Profit?
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### MSR Labs at a Glance

<table>
<thead>
<tr>
<th>Lab Location</th>
<th>Founded</th>
<th>Researchers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Redmond</td>
<td>1991</td>
<td>250</td>
</tr>
<tr>
<td>Cambridge (UK)</td>
<td>1998</td>
<td>125</td>
</tr>
<tr>
<td>Asia (Beijing)</td>
<td>1999</td>
<td>220</td>
</tr>
<tr>
<td>Silicon Valley</td>
<td>2001</td>
<td>45</td>
</tr>
<tr>
<td>India (Bangalore)</td>
<td>2005</td>
<td>50</td>
</tr>
<tr>
<td>New England</td>
<td>2008</td>
<td>10</td>
</tr>
</tbody>
</table>

Omits other research-related groups totaling about 400 people and over 1000 interns.
Where We Sit

Sales, marketing, and corporate functions (HR, Finance, Legal, etc.) are omitted.
Research Areas

- **Broad spectrum, 50+ areas (see web site)**
  - speech recognition, user interface research, programming tools and methodologies, distributed systems and networking, graphics, natural language processing, robotics, machine learning, databases, search and information retrieval, ...

- **Driven by technology, not specific business needs**
  - long-term and uncertain relevance, e.g., sensor nets, quantum computing, computing theory

http://research.microsoft.com
Our Mission

• Advance the state of the art.

• Bring advances quickly to Microsoft products and services.

• Ensure Microsoft products and services have a future.
Why World-Wide?

• Talent availability

• University connections

• Geographically flavored work
  – natural language processing (Asia, Redmond)
  – networking (Asia, India)

• The next billion users
Microsoft Research Norms

• **Bottom-up**
  – researchers create projects, not management

• **Collaborative**
  – within and across groups and labs, and externally

• **Flat management structure**
  – as much as possible, given lab sizes

• **Open**
  – most work presented publicly

• **IP-based**
  – patent protection routinely sought

• **Publish “at the right time”**
Relationship to MS Businesses

- Historically, technology transfer is the research’s toughest problem.
- MSR-PM (program management)
  - The “connector-facilitators”
- A contact sport
  - geography can pose challenges
  - development in Redmond, SVC, Beijing, Hyderabad
- Tech Fest
- Building on past success
  - Most MS products affected
- Incubation
- IP Licensing
More on Research Management

Paper:

A Perspective on Computing Research Management

Available at http://research.microsoft.com/users/roylevin
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http://research.microsoft.com
Selected Technology Transfers

- Natural language processing
  - Office help system
  - Knowledge base automated translation
- Graphics
  - Windows Media
  - DirectX/Direct3D
  - Numerous effect technologies (Xbox)
- Web search
  - MSN core engine
  - Relevance ranking
  - Spam reduction
- Large-scale spatial databases
  - MSN Virtual Earth
- Machine learning
  - Drivatar (Forza Motorsport)
  - Filters in Outlook/Exchange (spam reduction)
- Software development tools
  - PREfix/PREfast (find security holes)
  - Static driver verifier
- New user interface paradigms
  - Microsoft Surface

http://research.microsoft.com
Focus Areas for MSR Silicon Valley

• Distributed systems
• Data-intensive computing
• Security and privacy
• Web search
• Computer architecture
• Computing theory