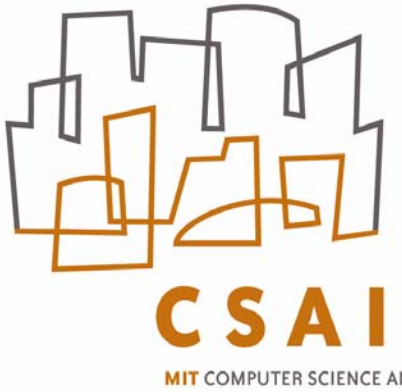

IT Research Funding: an MIT CSAIL Perspective

Rodney Brooks, Director,

MIT Computer Science and Artificial Intelligence Laboratory

April 19, 2007

CSAIL Formed in July 2003

- **Merger of former Artificial Intelligence Laboratory and the Laboratory for Computer Science (= Project Mac July 1963)**
- **About 833 members**
  - **93 principal investigators**
    - **73 active teaching faculty**
    - **EECS, Math, Brain and Cognitive, Aero/Astro, Mech Eng, Health Science Technology, Planetary Sciences, Whittaker Health Sciences, Media Arts and Sciences**
  - **471 graduate students**
  - **112 research staff and research affiliates, 46 staff, plus post-docs, visitors, and undergraduate researchers**
- **Faculty teach in departments and students receive their degrees there**
- **Offices are in the lab, and they do there research and get their funding there**
- **Largest on-campus lab at MIT. Current run rate ~$45M per year.**

CSAIL Funding Sources

	2000	2001	2002	2003	2004	2005	2006
Non government	28.3%	33.0%	43.1%	46.5%	36.5%	30.3%	31.1%
Government	71.7%	67.0%	56.9%	53.5%	63.5%	69.7%	68.9%
NSF	7.5%	7.9%	9.9%	15.3%	22.9%	25.3%	26.8%
DARPA	51.6%	47.9%	37.9%	26.6%	25.6%	25.6%	19.6%
DoD Total	62.9%	54.2%	43.6%	33.4%	29.7%	28.6%	24.3%
Other US Gov	1.3%	4.9%	3.4%	4.8%	10.9%	15.8%	17.8%

CSAIL
MIT COMPUTER SCIENCE AND ARTIFICIAL INTELLIGENCE LABORATORY

Industry Models (I)

- **Informal (becoming more formal…) unrestricted gifts**
  - **aimed at particular faculty members**
  - **e.g., Sun, Intel, Cisco, Google, VMware**
  - **small scale, and supposedly undirected**
  - **encouragement of grad students to spends summers at the companies**
  - **no IP involved**

Industry Models (II)

- **Individual contracts with individual faculty members**
  - **sometimes just a single point of contact**
  - **sometimes a deliberate effort to have multiple contracts, but completely based on individual research interests**
    - » **e.g., Toyota has established a laboratory on Main Street**
    - » **multiple contracts with multiple faculty**
    - » **originate in different operating companies and divisions within Toyota (even for a single faculty member)**
    - » **usually a master-contract as basis for individual contracts**
  - **sometimes there is a person in residence at CSAIL**
  - **sometimes there is a research affiliate based elsewhere in Cambridge/Boston**
  - **IP rights individually negotiated**

CSAIL
MIT COMPUTER SCIENCE AND ARTIFICIAL INTELLIGENCE LABORATORY

Industry Models (III)

- **Company has an MIT-wide agreement and spending level**
- **Company has a coordinator in residence at MIT**
  - **scouts for relevant research and solicits proposals**
  - **makes connections with people inside the company**
  - **shepherds those connections for the duration**
  - **may not have IT technical background**
- **IP rights are negotiated at the MIT level**

- **CSAIL has ongoing work with both Ford and Shell under such agreements**

CSAIL
MIT COMPUTER SCIENCE AND ARTIFICIAL INTELLIGENCE LABORATORY

Industry Models (IV)

- **Explicit multi-year agreement with CSAIL with IP rights negotiated up front**
- **Joint steering committee**
- **Multiple projects**
- **Multiple company researchers in residence**
- **We have had four of these recently**
  - **NTT, 1998-2003**
  - **Project Oxygen, 2000-2005**
  - **Quanta Computer, 2005-2010**
  - **Nokia, 2006-2009, renewable**

CSAIL
MIT COMPUTER SCIENCE AND ARTIFICIAL INTELLIGENCE LABORATORY

NTT (1998-2003)

- **5 years**
- **Provided an avenue for NTT internationalization during de-regulation**
- **NTT had a large research lab with similar intellectual aspirations**
- **Projects “jointly” proposed by NTT PI and MIT PI**
- **Selected by joint steering committee (3+3)**
- **Typically 18 concurrent projects, multi-year**
- **Multiple NTT researchers in residence at MIT**
- **Large group of faculty on yearly visit to NTT Research + NTT Operating Companies**

CSAIL
MIT COMPUTER SCIENCE AND ARTIFICIAL INTELLIGENCE LABORATORY

Project Oxygen (2000-2005)

- **Pervasive Human-Centered Computing**
- **Nokia, Philips, HP, Acer, Delta Electronics (+ NTT)**
- **5 years**
- **Joint steering committee selected MIT proposed projects**
- **In later years individual companies could “vote” 2/3rds of their funding (companies want their indiv. voice)**
- **Multiple company researchers in residence**
- **Week long tutorials to large groups in Asia, West-Coast, and Europe -- deploying technology into corporate research labs**

CSAIL
MIT COMPUTER SCIENCE AND ARTIFICIAL INTELLIGENCE LABORATORY

Quanta Computer (2005-)

- "Beyond the notebook computer"
- Five year initial engagement
- Joint steering committee (5+5) selecting MIT projects
- Quanta was to set up a Kendall Square Lab in year 2
  - has not happened -- instead coupled with NTU
- Was to have multiple researchers in residence
  - has not happened -- instead NTU students and faculty in residence at CSAIL
- Quanta reorganizing itself from a pure OEM/ODM to have research groups, and coupling with National Taiwan University as first level "catchers"
- 1-5 year time frame for productization

CSAIL
MIT COMPUTER SCIENCE AND ARTIFICIAL INTELLIGENCE LABORATORY

Nokia (2006-)

- New research lab in Kendall Square just for this project--about 20 permanent Nokia researchers
- Additional 20 on rotating basis
- Projects proposed jointly (truly) by MIT and Nokia researchers
- Down selected by steering committee (3+3)
- Completely open door for researchers involved at each lab
- Annual big CSAIL visit to Helsinki; Nokia Research + operating divisions
- Cambridge NRC Director actively involved in “selling” the research across Nokia
- 3-7 year time frame for productization

CSAIL
MIT COMPUTER SCIENCE AND ARTIFICIAL INTELLIGENCE LABORATORY

What Fails

- **High level buy-in/initiation within company followed by complete hand off to lower level management**
- **Expecting product development at CSAIL**
- **Company sends money, CSAIL sends reports**
- **Company expecting the value is in direct IP “items”**

CSAIL
MIT COMPUTER SCIENCE AND ARTIFICIAL INTELLIGENCE LABORATORY

What Works Well

- **Company with PhD level researchers who are used to publishing**
- **Company personnel in residence in the research groups at CSAIL**
- **CSAIL generating demonstrable systems**
  - **papers are fine but more on the CSAIL side than on the company side**
- **CSAIL taking demonstrable systems to broader parts of the companies**

CSAIL
MIT COMPUTER SCIENCE AND ARTIFICIAL INTELLIGENCE LABORATORY

My Current Concern…

- **Bayh-Dole (1981) let universities own IP for non-government purposes**
- **Allows faculty/students to spin out companies**
- **US corporations must charge research funding directly to the their bottom line, so they hardly fund it at all**
- **Instead they buy spun out companies with no bottom line consequences -- this is the current US technology transfer model (VCs get their cut for managing the risk)**
- **Now we are getting funding from foreign companies and giving them IP rights**
- **Will this slow down spin outs, and will it then end up hurting US companies by cutting off their traditional technology transfer route?**