Changing Interfaces Between the Research University and Industry

Wayne C. Johnson
Vice President, HP University Relations Worldwide

2005 Engineering Research Council Workshop and Forum
Washington DC, 2/27/05
Introduction

- During 1990’s the relationship between research universities and industry underwent fundamental change
  - Increasing industry need for people and ideas
  - Increasingly rapid transfer of new ideas from universities to the marketplace
  - Shortened time horizons
  - Increased awareness of the value of intellectual property
  - Intensified need for collaboration between universities and corporations
- Trend to increasing global dimension
  - Imperative to engage with research universities worldwide
- Trend toward business federation
- Need for substantial reform of US and EU ecosystem to avoid long-term damage to the system
- Missing an opportunity for strategic partnership
Evolving U.S. and Global R&D Ecosystems
Evolving US University Ecosystem

• Historic investments led to emergence of US research university ecosystem that complemented industry research labs
• Created a virtuous cycle of new technology and ideas

“The phenomenal innovation and job creation that America produced during the 1990s sprang from significant investments in education, infrastructure and research and development – that began in the 1960s.”

Globalization – Silicon Valley’s Challenge
San Jose Mercury News Editorial, March 21, 2004

• However, long-term investment in education and research have not been sustained -- US investments in physical science and engineering have decreased dramatically over the past two decades
obligations in billions of constant FY 2001 dollars

APRIL ’01 © 2001 AAAS
Evolving US Corporate Ecosystem

• Corporate research operations declined during the 1990s
• Old in-house system replaced by a new federated model of collaboration among corporate, government, and academic labs
• Impact of globalization is that many corporations are conducting research off-shore
Evolving Global R&D Ecosystems

- Considerable investments are being made on a worldwide basis that mimic the success of the research investments made by the US government after WW II (see Organisation for Economic Co-operation and Development data).
- Example of global struggle to dominate nanotechnology:
  - EU invested twice as much for basic research as the US in 2003.
  - Japan invested 40% more than the US National Nanotechnology Initiative (NNI) budget for 2003.
  - The $200 M budget announced by China is supporting the world's largest nanotechnology effort.
- Chinese universities granted 465,000 science and engineering degrees in 2001, approaching the US total.
- The virtuous cycle in the US is being starved, while the rest of the world continues to invest.
The rise of the rest: R&D investments are growing globally...

Among OECD countries

And “non-Member” countries

Source: OECD MSTI Database, January 2004
Flows of R&D funding between EU, US & Japan

2000, Millions of PPP $

Source: OECD, Activity of Foreign Affiliates database and Secretariat estimates.
Changing Interfaces Between the Research University and Industry
Impact of Open Innovation

• Historically, internal R&D was a strategic asset
• In the new model of open innovation, companies commercialize both their own ideas as well as innovations from other entities, e.g. universities
• Industries embracing open innovation view the research university as a source of graduates and applied research
• Researchers in companies have shifted to advanced technology and product development
Open Innovation Interfaces and Boundaries

• Cultural differences
  – Successful partnerships have researchers in the company working with researchers in the university

• Communication channels, working relationships
  – Creating a company culture where external contributions are accepted

• Functional organizations with specific responsibility to manage the external technology and research function
  – Example of HP University Relations

• Work pace, expectations
  – Since private labs work more quickly, a company may establish a small-firm channel to take advantage of the speed difference
  – MIT Industrial Liaison Program manages university research to meet the expectations of corporate sponsors
Changes in Intellectual Property Policies
The IP Problem – A Relationship in Crisis

- The partnership between industry and universities has been weakened over difficulties associated with negotiating IP rights in research contracts in recent times.
- Largely as a result of the lack of federal funding for research, American Universities have become extremely aggressive in their attempts to raise funding from large corporations.
- Industry feels that it takes too much time, effort, and money to negotiate an agreement.
- This has resulted in a perceived deterioration of trust and goodwill between industry and US universities, adversely affecting the long-term partnership between industry, universities, and government.
Trends in Nondefense R&D by Function, FY 1953-2002

Outlays for the conduct of R&D, billions of constant FY 2001 dollars

Source: AAAS, based on OMB Historical Tables in Budget of the United States Government FY 2002. Constant dollar conversions based on GDP deflators. FY 2002 is the President’s request.

Note: Some Energy programs shifted to General Science beginning in FY 1998.

April '01 © 2001 AAAS
Given that negotiations with an American university can take more than a year, the idea is often valueless before an agreement can be reached, and the company often spends more in legal expenses than it would be able to pay in royalties. This can lead to a company just walking away from the negotiation, and declining to sponsor any further research at that university.

“Typically at present, negotiating a contract to perform collaborative research with an American university takes one to two years of exchanging emails by attorneys, punctuated by long telephone conference calls involving the scientists who wish to work together. All too often, the company spends more on attorneys’ fees than the value of the contract being negotiated. This situation has driven many large companies away from working with American universities altogether, and they are looking for alternate research partners.”

Stan Williams
Director, HP Quantum Science Research
Consequence: Global Migration of University Research

• Many large companies are finding other sources of ideas and bright young researchers in emerging countries, where they receive very favorable intellectual property agreements.

“Large US based corporations have become so disheartened and disgusted with the situation [negotiating IP rights with US universities] they are now working with foreign universities, especially the elite institutions in France, Russia and China, which are more than willing to offer extremely favorable intellectual property terms.”

Stan Williams
Director, HP Quantum Science Research
Universities in China, India and Russia offer very attractive terms for research partnerships with US companies (research by purchase order).

“Many high quality foreign universities are very eager to work with American companies, and by keeping attorneys out of the discussion completely they have streamlined processes to allow a successful negotiation to take place in literally a few minutes over the telephone. It is possible to specify what one wants to a professor at a university in China or Russia and then issue a purchase order to obtain a particular deliverable. The deliverable is received and verified to be satisfactory before the American company pays for it, and in this case the American company owns all rights to the deliverable and the process by which it was created.”

Stan Williams
Director, HP Quantum Science Research
Operating Model

Vicious Cycle
- IP-centric
- It takes too much time, effort, money to negotiate agreements
- Perceived deterioration of trust and goodwill, adversely affecting long-term partnerships & collaborations
- Increased flow of sponsored research funds to other parts of the world
- At the working level, people just walk away

Virtuous Cycle
- Relationship-centric
- Trust-enhancing
- Builds on each other’s work
- Attracts increasing financial support
- Motivates increasing commitment and contribution of the current contributors
- Attracts increasing involvement of other organizations
“Of 3200 universities, perhaps 6 have made significant amounts of money from their intellectual property rights. IP rights should be pursued as a means for interaction with industry rather than as a means for raising revenue from commercialization.”

John C. Hurt
National Science Foundation
## Top University License Income

<table>
<thead>
<tr>
<th>Institution</th>
<th>License income ($M)</th>
<th>Research expenditures ($M)</th>
<th>Income as % of expenditures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Columbia</td>
<td>89</td>
<td>279</td>
<td>31.9</td>
</tr>
<tr>
<td>U. California system</td>
<td>74</td>
<td>1,865</td>
<td>4.0</td>
</tr>
<tr>
<td>Florida State University</td>
<td>57</td>
<td>133</td>
<td>43.2</td>
</tr>
<tr>
<td>Yale</td>
<td>41</td>
<td>316</td>
<td>12.9</td>
</tr>
<tr>
<td>University of Washington</td>
<td>28</td>
<td>480</td>
<td>5.8</td>
</tr>
<tr>
<td>Stanford</td>
<td>28</td>
<td>417</td>
<td>6.6</td>
</tr>
<tr>
<td>Michigan State University</td>
<td>24</td>
<td>208</td>
<td>11.4</td>
</tr>
<tr>
<td>University of Florida</td>
<td>22</td>
<td>280</td>
<td>7.7</td>
</tr>
<tr>
<td>U. Wisconsin-Madison</td>
<td>18</td>
<td>422</td>
<td>4.3</td>
</tr>
<tr>
<td>MIT</td>
<td>16</td>
<td>726</td>
<td>2.2</td>
</tr>
</tbody>
</table>

License Income Example

UC system 2001 license income $73 M
- legal expenses
- operating expenses
- distributions to joint holders
- distributions to inventors
- other costs

Net license income $5.2 M

Source: Alan Bennett, UC Technology Transfer Annual Report 2001
# License Income as a % of SRA Income
(for top 4 universities in CS/ECE)

<table>
<thead>
<tr>
<th>Institution</th>
<th>SRA income ($M)</th>
<th>License income as % of total SRA income</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carnegie Mellon</td>
<td>168</td>
<td>2.8</td>
</tr>
<tr>
<td>MIT</td>
<td>726</td>
<td>1.7</td>
</tr>
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<tr>
<td>U. California system</td>
<td>1,865</td>
<td>3.7</td>
</tr>
</tbody>
</table>

Source: J. Strother Moore, CRA Snowbird Conference, October 1, 2002
Technology Innovation and Recruiting Impacts

• This situation may adversely affect innovation and technology transfer in some key technology areas.
• Also, recruiting is at risk. Research at foreign universities provides a source of highly talented graduates.
GUIRRR Industry/University IP Congress

• Sponsored by Government-University-Industry Research Roundtable (GUIRR), National Council of University Research Administrators (NCURA), and Industrial Research Institute (IRI).

• Goal is to …
  – explore the current situation on IP rights as it affects negotiations on industry-funded research contracts and the regulations
  – examine economic forces affecting IP rights
  – create an understanding of cultural differences that are creating problems and controversy and keeping productive I/U relationships from happening
  – explore new ways of doing business that will meet the needs of industry, universities, and government

• Timeline:
  – August 20, 2003 – IP Congress in San Francisco
  – Spring, 2004 – next IP Congress
  – Fall, 2004 – summit of CEOs and University Presidents
BASIC is a collaboration of the Silicon Valley region’s major research universities (Stanford, UC Berkeley, UCSF, …), businesses (IBM, Genencor, HP, Lockheed, SIA, …), and national labs (Lawrence Livermore, NASA Ames, Sandia, …).

BASIC is dedicated to developing programs that take advantage of the unique capabilities at Bay Area R&D institutions to provide solutions for critical national and regional challenges.

Goal of the IP Project is to achieve a shared understanding of general principles that will more effectively advance the IP interests of public and private research institutions.

Motivation is driven by recognition that a problem exists and is becoming more contentious and complex over time.

IP Project Desired Impact and Outputs
- A set of general principles
- Achieve social / culture change in the total IP system
- Enhance economic and business development – create a virtuous cycle/environment rather than a vicious cycle.
AUTM Annual Meeting

• Held on 30th anniversary of passage of Bayh-Dole Act, with over 1700 university technology licensing and technology transfer people attending
• Former Senator Birch Bayh gave the plenary talk where he exhorted the AUTM members to fight the erosion of Bayh-Dole while seeking to expand its application
• AUTM is striving to export Bayh-Dole to other countries, such as Germany, Japan, Ireland
• Universities successfully lobbied DOE to enact regulations more stringent than Bayh-Dole for the joint DOE-industry funded Solid State Lighting Initiative
• These positions jeopardize efforts to heal the strained relations between universities and industry
Globalization of R&D
Global R&D Migration

• The shift to emerging economies first occurred in textiles and other manufacturing jobs, followed by low-end services such as telemarketing and data entry. Now it is moving up the labor food chain to R&D jobs.

• Debate over migration of white-collar jobs overseas is misguided.
  – Proponents say it’s a win-win for America and its trading partners.
  – Opponents say it’s a race to the bottom that will destroy America’s middle class.

• Jobs are flowing to Asia, Eastern Europe and elsewhere. Short of a radical change in policy – say, a complete halt to international trade – information age jobs will continue to shift overseas.
Relative Change in Bachelor's Degrees Awarded Since 1986

US undergrads are following the research $!$

- Biological/Agricultural: +55% in 1996
- Physical Sciences: +18.0%
- Mathematics: -12.6%
- Engineering: -19.2%
- All degrees: -21.1%

SOURCE: National Science Foundation

Science and Engineering Indicators 2000
Globalization of R&D – Software Example

• There are additional reasons which make global R & D federation so pervasive at this time

“One is the very nature of software R&D at an industrial scale. Developing Software includes a creative step (understanding requirements, generating ideas and prototypes, defining architectures) and a production step (coding then testing, bug fixing, verifying and shipping)... Although both the creative and production steps are generally considered “R&D”, they profoundly differ in style and substance over the life cycle of a software product.”

“Over the last 15 years, companies have found that there is a high cost in maintaining and enhancing the software products (the 70% production portion) and have attempted to distribute the process towards lower skilled lower cost locations... It is now possible to have software R&D done anywhere in the world, while maintaining tight connection among distributed teams.”

“During that same period of time, many countries/governments invested heavily in building up a highly educated workforce with advanced degrees in computer science and related technology fields and continue to do so. As a result the pool of talent in many regions of the world is now highly skilled and competitive and can tackle the most advanced part of software technology.”

Patrick Scaglia, Vice President and Director,
HP Internet and Computing Platform Research Center
• HP encourages collaborations with and among universities worldwide, exemplified by the Gelato Federation

• The Gelato Federation is a world-wide consortium of research organizations dedicated to enabling scalable, open source Linux-based Itanium computing solutions to address real world problems in academic, government, and industrial research

www.gelato.org
China University Engagement

• Built up momentum with 8+ universities
• Established contacts with 30+ universities
Competing on the Global Stage

- Significant attention is needed to address the issue of whether human capital will be built within the US or outside the US.
- America’s information and technology workers are being forced to compete with an exploding population of lower paid, skilled workers around the globe.
- US industries based on physical science and engineering face acute shortages of people and new ideas, forcing us to either import foreign researchers, or export our R&D facilities.
- Research conducted at foreign universities provides a source of highly talented graduates, who increasingly stay in their own countries and compete with us.
- To stay ahead in a skills-based economy, American companies and universities must work together to invest in developing the most skilled and flexible workforce in the world.
Changing the Ecosystem: Opportunity For Strategic Partnership
Knowledge Supply Chain

- Universities and industry generate knowledge and transfer knowledge.
- Barriers between the two cultures impact the ability to create new knowledge to satisfy society.

Source: Knowledge Supply Chains, A Next-Generation Manufacturing Project
The Knowledge Process Today

• Partners need to understand how they fit in an integrated knowledge process.
• Each partner is responsible to help others succeed.
• Partners must be part of a continuous, free flow of information and knowledge.

Source: Knowledge Supply Chains; A Next-Generation Manufacturing Project
The Knowledge Process of the Future

- Outcomes for industry include more effective access to knowledge => reduced technology development cycles.
- Outcomes for universities include increased funds and capacity for pursuing relevant basic research.

Source: Knowledge Supply Chains; A Next-Generation Manufacturing Project
Partnership Framework
The Partnership Continuum

- An increasing level of trust is developed in the partnership.
- The relationship becomes a holistic engagement in the strategic partnership phase.

KEY
1. Recruiting
2. Education Sales
3. UR Account Managers
4. UR Programs
5. UR Research
6. Other (Philanthropy, Alumni, Executive)
New Relationship Models

“Dedicated to the public domain” model

- Some university faculty put the results of their research directly into the public domain and do not try to obtain a patent
- This strategy has been quite successful, since many companies would rather just give money to a university in return for access to students than waste time, money and energy in futile licensing negotiations
- In this approach, all companies have equal access to the ideas, and those who push the hardest (and hire the students who worked on them) will bring them to market
- Neither the university nor faculty receive royalty income, but those who adopt this strategy have found that the increase in direct research support more than outweighs the potential (but seldom realized) income
New Relationship Models

“Research commons” model

• Proposed by Bob Miller, Vice Chancellor of Research, UC Santa Cruz
• Multiple companies and universities interact on research activities in the research commons
• IP is freely available to the companies and universities participating in the commons
• Under discussion at the UC System
New Relationship Models

“Second Generation Technology Transfer” model

- Proposed by Gerald Barnett, UC Santa Cruz Technology Transfer Office
- Current approach of patenting and licensing university inventions to generate royalties is flawed because it concentrates resources on trying to find a few winners, rather than using university technologies to build relationships with companies that might actually use those ideas
- Barnett advocates using intellectual property as a tool for working with industry more, not less
- Awards nonexclusive licenses to industrial sponsors of research
New Relationship Models

“Privatization” model

• Proposed by Mike Uretsky, NYU Stern School of Business

• His thesis is that universities are the wrong place to do technology development, since universities can’t move fast enough and don’t understand the marketplace

• The challenge is dealing with economic realities that keep this from being successful

• Uretsky proposes the formation of a middle operation between universities and industry to focus on development, prototyping, testing, refining, and commercialization of technologies
Conclusions

• Focus on Building long-term Strategic Partnerships that help each other be successful:
  – Build trust and mutual respect
  – Maximize the creation and transfer of knowledge
  – Publish and use public domain where appropriate
  – Emphasize total revenue to the university (focus on research funding)
  – Favored vendor status
  – Access to government resources
  – Accreditation & learning science and teaching
  – Technology program portfolio/balance science & engineering

• We believe this leads to win-win collaborations.
University/Industry Interactions: One College’s Approach

Deanna Dietrich, Associate Dean
College of Engineering
UW-Madison
Outline

• Overview of Major Issues
• Example Model Currently in Use
• Advantages/Disadvantages of Current Model
• Alternatives to Consider
• Lessons Learned
• Discussion
Overview of Some Issues

• Organizational Structure/Goals
• Time Scale
• Confidentiality
• Publication
• Intellectual Property
Issues – Structure/Goals

- Industry typically hierarchical organization
- University does not have as clear a “chain of command”
- Industry needs to justify investment of time and money
- Industry looking for specific product or output
- University examining interesting questions/educating students
Issues – Time Scale

• Short time frame to university is one semester
• Short time frame to industry is one day or less
• University bureaucracy operates on pace with federal agencies
Issues - Confidentiality

• Industry employees use requirements of confidentiality as a competitive advantage
• University typically encourages an open, free exchange of ideas
Issues - Publication

- Key University goal to disseminate information
- University faculty and students judged on publications
Issues – Intellectual Property

• Federal Funding – Bayh Dole Act (35 U.S.C. ss.200-212)
  – Encourage licensing of inventions funded by federal government
  – University may elect to retain title to inventions developed with federal funding
Issues – Intellectual Property

• Ownership - University
  – To ensure compliance with Bayh Dole, University will not agree to assign rights to ip that may have been developed using federal funds
  – Under Bayh Dole, prohibition against assignment to a third party, other than a patent management organization, without specific government approval
Issues – Intellectual Property

• Ownership - Industry
  – “We paid for it, we own it.”
  – However, budget for research project rarely reflects the entire cost, even when “full” indirect costs are included
    • Investment in faculty’s knowledge and experience
    • Budget might not include any faculty salary
    • Long term investment in specialized research facility may be required for the project
Issues – Intellectual Property

• Ownership – University
  – University/researcher maintain ownership in order to continue to perform research in that area.
Issues – Intellectual Property

• Licensing
  – Preferential rights to sponsoring industry
  – Industrial concern that competitor might also license

• Access versus Ownership
  – Ability to use/right to license rather than absolute ownership is usually sufficient
  – Notice and right to negotiate
Example Model

• Central Contracts Office – Research and Sponsored Programs
  – Ultimately has signature authority/institutional approval
  – Reviews for legal, policy, institutional issues
  – “Team” of three people assigned to several colleges/schools
Example Model

- **Wisconsin Alumni Research Foundation (WARF)**
  - UW-Madison’s patent management agent
  - Receives assignment of inventions developed with federal funds or at inventors request, if no federal funds involved
  - Prosecutes and maintains patents
  - Licenses technologies
Example Model (cont’d)

• College of Engineering – Research Services Office
  – Associate Dean, Research and Policy Administration
  – Two academic Staff for “pre-award” (proposal) issues
  – Two Academic Staff for “post-award” issues
  – Students for filing, errands
Example Model (cont’d)

- College of Engineering – Research Services Office
  - Works closely with faculty, RSP, WARF, sponsor
  - Departments assigned to specific Contract Specialists
Example Model (cont’d)

• College of Engineering – Research Services Office
  – Reviews agreements received from sponsor
  – Coordinates review activities with faculty, RSP, WARF
  – Submits combined comments to sponsor
Advantages of Current Model

- College faculty/researchers have point of contact in Dean’s office
- Dean’s office staff more familiar with research programs and specific issues
- Dean’s office able to prioritize based on College objectives
- Sponsor has one point of contact
Disadvantages of Current Model

• Multiple Layers of Bureaucracy
• Not consistent with rest of campus (more scrutiny of College agreements?)
• Sponsor may have to deal with several contacts in other schools/colleges across campus
Alternatives

- Contracts Team within Central Office
- Contracts Team within Tech Transfer Office
- Contracting Authority to Schools/Colleges
- Revise standard ip language/approach
Lessons Learned

• Discuss Expectations
• Get to “drop dead” issues as soon as possible
• Explain Process – whatever it might be
• Timely Responses – even if it is just to say more time is needed
Is there a Better Way to Work with Industry?

Gary S. Was
Associate Dean
College of Engineering
University of Michigan

ERC Workshop
Challenges in Industry/University Interactions
February 27, 2005
Ties to industry are important in providing the best opportunities for engineering graduates, for bringing practical, real-world problems into the classroom and laboratory, for engaging faculty to apply their expertise and for providing a platform for the institution to address industry challenges, thus providing an opportunity for national and global leadership in engineering. A measure of the extent of industry interaction is the level of research support from industry relative to other sources.
Most Common Paths for Industry Interaction - what we learned from our peers

- **Single and multiple-PI grants** range from a few to ~50% of total industry support.
- **Federally-funded centers** provide a strong vehicle with which to attract industry support.
- **Industry consortia:**
  - Broad participation - large number (>20) of companies provide modest level of support ($15-$50K). Objective is to provide access to students and to showcase research at the institution.
    - MIT: Media Lab (150 companies) and World Wide Web (200 companies, both at $50-70K).
    - Stanford: Computer Forum (90 companies) at $18K.
    - U.T. Austin: Construction Industry Institute (100 companies @ $25-$50K).
Other ideas

- **Focused, high level partnerships:**
  - MIT: Strategic Alliance Program
    - Initiated with major corporations at Presidential level
    - Commitment to support research covering a broad range of activities of interest to the company
    - MIT Industrial Relations Board, with senior faculty guidance, establishes details of agreement with counterpart in the company
    - Typical alliance agreement is for 5 years at ~$5M/yr.
    - 9 partners
Characteristics of strong industry research programs

- **Commitment to working with industry**
  - Indigenous to all successful programs.
  - Proactive efforts to engage industry, to showcase their research and to foster contact with students.

- **Multidisciplinary centers of activity**
  - “One-stop” research shopping resource.

- **Support of state government**
  - One-to-one correspondence between successful industry interaction and state support.
  - State support seeds and draws industry to campus.
Recommendations

1. Develop a culture in which industry interaction is perceived to be of value and is rewarded equally with federally-based research.

2. Develop programs to attract industry to campus.

3. Engage the State in an effort to develop deeper lines of support for partnering with industry in research programs that ultimately benefit the state economy.

4. Develop a strategy for partnering with industry on a broad, multidisciplinary front that takes advantage of both the breadth and depth of the institution.
Current “grass roots” approach to research interactions with industry

CoE/UM Research Capabilities

Company Interests

- A
- B
- C
- D
- E
- F
- G
- H
- I

1
2
3
4
5
6
7
8

= unmet needs (company) or untapped resources (university)
Contract negotiation is generally costly to the institution for such small return.
- IP and related issues
- Publication often an issue

- Negotiated at low level within the company --> $20-50K/yr.
- 1-2 year duration - barely enough to support an MS student.
- Shallow intellectual level so inappropriate for PhD research.
- Onerous reporting requirements, especially per $ invested.
- Little or no connection with other university research programs sponsored by the company.
- Little or no connection with other programs at the same institution sponsored by the company.
- High risk - first to be cut when company budget is tight.

Why would universities want to work with industry in this way?
Contract negotiation is generally costly to the institution for such small return.

- IP and related issues
- Publication often an issue

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Little or no connection with other programs at the same institution sponsored by the company.

High risk - first to be cut with the red ink starts to flow.

They don’t, and neither does industry!
**Pros**
- Leverages significant federal dollars
- Provides a “friendly” forum for interactions with competitors and industrial peers

**Cons**
- Research agenda set by the federal grant and multiple constituents
- Research tends to be focused on a single technology area
“Corporate Consortium” Model
(Example-HUMOSIM)

Pros
- Research generally more directly relevant to industry
- Provides a “friendly” forum for interactions with competitors and industrial peers

Cons
- Research focused in one specific area
- Research agenda influenced by multiple constituents
- May lack federal $ leverage
Close, but not quite

All of these “center-based” concepts have industry “on the outside looking in”

Need to put the company as the focus of the research
“Customer Centric” model

Customer Centric Model

Industry Partner

- Mechanical Engineering
- Electrical Engineering
- Business School
- Chemical Engineering
- Biomedical Engineering
- Materials Science Engineering
- Medical School
Mission: • Conduct research and development activities in areas that are of critical importance to GM’s powertrain and manufacturing operations.
• Facilitate the exchange of technical personnel between GM R&D Operations and the University.

• Established to support a long term, strategic, and productive relationship between GM Research & Development Operations and the UM College of Engineering.
• Supports the transfer of knowledge, technology, and engineering human talent to GM through courses, personnel exchange, and graduate student involvement in the GM-sponsored research projects.
• Multi-year (5-10 yrs) program involving 10 faculty and numerous students from UM and 10 researchers from GM.
A Strategic Research Partnership (SRP) Model

CoE/UM Research Capabilities
- Faculty
- Dept
- Facilities
- Other Colleges

Research Thrust #1
UM Thrust Manager
Company Thrust Manager

Research Thrust #2
UM Thrust Manager
Company Thrust Manager

Research Thrust #n
UM Thrust Manager
Company Thrust Manager

Project Selection

Tech Transfer

Company Interests
- Manufacturing
- Design
- ....

SRP Executive Committee

Michigan Engineering
Benefits of the SRP Model

To the company

- Focus is on corporate research mission and objectives
- Long-term partnership (5-10 yrs) to tackle significant problems
- Access to entire portfolio of University expertise and students
- External “sounding board” for technological direction
- Streamlined contract and IP arrangements
- Accelerated technology transfer mechanism

To the university

- Critical mass of funding for a graduate student “lifetime”
- More “basic science” to engage PhD students
- Provides insight into “real world” challenges
- Improved exposure to all levels of corporate management
- Streamlined contract and IP arrangements
- Accelerated technology transfer mechanism
Successes with SRP approach

- General Motors Collaborative Research Laboratories
  - Powertrain
  - Manufacturing

- USA program with General Electric Aircraft Engines
  - Materials
  - Manufacturing
  - Turbine engine design
  - Computational fluid dynamics
In Closing......

- Institutional commitment to work with industry.
- Actively develop programs to attract industry.
- Partnerships constructed on many levels.
- Emergence of the “strategic-research partnership” model for developing deeper and more productive programs with industry.

Universities and industry are looking for the same thing - they just haven’t recognized it yet.
2005 ASEE/ERC Workshop on Challenges in University/Industry Interactions

Yaman Yener
Associate Dean
College of Engineering
Northeastern University

Sunday, February 27, 2005
Arlington, Virginia
In COE at NU, about 8-10% of external research funding is generated each year through research contracts with industry.
Interaction with Industry

- Single and Multiple PI contracts.
- Research Centers.
In 1997, COE established an **Office of Industrial Relations (OIR)**.

**Director** reports to the Associate Dean for Research and Graduate Studies.

The mission of **OIR** is to establish and sustain productive relationships with the corporate sector leading to research support.
Industrial Relations Activities:

• Arrange visits and presentations to companies.

• Arrange and host company visits to NU.

• Establish Industrial Showcases to build awareness of the College’s research activities leading to support.

• Work with COE faculty to facilitate commercialization of intellectual property, and leading edge technical workshops and seminars.
The **Division of Technology Transfer (DTT)** was established at NU in 1999.

**Mission**

To promote technology transfer for society’s use through commercialization and sponsored research activities.
Principal Functions of DTT

Actively seek opportunities to:

- License University-owned technologies to existing corporations.
- Promote the formation of start-up businesses based upon new technology development.
- Perform sponsored research for industrial partners.
NU/COE’s Federally/Corporate-Funded Centers

- CenSSIS – NSF/ERC
- CHN – NSF/NSEC
- CAMMP – NASA
- CDSP – Corporate funded
- CMC – NSF/IUCRC
CenSSIS – An Example
(>15 Industry Partners)

• Strategic Partner
• Corporate Partner
• Associate Partner
CenSSIS – Each Industrial Partner signs an Industrial Partnership Agreement

This defines,

• Terms
• Support
• Investment components
• Mutual responsibilities

For sponsored research projects, a separate agreement is created between the partner and the participating CenSSIS parties.
Support to CenSSIS can involve four major components:

- Core research funding
- In-kind
- Sponsor (I-UROP) students
- Sponsored research project funding
All membership levels include access to CenSSIS core intellectual property.

**Strategic Partner Level** levels includes:

- Membership on the CenSSIS Board of Directors
- Indirect Cost Reduction
Single and Multiple-PI grants with industry

- In each case, a separate Industrial Sponsored Research Agreement is negotiated and create
  - Lengthy
  - Costly
  - Low level return
  - Short duration
Graduate School of Engineering

Single and Multiple-PI grants with industry

- Usually there are issues with
  - IDC
  - Intellectual Property
  - Publications
  - Confidentiality
  - Indemnity and Liability
At NU, Director of DTT(*) (on behalf of the Provost) is responsible for the administration of intellectual property matters relating to

- inventions,
- patents,
- trade secrets,
- trade marks,
- copyrights, and
- publications.

* Division of Technology Transfer
• The University has a **Patent Committee** which is responsible for advising and making recommendations to the **DTT** Director concerning intellectual property matters which arise from activities of

  • faculty,
  • staff, and
  • Students.
These include,

- Inventorship,
- Determination of rights between inventors,
- Determination of rights between the inventor and the University,
- Disposition of patent rights which the University does not wish to exercise.
• The patent Committee also makes recommendations regarding those inventions on which patent applications will be filed and the disposition of patent rights involved,

• Recommends arrangements for prosecution of patents and commercialization of inventions, and

• Considers and makes recommendations on special patent, trade secret, trade mark, copyright, and publication matters submitted to it for resolution.