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University Industry Partnership

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The Mission of a University

- Education, research and public service
- Source of discoveries, new knowledge and basic research (upstream research)
- Provide skilled and educated manpower to meet the developmental needs of the country.

- Many universities, however, are accused of
  - Being in ivory towers, removed from the needs of the community
  - pursuing knowledge of little relevance to the developmental needs of the country
  - producing a workforce ill equipped to meet the challenges of industry and
  - in general contributing very little to the practical development needs of a country

Changing Role of Universities

- Universities key players in the Knowledge Economy. They produce the raw material for the knowledge economy
- Universities are expensive institutions for any country, what ever be the level of development (investment)
- There is a certain expectation now that countries cannot afford to let this very important resource go unmanaged. That there must be a return on investment and that knowledge generated in universities must be fashioned to meet the needs of the country after development by others (down stream research), in many products beneficial to the community.

The Challenge of Universities

- Unable to retain qualified people
- Inadequate state funding, no means of creating funding sources
- Inadequate infrastructure and facilities
- Gap between the outcome of university research and the stage which firms can assimilate it

University Industry Cooperation - Benefits to University

- Industry is the conduit through which the results of university research can be transferred, disclosed and disseminated to the public for the public benefit
- It will bring in badly needed funds allowing the university to fulfill its fundamental mandate.
- Supplement the income of staff to retain talented staff
- Provide early exposure to universities of the inner workings of industry

Concern – will universities be able to fulfill its fundamental mandate

- Universities have evolved from “public trusts to something akin to venture capital firms” - Fortune
- Research should be curiosity driven not market driven
- Open culture of sharing and publication now clouded in secrecy and driven by profit
- Loss of control
- private interests may undermine the objectivity of research by causing bias, suppression of results, and even fraud

Benefits to industry

- Industry is not usually in the business of basic research whereas that is the function of university
- Source of new technologies
- Expert support at lower cost

Concerns

- University inventions are sometimes considered too early stage (arcane!, impractical) and a lot of innovation may be required to make it ready for market
- Universities tend to publish early
- What follow up support could be expected from the inventor for further development
- Universities' mind set is academic and not entrepreneurial
- Universities are less inclined to work with small firms who cannot provide the same legal and financial security as a larger firm.

Blending the University Research and Entrepreneurial Cultures

- Academics
  - research priorities set by investigator
  - grant-seeking
  - publications
  - serendipity
  - transfer at early stage

- Industry
  - research priorities set by management
  - profit-seeking
  - proprietary
  - control
  - add value before transferring

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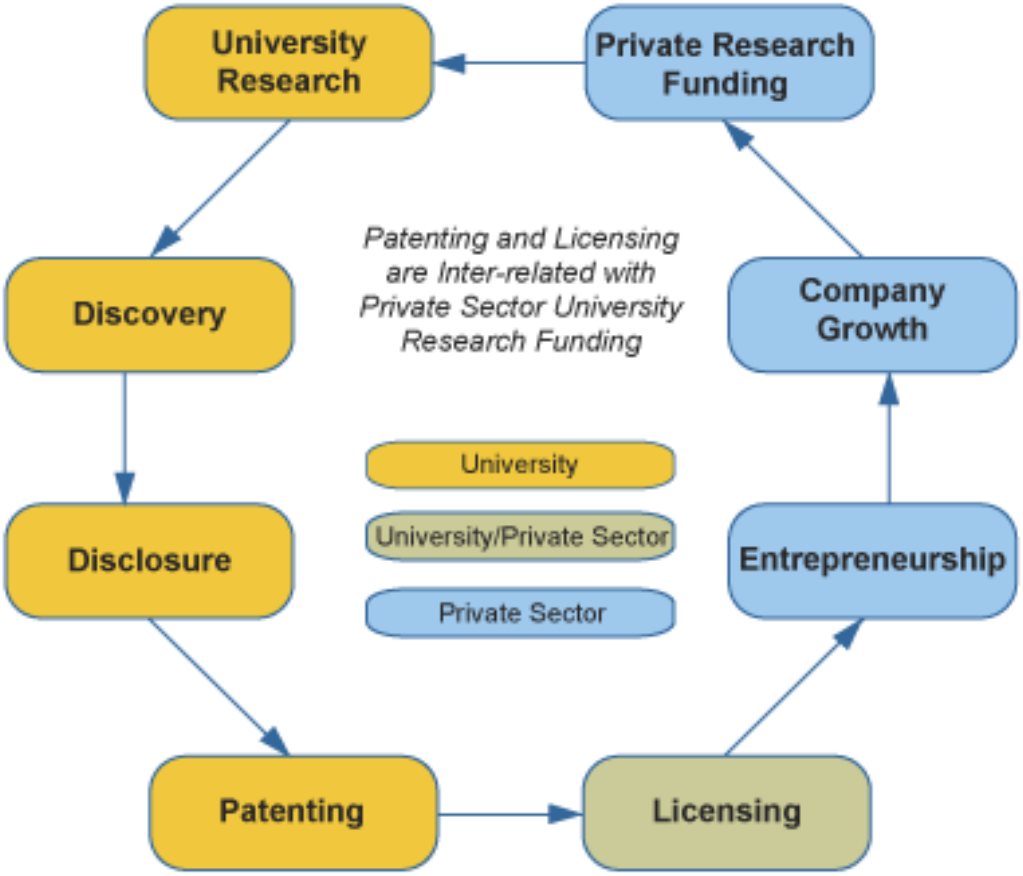
Types of Cooperation

- Direct funding of research through gifts and grants
- Exchange programs and internships
- Consulting by faculty
- Commercialization of inventions, innovations and research findings

Discovery to entrepreneurship

Source UC Davis



Goal of a University IP Policy

- Not conflict with the primary goals of an university (teaching and research)
- Balance the interests of all stake holders
  - The university employs the researcher, provides the facilities and its name
  - The researchers expends his time, energy and skills
  - The govt uses its scarce resources to support universities and expects the knowledge produced to promote national development
  - Sponsors want to own the results of sponsored research

Elements of an IP Policy - 1. Ownership

- Inventions and innovations arising from activities using university resources and facilities are owned by the university

- The ownership of inventions and innovations that arise from activities using government grants depends on the law of the country
  - US - Bayh Dole Act.
  - Japan

Bayh-Dole Act of 1980, USA

- Prior to the Bayh-Dole Act public funded research belonged to the public. 50% of all research in the US was government funded but very little was put to use. No private ownership no investment.
- Under the Act, inventions made by universities that have received federal funding may be owned by the university.
  - The inventor must disclose the invention to the university and to the government with a statement that the invention was made with government support.
  - The government retains a non-exclusive, non-transferable, irrevocable, paid up, world wide license
  - The government can require the inventor to grant reasonable licenses to third parties under certain circumstance (march in rights)

- Since Bayh-Dole came into force, nearly 5,000 companies have been spun out of American campuses, over 40,000 licence agreements have been concluded between academic institutions and outside parties.
- Companies with their roots in the US university system now contribute an estimated US$40 billion a year to the country's economy.
- The Bayh-Dole is credited for the creation of around 1500 **biotech** companies, employing more than 180,000 people generating upwards of US$40 billion in revenue
- For example the California Institute of Technology (CALTECH) received in one year some 10m $ in licensing revenue, filed 416 patent applications, received 142 patents, started 14 new companies.

A wide range of new products have stemmed from university -based research

- Kansas State University developed nanomaterials that can neutralise a wide range of contaminants and chemical warfare agents. The technology is licensed to NanoScale Materials Inc of Manhattan, Kansas.
- University of North Carolina invented a software program that incorporates a 3D microscope, which allows students to experience microscopy in the classroomand from home. The technology is licensed to Science Learning Resources Inc, of Carboro, North Carolina.
- Researchers at Boston University, developed an optical device known as the Numerical Aperture Increasing Lens (NAIL) to produce high-resolution images of wafer circuitry.
- EdgeTech of Marlborough,Massachusetts, has taken a licence to a sonar technology developed at Florida Atlantic Univeristy that can be used to locate buried underwater mines.
- Purdue University developed a miniature mass spectrometer now licensed to Griffin Analytical Technologies Inc, of West Lafayette, Indiana. This portable device can be used to identify chemical warfare agents, explosives and toxic industrial chemicals.
- University of Texas scientists developed wired enzyme technology, which allows diabetes patients to measure blood glucose with a much smaller sample than required by existing methods.
- Allergan Inc, of Irvine, California, is selling a new drug, Restasis, which is based on technology licensed from the University of Georgia. Restasis, an immunosuppressant, decreases tear duct inflammation and is used to treat dry eye.

The Bayh-Dole Battle by Victoria Slind-Flor, Intellectual Asset Management December/January 2006

- Sponsored research
  - Inventions arising from research sponsored other than by the government would be governed by the terms of the agreement which would normally have been approved by the university
  - Usually the sponsor would expect to own the results of the research (but powerful universities like UCLA own the IP even in such cases).

The Onco-mouse

- On April 12 1988, the U.S patent office granted Harvard a Patent rights over the Oncomouse, a transgenic mouse designed to have a predisposition to cancer
- Dupont had provided some $6 US funding for the research that resulted in the Onco mouse and under the terms of that funding were granted an exclusive license giving DuPont the right to “make and have made, to use and have used, to sell and have sold, the Oncomouse, and to fully exploit the patent rights”.

- **Limits on informal exchange of mice** - DuPont would not allow scientists to follow their traditional practices of sharing mice or breeding extensively from the mice.
- **Contractual control of scientific disclosure** - DuPont imposed forms of contractual control on scientists, most notably a requirement that they fulfill annual disclosure requirements; this was not a strict prohibition on publishing but a requirement that scientists using an Oncomouse would provide an annual research report on their published findings.
- **Reach through rights on future discoveries made with an Oncomouse** - DuPont required that scientists give them rights to future inventions made using oncomice. These so-called reach-through rights give the licensor of a patented technology a share in any proceeds from a product even though the original technology is not incorporated into the end product. These rights are not an integral part of patent law but instead emerge as part of a negotiation over the terms of conditions of a contract to make use of a technology – they are part of the price of use. While common in the contracts between biotechnology and pharmaceutical firms, this was the first time a company had sought to impose such a provision on academic scientists.

- By late 1999, after four years of negotiations, DuPont and the NIH signed a Memorandum of Understanding under which academic scientists (when funded by the NIH) could use oncomice without cost, providing they were not using them for any commercial purpose, including research sponsored by a commercial firm.

- Inventor
  - If the university does not proceed to patent an invention the inventor may request that the right to patent be transferred to him. The University may retain a non exclusive right to use the IP for educational and research purposes and perhaps a right to a percentage of the revenue
  - If the invention was made without “significant” use of the university’s resources the inventor could claim ownership

Elements of an IP Policy
2. Management

- Create a department/office such as a Technology Licensing Office to be in charge of managing the university's IP assets
- Responsible for the protection and commercial development of inventions and creations

Responsibilities of a TLO

- Processing and safeguarding relevant IP agreements;
- Determination of patentability, managing invention disclosures, undertaking patent search and completing applications for patents;
- Evaluating the commercial potential of an invention;
- Obtaining appropriate patent protection;
- Locating suitable commercial development partners;
- Negotiating and managing licenses.

Invention Disclosure

- A disclosure is the first signal to the university that an invention has been made.
- It is typically used to give a formal description of an invention that is confidentially made by the inventor to his or her employer.
- It provides information about the inventor or inventors, what was invented, the circumstances leading to the invention and facts concerning subsequent activities.
- It provides the basis for determining patentability and the technical information for drafting a patent application.

- All researchers are obliged to report to the University TLO all potential patents through the disclosure document. Premature public disclosure may affect novelty and disqualify it from patentability
- An invention disclosure is treated with confidentiality by the TLO
- Submitting a disclosure is the first formal step towards obtaining proper intellectual property protection through the university.

- *Identify* commercially valuable inventions
- *Protect* them (assess their patentability, prepare and make the patent application)
- *Reward* employees who create such inventions
- *Commercialize* (Locate commercial partners and negotiate licensing agreements)

Elements of an IP Policy - 3. Income Distribution

- Gross income - license fees, royalties, milestone payments etc
- Net income - gross income less university expenses for filing patents, negotiating license agreements etc..
- Distribution of revenue - generally the inventors share ↓ and that of the university ↑ as total net revenue ↑
- Many universities grant an average of 35% income to the inventor.

Spin -Off

- Commercialization of research can also take place (other than through licensing to another company) through the route of a spin off company that will commercialize the invention
- a spin off company is one that is established by members of university staff to exploit IP that belongs to the university
  - For example the university will transfer the relevant IP free of royalty to the spin off and will seek a majority shareholding in the company.
- Incubators have been useful in assisting the development of spin offs

Incubators

- Business incubators are designed to help start-up firms. They usually provide:
  - flexible space and leases, many times at very low rates
  - fee-based business support services, such as telephone answering, bookkeeping, secretarial, fax and copy machine access, libraries and meeting rooms
  - group rates for health, life and other insurance plans
  - business and technical assistance either on site or through a community referral system
  - assistance in obtaining funding
  - networking with other entrepreneurs
- The primary goal of a business incubator is to produce successful businesses that are able to operate independently and financially viable.

Companies that spawned from Stanford

- Altera
- Atheros Communications
- BEA Systems
- Charles Schwab & Company
- Cisco Systems
- Cypress Semiconductor
- DNAX Research Institute
- Dolby Laboratories
- eBay
- E*Trade
- Electronic Arts
- Gap
- Google
- Hewlett-Packard Company
- IDEO
- Intuit
- Kiva
- Linked In
- Logitech
- Mathworks
- McCaw Cellular Communications
- MIPS Technologies
- Nanosolar, Inc.
- Netflix
- Nike
- NVIDIA
- Octel Communication
- Odwalla
- Orbitz
- Rambus
- Rational Software
- Silicon Graphics
- Sun Microsystems
- Sun Power Corp.
- Taiwan Semiconductor
- Tandem Computers
- Tensilica
- Tesla Motors
- Trilogy
- Varian Associates
- VMware
- Whole Earth Catalog
- Windham Hill Records
- Yahoo!
- Zillow

Stanford University – Some of the inventions licensed

- **Digital sound synthesis**: John Chowning developed FM sound synthesis for digitally generating sounds in the late 1960s, leading to the music synthesizer.
- **Disease management**: The Stanford Patient Education Research Center develops programs for people with chronic health problems, including arthritis and HIV/AIDS. The program has been licensed to more than 500 organizations in 17 countries and 40 states.
- **DSL**: In the 1980s, John Cioffi and his students realized that traditional phone lines could be used for high-speed data transmission, resulting in patents used in asymmetric digital subscriber lines.
- **E-mail security**: Identity-based encryption, developed by Dan Boneh and Matt Franklin, offers an efficient way to encrypt and protect e-mail.
- **Functional antibodies to treat disease**: In the 1980s, Leonard Herzenberg, Vernon Oi and Sherie Morrison discovered how to mass produce antibodies— molecules that detect foreign substances—and target them for destruction by the body's immune system.
- **Genome sequencing**: Two tools assist in the sequencing of DNA: CHEF electrophoresis, invented in 1987 by Ron Davis, Gilbert Chu and Douglas Vollrath; and Genscan software, developed by Christopher Burge.
- **Google**: The world's most popular search engine got its start at Stanford when Sergey Brin and Larry Page developed the page-rank algorithm while they were computer science graduate students.
- **Personalized medicine**: The gene chip, based on spotted microarray technology developed in the 1990s by Pat Brown and Dari Shalon, allows doctors to create genetic profiles of patients and their diseases.
- **Recombinant drug production**: Recombinant DNA technology, developed in 1973 by Stanley Cohen and Herbert Boyer, laid the groundwork for modern genetic engineering by allowing scientists to combine pieces of DNA from different organisms.

Questions to consider

- Is the mission of universities being compromised by commercial interests
- Should research results funded by tax payer money be privately appropriated

- If commercialization of publicly funded research is appropriate
  - Ensure clarity on ownership of research results
  - Allow each university and PRO to develop their own internal policy along the above lines within the broader national goals
  - Governments could inject humanitarian/public service licensing policies into such national goals

Trend

- Major private research labs are down sizing while smaller start ups are increasing their research activities
- Companies are funding more basic and applied research in universities. Less corporate funding for the sake of public good but tied directly to corporate goals.
  - More funding
  - Less independence
  - Rise in “real world” research