Liaising with Industry

TECHNOLOGY TRANSFER AND COMMERCIALISATION
Hall "Ruen", 27th of September 2011

European Day of the Entrepreneur (EDE)
Sofia, 26-27 September, 2011

Why industry approaches academia

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MIT case!

- Expose management to leading-edge thinking, technology
- Gain insight from internationally-recognized experts
- Strengthen strategic decision-making:
  - development of new products and processes
  - implementation of innovative management practices
  - achievement of effective growth strategies
- Create research synergies
- Recruit future company leaders

MIT research funding FY 2009

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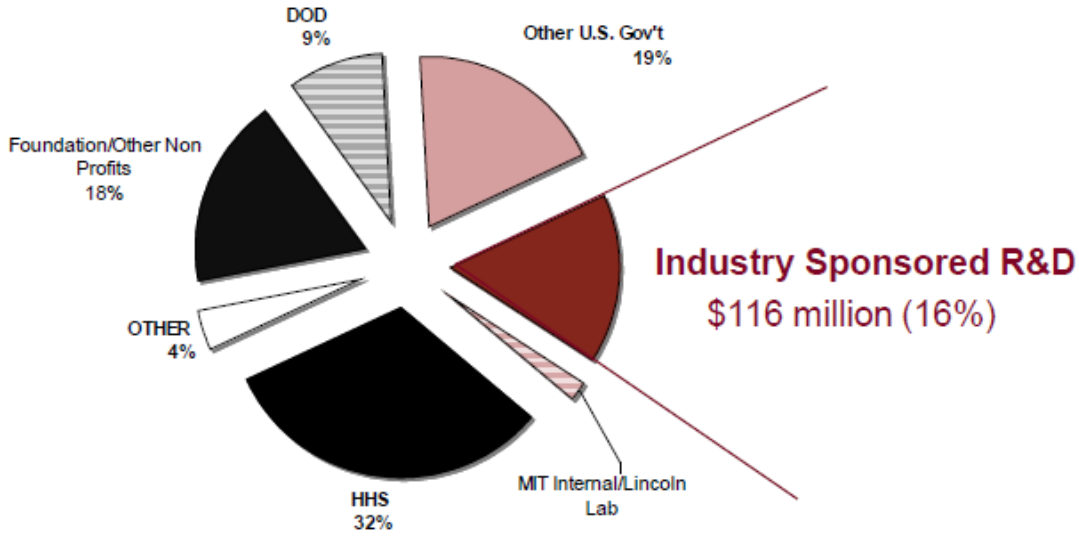
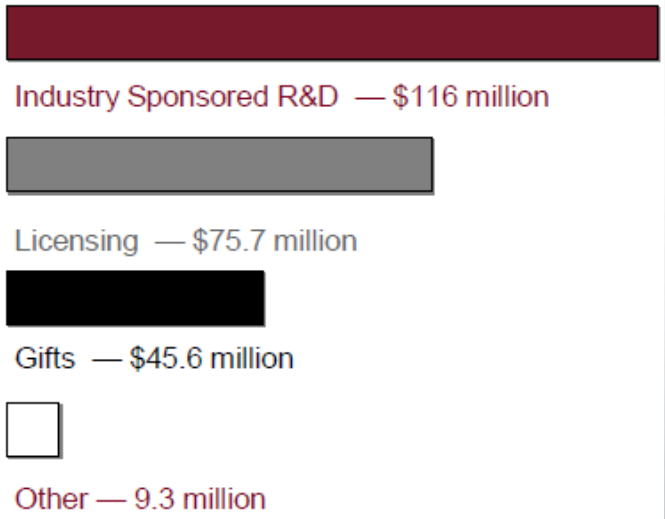
On-Campus R&D: $718 million



Source: MIT Data Warehouse — FY09 Expenditures by Sponsor (unaudited) 8/21/09

Total Industry Support: $241.3 million



Source: OCR FY09 Industry Support (unaudited as of 8/25/09)

EU vs. US

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- 70% of all pre-competitive R&D is performed by PROs (Public Research Organisations)
- 70% of all US patents based on PRO results (probably less in Europe)
- Only 5% of innovations are attributed to PROs in Europe
- Need to facilitate university-industry knowledge transfer (in particular to promote the exploitation of publicly-funded R&D results, and EU competitiveness); Europe is lagging behind the USA in this area

Knowledge transfer is not efficient in Europe

Innovation models

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Evolved and Evolving Innovation Models for Universities and R&D Institutes

- Information and Documentation (I&D Model)
- The Cooperation Model
- Blurring of Boundaries (BoB) Model

I&D model

Linear: knowledge generation - Dissemination – Utilization
"Technology Push" model

- The transfer of existing knowledge across science-industry boundaries takes place without any transformation of that knowledge.
- Information may be condensed, or, translated.
- There is no assumption of personal contact between scientists and industry.
- The scientist's primary role is that of knowledge producer.
- At most the scientist may be asked to provide titles and abstracts that may be easily understood by others and to avoid "unnecessary" or redundant publications.

The Co-operation Model (Mid 1970s)

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- actual or perceived "cultural gaps" between science and the economy that can only be bridged by personal trust.
- feedback on market needs to technology developer.
- importance of partnerships and joint ownership of technology development and transfer

"Market Pull" Model

- Emphasizes that science and technology transfer can only be successful if the inventors and commercializes actively exchange their ideas through immediate personal contact.
- Exchange can be achieved informally or formally, e.g. through personnel exchanges between research institutions and industrial partners.
- The role of the technology transfer professionals is to help to establish contacts and to clear up misunderstandings.

An example: Fraunhofer Gesellschaft

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The Fraunhofer Gesellschaft: the leading organization for applied research in Germany.
Strong application orientation:

- 70 % institute's income to be acquired through industrial and public projects.
- guarantees that only research proposals that can demonstrate a good return on investment will be pursued

Engagement in basic research:

- the director of a Fraunhofer institute is always a university professor
- 30 % of their of their income being supplied from base funding

Blurring of Boundaries (BoB) Model

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1990s onwards

This model assumes that institutional boundaries between science and the economy are becoming increasingly permeable and "blurred".

Two variants:

1. The Entrepreneurial University: engaging in licensing and spinout activities. This is seen as a factor in economic development in its own right.

2. Networks: which emphasis how academic knowledge production is part of a comprehensive and complex innovation process. This model highlights, the interaction of the systems' components or feedback loops.

Characteristics of BoB model

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In this model the technology transfer office is increasingly engaged in networking activities to link the university to:

- other research organizations
- different kinds of firms
- political agencies

All of these are seen as different nodes in the innovation process.

A “Feed-back Loops Model”

BoB examples

The Entrepreneurial University: engaging in licensing and spinout activities. **Example: Oxford University:**

- considered to be "one of Europe's most innovative and entrepreneurial universities"
- Technology Transfer Office (TTO) files on average one new patent application per week
- TTO spins out a new company from Uni. Res/ 2 months

Networks: academic knowledge production is part of a comprehensive and complex innovation process.

Example: The London Technology Network

- a network of over 100 university-based research experts
- LTN links 6,000 academics across London and the SE
- Helps map their research in order to provide technology solutions to business needs.

Areas of interaction PROs-industry

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- Industry participation in technology development involving some exploratory work
- Academic intervention in solving specific industry problems
- Laboratory/ research infrastructure utilization by industry
- Education and training programmes/ staff exchange
- Industry support to basic research (not often)

Industry Needs and Expectations

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- Industry's enduring interest lies in **targeted development**.
- Large scale industry expects and relies on academic intervention for **minor technological innovation/modification** aimed at technology absorption/ implementation
- Medium and small scale industry, looks toward academia for **problem solving**, with support in the areas e.g. of newer dosage forms, process improvement and plant and machinery performance, etc.

Industry Needs and Expectations..

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The industry may also need academic intervention in-

1)Reverse engineering where the product exists and what is sought to be developed is a process to yield it.

2)Parallel exploration of a new product line triggering a focused developmental activity.

3)Product testing and production enhancement in terms of quantity and quality in case of industries involved in contract manufacturing.

4)Ancillary facility to medium and large scale industries.

Industry Expectations..

In its interaction with the academia, industry's expected **time frames are immediate**, and investment is directed towards efforts that promise **result-oriented solutions**. The costing frames are typically guided by a reluctance to invest in technology R&D which has either long term or unclear outcomes……

However industry support to basic research is virtually non-existent…….

Acedemia Attributes…

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Academic research activity consumes both time and effort

- The result may often be inimical to what the industry would regard as a wholesome solution.
- Time frames governed also by research guidance and teaching priorities of the academic community.
- Globally, funding considerations orient academicians towards sponsored R&D activities, to sustain their broader research interests.

Each side wants...

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PROs

- Results, data, Knowledge
- Publications
- Grants, support
- New research
- Resources (Access to machines, methods, Materials, samples, Expertise, network)

INDUSTRY

- Information
- Service for fee
- Development of idea or method, for new products/ services.
- Sales, Market share, Share price, Profit
- Goodwill, PR (Access to Expertise, network)
- Resources (Information, Access to methods, Samples, materials)

The Mismatch

The gap between industry's needs and the academic community's aspirations

•For academia, technology development amounts to conceptualization and execution coupled with validation at the laboratory level.
•For industry, the interest lies in translating the laboratory validated concept into a commercial proposition, where the most important considerations are those of economic viability.
•industrial R&D focused on this phase of technology development where laboratory models are scaled up and converted into commercially viable products/processes.
•The academic potential is best exploited in the first phase of technology development.

Lack of Mutual Trust.
Acedemia: Often engaged in state/ EU finded programmes merely for securing funds
Industry: Doubts ability of academics in problem-solving.

Collaboration motives for Industry

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- ✓ Saving of Cost.
- ✓ Inadequate in-house R&D.
- ✓ Development of Standards
- ✓ Access to new areas of expertise.
- ✓ Strategic benefits & opportunities.
- ✓ Participation in public programmes.
- ✓ Access to public sector markets.
- ✓ Internal problems.
- ✓ Carrying out trials.
- ✓ Access to equipment
- ✓ Testing and Calibration.
- ✓ Student projects.
- ✓ Use of facilities.

Collaboration motives for PROs

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- Commercial exploitation of Research outputs.
- Additional income for the Institution.
- Improving the image of institution before society.
- Improving employment opportunity for graduates.
- Financial incentives to researchers/ inventors.
- Promoting knowledge based entrepreneurship and spin-off firms.

Link mechanisms

I. Institution-based link mechanisms-Linkages as extensions of institutions: e.g.

Industrial Liaison Office (ILO), Technology Transfer Office (TTO).

Research Contract, Consulting Agreement, Affiliate Programme, Research Consortia, Industry Cooperative, Teaching Company Scheme, Exchange of Personnel, University based Institutes.

II. Linkages through Creation of Additional Organizational Infrastructure, e.g.

Cooperative Research Centre, Centre of Excellence, Advanced Technology Centre, Incubation Centre, Technology Incubator/ Business Incubator Etc.

Link mechanisms

III. Property based initiatives in/around institutions with investment by institutions, industry, government, Venture Capital Funding agency, either solely or jointly e.g.

Science Park (e.g. Cambridge, Warwick, Aston in UK)

Innovation Centre (e.g. BIG, Germany)

Technology Park (e.g. Adelaide, Australia)

Research Park (e.g. Heriot-Watt, UK)

Industrial Park (e.g. Silicon Valley, Route 128, USA)

High Technology Developments

Technopoles (e.g. Sophia Antipolis, France)

University Company, etc.

Cooperation types

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- License or assignments of patented technologies
- Material transfer of un-patented technologies
- Collaborative or sponsored research for development of new technologies
- Employment and transfer of skilled researchers
- Consulting agreement
- Formation of start-up companies.
- Teaching, training and learning employer engagement, tailored courses)

Tips for more effective interaction

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- Make expectations clear! Unstated expectations: source of conflict
- Dialogue needed for understanding what does the other party want? Discuss foreseeable problems (Publication, Failure, Quitting prematurely)
- Is the collaborator honest about goals? State requests clearly from start
  - Not: "I need X. Now I need Y… And Z…" *(JL)*
- Professional legal advice (Within University?, Consultant). Standard contracts
- Advice from colleagues who have successful collaborations
- Friendly agreement: may work...
- Define type of collaboration early. Many different variants (Service for fee, Purchase material/knowledge, Consultant, True joint project). Avoid misunderstandings

Opportunities for making contacts

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With executives (from SMEs and large multinationals)

- Sector-focused networking events
- Fairs and exhibitions
- Major conferences where desired company executives and researchers participate as speakers (spot them in advance by studying the programme)
- Googling for desired contact details (U might be lucky! Send mail but make contact by calling)
- Technology partnering databases

And of course…

Via your local TT office

Technology partnering databases for:

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R&D seekers

- Contract research/testing opportunities (Equipment and
- specialist facilities)
- Industrial collaborators and the Media
- Group R&D collaborations
- Individual Consultancy opportunities (Experts with specialist knowledge)

Technology adopters

Licensing opportunities

Investors

Spinout-out opportunities

Databases: per Institution (e.g. TEKES Finland) or gathering profiles of various institutions and companies (e.g. EEN network)

Equipment and specialist test facilities databases

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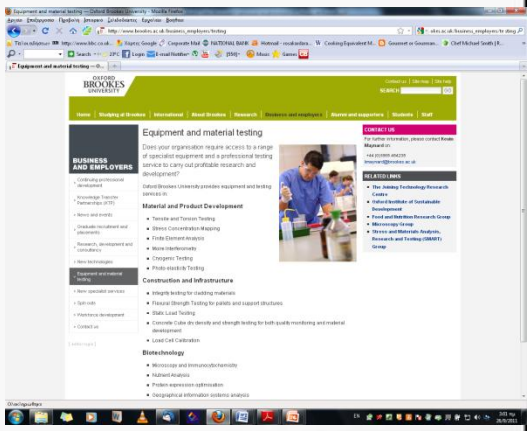
• Enables a range of specialised under-utilised equipment to be offered to the commercial sector

✓ At a commercial price!

✓ With support for use



Professional testing service

• Companies can carry out profitable research
and development

• Without investment in specialist equipment and personal

Example:
http://www.brookes.ac.uk/business_employers/testing

Experts databases

Expert Opinion

http://www.ucl.ac.uk/media/media/experts

http://www2.admin.ox.ac.uk/expert/search/

Expert Knowledge

http://www.isisinnovation.com/consulting/AreasofExpertise.html

http://www.brookes.ac.uk/business_employers/consultancy

Technology Acquisition databases

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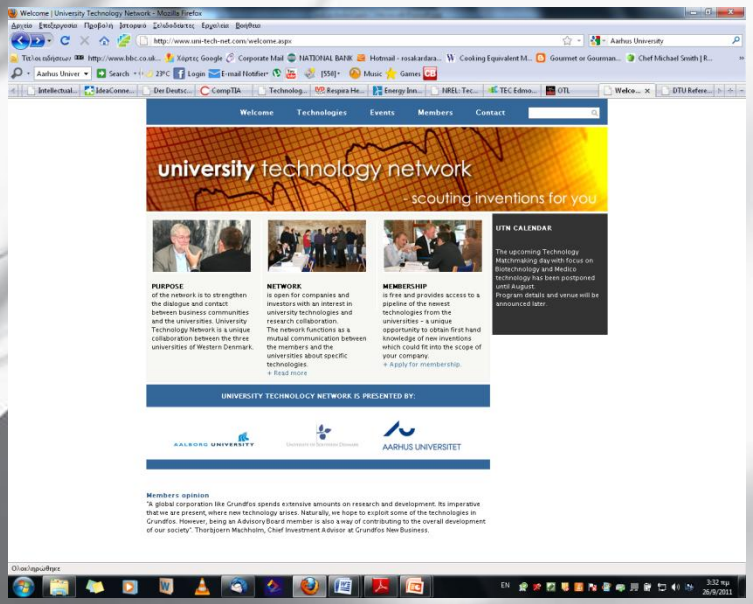
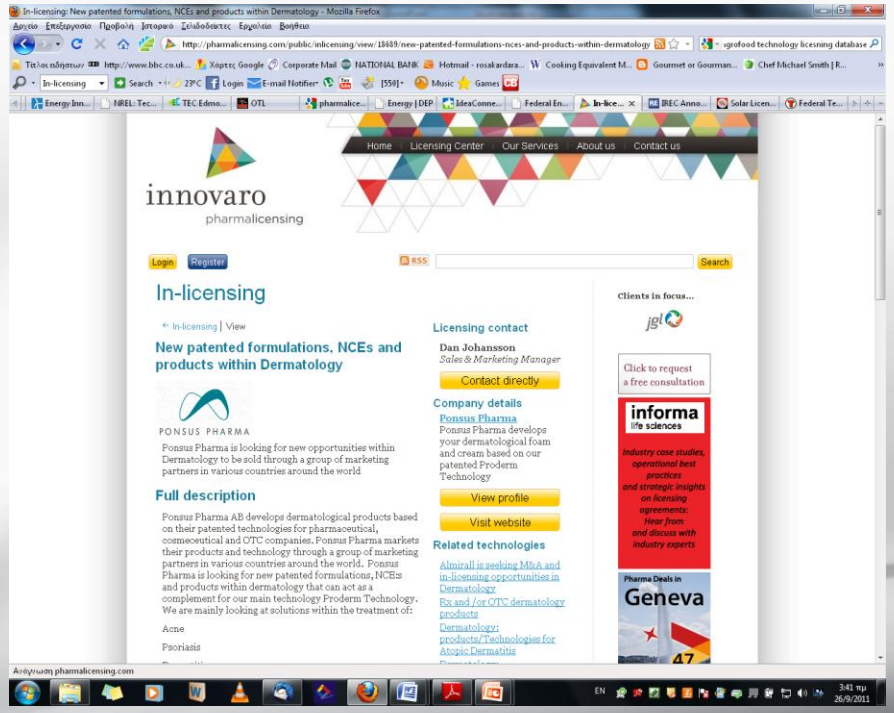
Licensing opportunities

- Access to new technology development opportunities
  - –Technology Patents
  - –Software
  - –Databases
  - –Devices





Networks – an example

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London Technology Network :

'helping companies succeed through technology intensive innovation'.

- Network of over 100 university-based research experts.
- Promotes innovative collaborations
- Helps to stimulate technology-intensive innovation between universities and business.
- Links 6,000 academics across London
- Maps their research in order to provide technology solutions to business needs
- Holds networking and brokerage events
- EEN office

Links with Academic Institutions - Astra Zeneca

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•2008 started collaboration with Cancer Research UK – Linking an AstraZeneca development compound with the charities Clinical Development Partnership program
•Royal Marsden NHS foundation trust – accessing imaging technology to study the impact of Recentin on solid tumours
•Manchester University – strategic alliance to look at imaging biomarkers. In addition there are links through Manchester University to the National Cancer Centre Singapore
•Newcastle University – linked with Astrazeneca via Cancer Research Technology Ltd and KuDOS to study DNA-PK inhibitors
•MRC – 4 PhDs
•BBSRC – AstraZeneca linked with the Babraham Institute
•Division of Signal Transduction Therapy – University of Dundee
•ICC – Innovation Centre China ($100M investment)
•University of Washington St Louis – Investigation in to Alzheimer's Disease to find better ways of diagnosis and treatment
•Columbia University Medical Center – Identification of new targets and novel therapies for type 2 diabetes and obesity
•Virginia Tech and Mayo Clinic – licensing agreement for the triple reuptake inhibitor for treatment of depression
•University of Texas MD Anderson Cancer Center – Studying cancer related pain
•Clinical studies and alliances with several US cancer institutes including Mass General Hospital, Vanderbilt-Ingram Cancer Center, University of Colorado and National Cancer Institue

Building a partnership with AstraZeneca

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- Strategic Planning and Business Development (SPBD) Group
  - Main role is to manage in-licensing activities
  - Aligned with therapy areas
  - Also involved with out licensing, spin offs, risk sharing deals
  - Established a Master agreement system for main c
    - Manchester Cancer Research Centre
    - Royal Marsden Hospital
    - NKI-AVL – Netherlands Cancer Institute
- Strategic Alliances Group
- Science and Technology Alliances Group
  - Collaborations relating to technology which is applicable across therapy areas
- Advanced Science and Technology Lab – ASTL

AstraZeneca
RESEARCH & DEVELOPMENT
CANCER & INFECTION

Keep in mind that…

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- Effective innovation (the successful commercial exploitation of new ideas) involves knowledge, technology, skills and adaptability to implement it, which is not always embodied in equipment or codified in an easily transferable form.
- People embody the skills and often the real know-how to effect innovative change in businesses.

- Knowledge developed or improved in academic institutions (knowledge base) may need extensive or intensive adaptation to particular business applications.