Different Routes to Commercialization
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Outline

• What is innovation?
• Oxford’s structure to promote commercialization
• The time gap between invention and commercialization
• How to manage the time gap
What is Innovation?

- Invention happens and IP is created, Patents filed etc…
- The IP has to be converted into a business or a product: this is the innovative step.
- Managing innovation is a new and poorly understood topic.
- We introduced Enterprise Fellowships to do this
The Innovation chain

Research

Inventive step
Patents

Spin-out
company

Partnership(s)

Company
Expands
(sales/marketing)

Products A

Products B

Products purchased

Innovation occurs here!
How do we encourage innovation?

- Enterprise Fellowships (Begbroke)
- Oxford Science Enterprise Centre (Business school)
- Courses introduced in the undergraduate curriculum
- Creating a new ethos for invention and innovation
Innovation at Oxford

“Innovation is what happens between invention and revenue generation”

Invention by academic

Licence Deal

Device or materials supplier

End-user

Continuing Professional Development

KTN and KTP activities

Spin-off Company

Begbroke Science Park: space and industrial links

Flotation or acquisition

OxSec and Venturefest raise awareness

INVENTION

REVENUE
Enterprise Fellowships

- Industrial Research Fellow
  exploit recent research by post-grads/docs
- Business Development Fellow
  assist Isis Innovation team with the above, with help from Business School
- Knowledge Transfer Fellow
  work with Continuing Professional Development to develop new modular courses in topical key areas.

All of these were given training and mentoring by a team of experts and we had 17 Fellows setting up 6 companies, several license deals, file over 17 patents and develop several new courses in 3 years.
Begbroke Science Park

• Purchased 1998 with 7500m² lab/office space.
• Initially mainly Materials Dept. and spin-off activities
• Being expanded to 13,000 m²
• Investment ~£35M (2005) from University, JIF, SRIF, Industry sources
• Prof Peter Dobson Academic Director (2002)

6 miles north of Oxford city centre

Initial Focus on Advanced Materials and Nanotechnology
Transfer of Intellectual Property in Oxford University

Assignment of intellectual property rights

Inside the University
- Research
  - Funding source
    - Government
    - Charities
    - Industry
- IP Due Diligence Team

Outside the University
- New sponsored research
  - Spin-outs
  - Consulting
  - Licences

Research Services
- 40 Staff
- 85% Graduates
- 33% Post grad degrees

Isis Innovation
- 36 staff
- 75% Graduates
- 50% Science doctorates
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Spin-out Strategy

University

- Research Group Head
- Senior Scientist
- Support
- Scientists

New Company

- New Managing Director
- Research Director
- Finance & Admin
- Sales & Marketing
- Production
- Scientists

technology interchange

moves
Innovation at Oxford

“Innovation is what happens between invention and revenue generation”

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**Invention by academic**

- OxSec and Venturefest raise awareness

**Spin-off Company**

- Begbroke Science Park: space and industrial links

**Licence Deal**

**Device or materials supplier**

**End-user**

**Continuing Professional Development**

**KTN and KTP activities**

**Flotation or acquisition**

**INVENTION**

**REVENUE**
Science and Technology

The time gap

There is a time lapse between first scientific publications and commercialisation

Transistors (10 years)
Liquid Crystal Displays (12+ years)
Tungsten filament light bulbs (10 years)
Semiconductor lasers (12+ years)
Enzyme-based glucose biosensor (10 years)

Why this time lapse? What goes on during this period?
What goes on in the “Time Gap”

• Patents filed and substantiated
• Market assessment to establish a business case
• If a business case can be made: process and production issues addressed
• “scale up” may pose problems, and the real costs will emerge
• Market may change for better or worse!
The Time Gap

- Development takes longer than you think! It also costs around 10x research costs
- Is there a market/business to be had? Too many scientists ignore this
- Manufacture is capital intensive (typically another factor of 10x!!) and it takes time. The skills are completely different from scientific research
Can we quantitatively predict these curves and determine investment profile?
The Time Gap
Can it be shortened?

- Money needs to be available for the risky development stage.
  This must come initially from Govt. (note the SBIR scheme in the US)
- The risks and market dynamics need to be understood (and controlled).
  A role for Business Schools (and Banks?)
- A new “culture” of entrepreneurism and acceptance of this needs to be instilled.
  Education at all levels
Can we shrink the timescale?

Form partnerships with other companies
Use toll manufacturing
Use other sales/marketing
Overall Conclusions
How can we speed up Innovation?

• Never “push technology” but look for market-led solution provision
• Develop a balanced team, especially help with sales/marketing
• Try to shorten the time from invention to revenue generation by partnerships
• Treat investors’ money as your own and respect their risk and confidence
So how do we decide on the optimum route?

• License deal?
  This has advantages for a swift form of revenue generation, but it needs careful choice and decisions about exclusivity

• Spin-off company?
  Probably the best option for very novel and disruptive technology.

• Form partnerships?
  Need to have good reasons: access to markets could be quicker; access to scaled-up manufacturing.....
License Deal Issues

• Depends on the type of organization that holds the IP. Universities, Research Institutes and companies all have different objectives

• Exclusive or non-exclusive?
  the former could create a monopoly with high value; the latter could create high value with a large diversity

• Up-front fee plus royalty?
  Fee ensures commitment and is important for cash flow for SMEs

• Game theory has been applied to this, but in reality deals are made “on the spot”
Opportunities enabled by Oxford Biosensor’s multi-analyte platform

PROFESSIONAL (POINT OF CARE) DIAGNOSTIC SYSTEM - CLIA waived:

- Hospital
- Doctor’s Office
- Clinics (diabetes, renal etc)
- ER

FUTURE MARKETS:
Consumer - ‘Empowering the patient’

e.g. Management of Cardiac Risk


This is a disruptive new technology
Tri-Imagable Nanoparticle for disease detection

- Antibody
  - Cancer: Herceptin to recognize HER2
  - Multiple Sclerosis: L243, anti–HLA-DR mAb

Although highly original and novel, this is only a small part of a big problem and formation of an alliance with a medical imaging company may be the best route.

Doped Titania for UV protection

- Sunscreen/cosmetics
- Paints/coatings
- Polymer additive

Establish materials supplier, probably different for each application

- Formulate and sell direct: Retains control and value, but requires investment in sales/distribution
- Partner with established company: Saves investment, makes use of sales/distribution, but could lose “value”
Typical Cost/Time Profile of a Spin-Off in the UK

- University research phase £120K, 2 years
- £1M start-up funds, 2 years with milestones
- £5M-£10M over ~3 years with milestones

- Discovery, invention, IP filed, some market info. Find a future CEO
- Acquire premises, build team (10-12), equipment, serious market info. Generate IP, retain University contact.
- Move/extend, restructure Board, build team especially sales/marketing and retain University contacts