

# Commercialisation of Research

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Principle Investigator Development Programme

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## Processes for the dissemination of knowledge

- natural flow of people and knowledge as a result of teaching and publication of research results
- ad hoc activities of individuals through advisory work, consultancy and spin-off companies
- sponsorship of individual research projects
- increasingly orchestrated collaborations -often interdisciplinary, international and many partners
- protection and exploitation of intellectual property

## Why do universities protect and exploit their intellectual property?

- Inventions are embryonic, require large investments of time and money to turn them into products
- Protection is necessary to safeguard investment
- Makes available the results of their research for the benefit of society, to enhance wealth creation and the quality of life
- Stimulates industrial sponsorship of research
- Induces substantial external investment
- Motivates staff -results are used, unfettered income, consultancy opportunities
- Creates opportunities for staff and students to work with and for industry
- Generates **modest income** (a few percent of total university research income)

## IPR Policy Background

- When:
  - Series of Reports and Discussions from 2001 until vote in December 2005
- Why:
  - Transparency
  - Provide some uniformity regardless of funding source
  - Safeguard individuals' interests (e.g. student/supervisor relationship)
  - Be explicit about rights of academics
  - Recognise obligations to funders
  - Try to avoid joint ownership

# University of Cambridge and Intellectual Property

University Policy – updated December 2005

- Subject to any funding agreements with research sponsors:
  - Researcher decides if they wish to commercialise their work
  - If the Researcher decides to commercialise their work this must be disclosed to the University which has the right to apply for registerable intellectual property rights (e.g. patents)
- Students own IP they create on their own and which is without obligations to a sponsor
- Provides an option for inventors to commercialise IP independently of the University, subject to funding terms
- Cambridge Enterprise Limited collaborates with researchers to licence technology to new and existing companies, and helps the Researchers to set up businesses and raise funding

## University Revenue Sharing From Licensing Technology

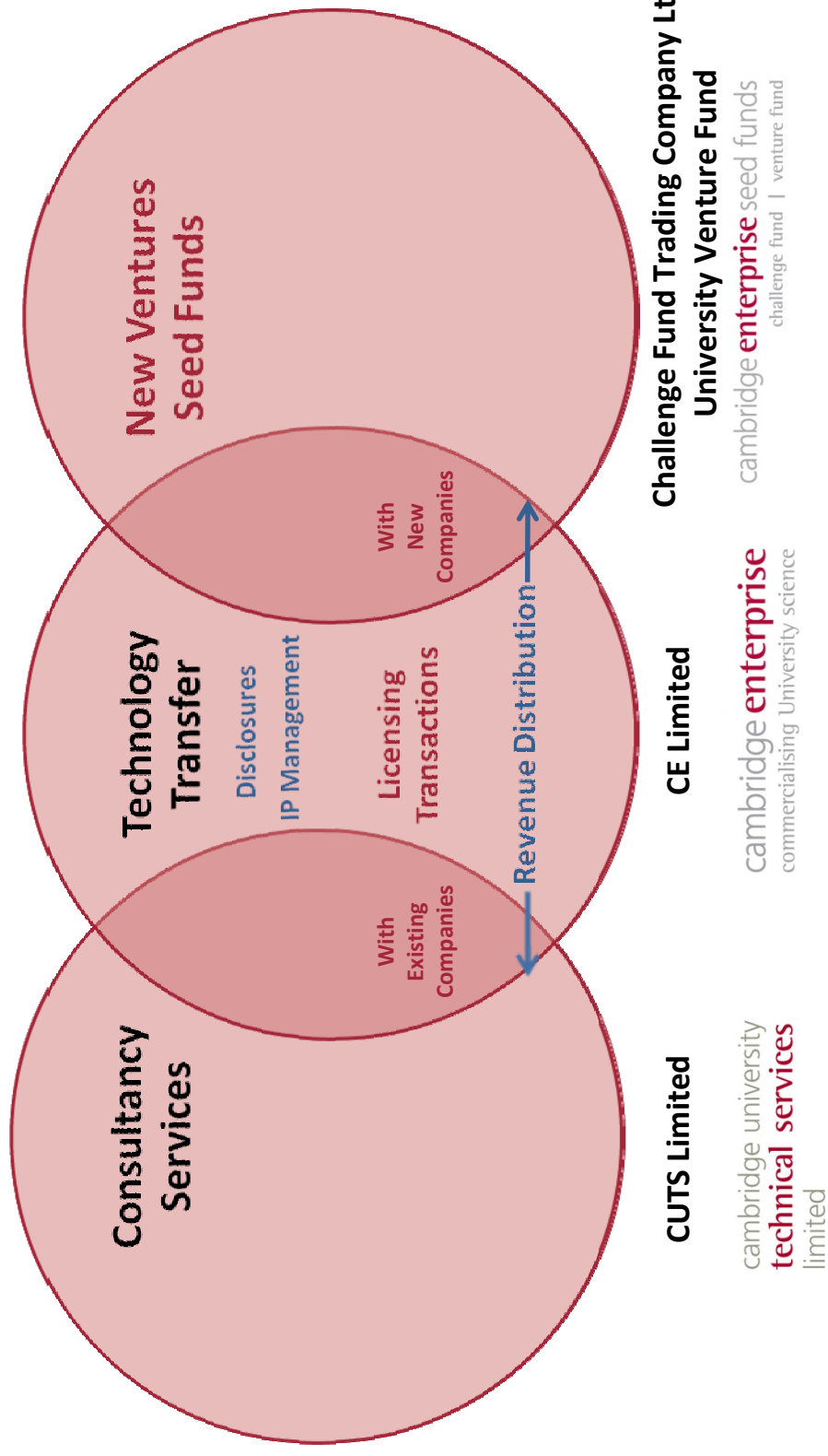
Net Income (opt in)	Inventor(s)	Department(s)	University
First £100,000	90%	5%	5%
Next £100,000	60%	20%	20%
Above £200,000	34%	33%	33%

Net Income (opt out)	Inventor(s)	Department(s)	University
First £50,000	100%	0%	0%
Above £50,000	85%	7.5%	7.5%

*University Policy – updated December 2005*

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# Cambridge Enterprise



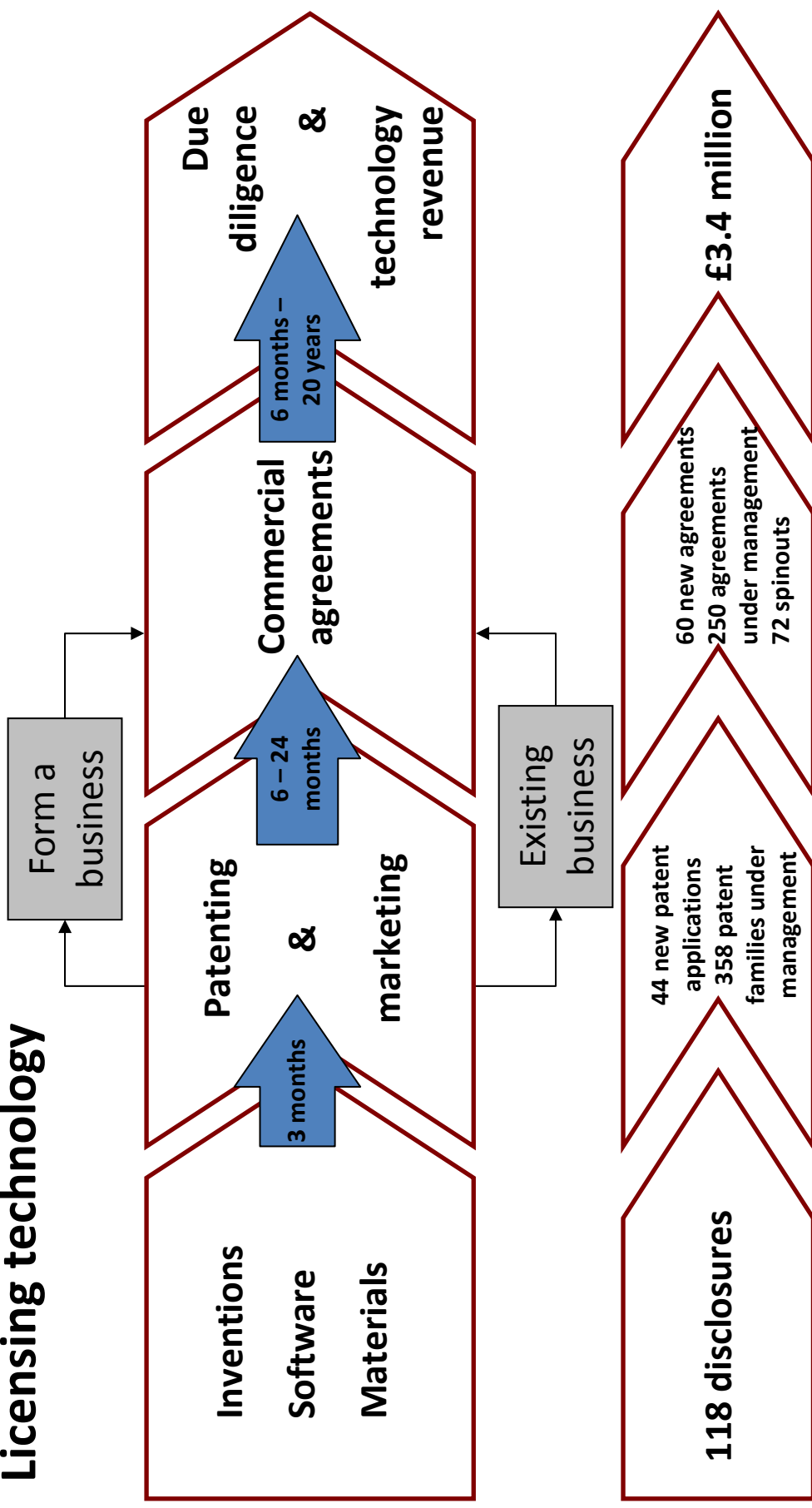
## Principles

**“Cambridge Enterprise exists to help University of Cambridge inventors, innovators and entrepreneurs make their ideas and concepts more commercially successful for the benefit of society, the UK economy, the inventors and the University”**

1. Accept cases into the portfolio with the strongest potential to make a significant positive impact and using commercial channels is the most reasonable means to bring the idea forward
2. Take the course which supports commercialisation of the technology
3. Work effectively with the inventor(s) to support their aspirations, manage conflicts and encourage synergy with the mission of the University
4. Find the best partner (licensee or start-up senior management and investors) to take the idea forward
5. Negotiate fair and reasonable terms which reflect the contribution of the assets and expertise being transferred
6. Close lots of good deals
7. Look after the deals once they are closed



## Licensing technology



*Data for 2006/07*

# Invention Evaluation

Revenue Potential	Probability of Success	Cost
<ul style="list-style-type: none"> <li>• <b>Are commercial applications identified?</b> <ul style="list-style-type: none"> <li>• First use</li> <li>• Follow on opportunities</li> <li>• Multiple fields of use</li> <li>• “hot list” discipline</li> </ul> </li> <li>• <b>Market value</b> <ul style="list-style-type: none"> <li>• Market size</li> <li>• Market maturity</li> <li>• Social value?</li> </ul> </li> <li>• <b>What is the competition?</b> <ul style="list-style-type: none"> <li>• How happy are customers with current solutions?</li> <li>• Are alternative technologies progressing?</li> <li>• Number of related patents/patent activity</li> <li>• Number of related invention disclosures</li> <li>• Do we have a competitive advantage?</li> </ul> </li> <li>• <b>Potential licensees</b> <ul style="list-style-type: none"> <li>• Are sponsors interested?</li> <li>• Number of potential licensees</li> <li>• Is the industry predisposed for/against licensing?</li> </ul> </li> <li>• <b>Who will derive value?</b> <ul style="list-style-type: none"> <li>• End customers</li> <li>• Licensees / sub licensees</li> </ul> </li> <li>• <b>Is the patent licence enforceable?</b> <ul style="list-style-type: none"> <li>• Enforceable</li> <li>• Distinguishable from alternative approaches</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• <b>Track record of inventor</b> <ul style="list-style-type: none"> <li>• Previous successes with CE</li> <li>• Previous successes with industry expectations</li> </ul> </li> <li>• <b>Who are champions?</b> <ul style="list-style-type: none"> <li>• Industry support / Inventors / Customers?</li> </ul> </li> <li>• <b>Does it build on previous successes?</b> <ul style="list-style-type: none"> <li>• An extension of a related commercial success</li> <li>• Do markets/channels /customers already exist?</li> <li>• Have manufacturing processes been proven?</li> <li>• Have similar therapeutic approaches been approved?</li> </ul> </li> <li>• <b>What stage in the development process?</b> <ul style="list-style-type: none"> <li>• Working prototype/mass producible</li> <li>• Proof of concept</li> <li>• Analytical work</li> <li>• Idea</li> <li>• Do we understand the next stage?</li> </ul> </li> <li>• <b>CE’s relationship with industry/discipline</b> <ul style="list-style-type: none"> <li>• Networks with industry</li> <li>• Networks with academics</li> <li>• Technology well understood</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• <b>Administration</b> <ul style="list-style-type: none"> <li>• Time available to file</li> <li>• Complexity / complications</li> </ul> </li> <li>• <b>Licensing</b> <ul style="list-style-type: none"> <li>• Receptivity of potential licensees</li> <li>• Number of licensees</li> <li>• Nature of licence terms</li> <li>• Liability</li> </ul> </li> <li>• <b>Patenting</b> <ul style="list-style-type: none"> <li>• Financial support from sponsors/licensees</li> <li>• Interrelationships with other patents/prior art</li> <li>• Geographic coverage</li> <li>• Complexity of concept/prosecution</li> </ul> </li> <li>• <b>Enforcement</b> <ul style="list-style-type: none"> <li>• Easy to determine infringement?</li> </ul> </li> </ul>



## Research Reagents: Deriving Value from Research Tools

- University researchers develop antibodies, cell lines, proteins, plasmids...
  - Availability of these reagents is vital for research community
  - Many commercial suppliers emerged to meet this need and keen to sell these reagents & share revenue
- ⇒ Cambridge Enterprise set up the “**Research Reagents Licensing Service**”
- Advantages:**
- ⇒ **Availability** - your reagent is available to the whole scientific community
  - ⇒ **Efficiency** - supplier maintains & distributes reagents allowing you to concentrate on research
  - ⇒ **Financial return** - Cambridge Enterprise will share revenue generated through licensing with you and your department

**Currently : 88 reagents, 70 active licence deals, generated £193K in 06/07**

Boris Bouquenaux: Email: [reagents@enterprise.cam.ac.uk](mailto:reagents@enterprise.cam.ac.uk), Telephone 01223 765795

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## Consultancy

### Provision of Expert Advice to External Clients by University Personnel

- Part of the University's mission to contribute to society through application and dissemination of knowledge
- "...one of the principle mechanisms for transfer of knowledge with practical application and thereby contributes to economic growth"  
(UUK-AURIL ,2001)
- "Undertaking consultancy is of course a highly efficient way of using the expertise of universities for the benefit of industry and government, while at the same time honing the skills of the academic concerned"  
(University Report on IPRs, 2003)
- "Consultancy is one of the simplest ways for business to interact with universities and draw on their research...In particular increasing consultancy may be one way to bring more companies into contact with universities"

(Lambert Report,2004)

# Consultancy

## University of Cambridge Policy

Academics may consult through two mechanisms:

Through CE/CUTS <sup>1</sup>	In a Private Capacity
Benefit of University's liability and indemnity insurance cover.	Personal liability for the work. Not acting on behalf of the University.
Use of University address and affiliation.	From home address and use of personal letterhead.
Time commitment a matter for individual and their Head of Department.	University staff performing work in a private capacity do so entirely at their own risk and must make a clear distinction between private work and their University duties.

- **Members of the Clinical School carrying out private practice work (post 2000):**
  - May receive fees personally
  - No more than one NHS session (one half day) per week
  - Should use CUTS
- **Further information available at [www.enterprise.cam.ac.uk](http://www.enterprise.cam.ac.uk)**

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<sup>1</sup> Cambridge University Technical Services Limited (CUTS) is a wholly owned subsidiary of Cambridge Enterprise Limited. CUTS has no employees and work is undertaken by Cambridge Enterprise Limited staff.

## Consultancy

### **Cambridge Enterprise Limited through CUTS Limited provides:**

- Dedicated personnel (Richard Jennings, Jonathan Bailey, Amanda Zeffman plus Legal Services Office and Insurance Section of Finance Division)
- Standard agreements, negotiation of fees (costing and pricing), terms and conditions
- Administrative, invoicing and accountancy services
- Indemnity and personal cover for staff and students (provided a PI is responsible)
- Ability to identify to clients both CUTS and consultants' position in the University
- A managed service for both consultants and clients (CUTS management fee included in the price of the contract and paid by the client)

*Dr Richard Jennings: Email: [richard.jennings@enterprise.cam.ac.uk](mailto:richard.jennings@enterprise.cam.ac.uk)*

## Consultancy or Collaboration?

Consultancy	Collaboration
<ul style="list-style-type: none"><li>• Voluntary activity by consultant</li><li>• Specific problem solving for client</li><li>• Individual work, some facilities use</li><li>• Results confidential</li><li>• Client owns IP</li><li>• FEC + Profit</li><li>• Short timescales</li></ul>	<ul style="list-style-type: none"><li>• Research forms part of academic duties</li><li>• Speculative research of mutual interest</li><li>• Results published</li><li>• Substantial use of facilities</li><li>• University owns IP</li><li>• FEC</li><li>• Post docs (1+ years)</li><li>• Studentships (3 years)</li></ul>

## Cambridge Enterprise Seed Funds

cambridge **enterprise** seed funds  
challenge fund | venture fund

- Provide seed investment
- Facilitate specialist advice
- Introduce the financial community
- Help build the team
- Help run the companies
- Provide office incubator space
- Find co- or follow on investors



# Cambridge Enterprise Seed Funds

## Investment Phases

- Pathfinder of up to £10,000
- Proof-of-Concept of £60-80,000
- Seed investments up to £250-500,000
- Take equity
- Seat on Board for as long as holding 5% shares
  
- Total invested to date: ~£4.0 million (since 1999)
- Total follow on funding raised: >£70 million (since 1999)
- Grant income to companies: ~£7 million (since 1999)
- Realisations:
  - CF Portfolio since 1999
    - Shareholdings in 2 companies sold
    - 1 company acquired by plc
  - VF portfolio since 1996:
    - 6 listed companies shares sold

# Cambridge Enterprise Seed Funds

## Investment Process

- Direct approach, referral
  - Informal meeting and evaluation
  - Preliminary due diligence
  - Team appraisal
  - Further due diligence, external advice
  - Presentation to Investment Subcommittee
  - Legal process (equity investment or convertible loan)
  - Completion, company formation
  - NED
  - Growth

## New Company Support

for University founded companies

- Specialist Surgeries:
  - Confidential one-to-one sessions with professional advisers with a range of expertise including legal, business and financial issues
- Access to Capital:
  - Cambridge Enterprise Seed Funds
  - Cambridge Enterprise Venture Partners
- Mentors:
  - Access to experienced business people, on an individual basis and at group presentations such as Mentoring Breakfasts
- Incubator:
  - Business incubator space at West Cambridge site
- Introduction:
  - “Starting a Technology Company” booklet available for download from [www.enterprise.cam.ac.uk](http://www.enterprise.cam.ac.uk)

## Contact Us

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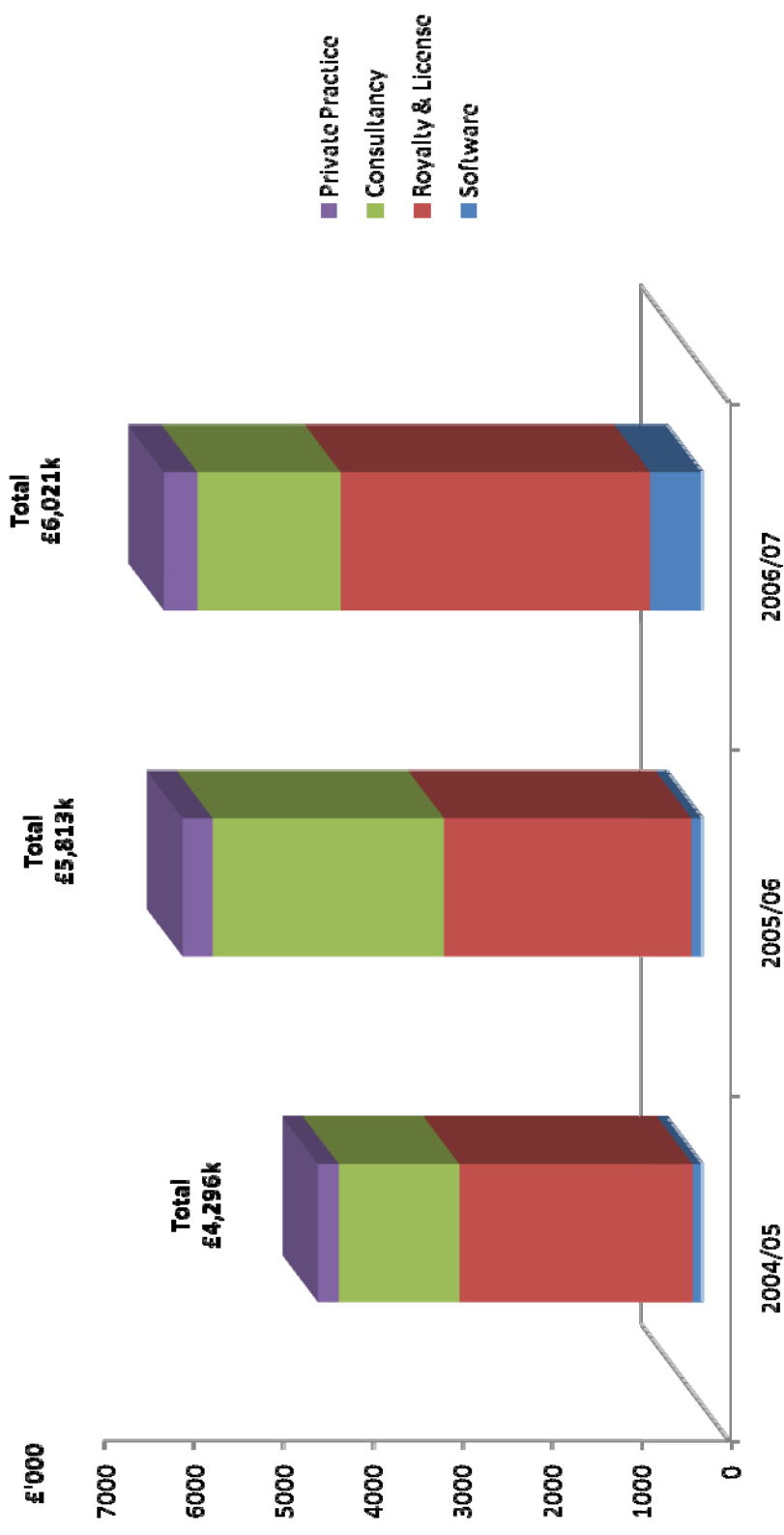
[www.enterprise.cam.ac.uk](http://www.enterprise.cam.ac.uk)

## Recent Performance 2006/07 (2005/06)

Invention Disclosures	118 (152)
Licenses & Options Granted	60 (61) - Total 250 active licences
Total Group Income	£6 million
Return to University	£5.3 million
Consultancy Contracts	95 (82)
Equity Holdings In Portfolio	72 companies
Total “Follow On” Funding To Equity Portfolio	£70 million
Portfolio Realisations	BioFocus, Paradigm, Solexa (4)
Start-ups Assisted	17 (28)

## 3 Year Performance Comparison

### Group Income 2004/05 - 2006/07



## Patents and Copyright - Basics

- Patents
  - New/novel
  - UK/Europe – first to file, no disclosure before filing
  - USA – first to invent, grace period of one year from publication
  - Inventive (non-obvious)
  - Industrial application
  - Duration: 20 years from filing
  - Registration by geographical territory
  - Specific exemptions (e.g. scientific or mathematical discoveries, theories or methods, literary, dramatic or artistic works, ways of performing mental acts, playing games or doing business, presentation of information and some computer programs, animal or plant varieties, methods of medical treatment or diagnosis of the human or animal body)
- Copyright e.g. in computer software
  - Right arises on creation, no need to register
  - Duration: life of “author” plus 70 years

## Patent Process

<b>Time (Months)</b>	<b>Application Stage</b>	<b>Approximate Cost</b>
0	File UK application (priority date)	£0 - £5,000
12	File Patent Cooperation Treaty application	£5,000 approx
18	Publication	
15-29	Searches and ordinary examination	£3,000 approx
30	National filings	£20,000 approx
	Further examination	From £5,000
	National patents granted	Annual fees (£hundreds)





## Case Study: CASTEP

**Professor Mike Payne, Department of Physics**

- ab initio quantum mechanical modelling programme to simulate properties of solids, interfaces and surfaces
- Originated in the Theory of Condensed Matter group (Cavendish Laboratory); licensed from CUTS to Accelrys (then MSI) in 1994
- Ongoing collaboration in development of programme
- Back licence to authors for commercial code
- Royalty stream back to contributors

## **Case Study: Computational Fluid Dynamics Software**

**Professor John Denton & Professor Bill Dawes, Department of Engineering**

- Analysis of complex flow problems in turbo-machinery and jet engines
- Source code licensed non-exclusively to leading engineering companies worldwide
- Multi-million pound revenues achieved over nearly two decades
- Cambridge Flow Solutions Ltd (1999) formed to use generic functionality to provide custom solutions to companies in other engineering sectors

## **Case Study: Enval Limited**

**Dr Carlos Ludlow-Palafox & Professor Howard Chase, Department of  
Chemical Engineering**

- Department of Chemical Engineering circa 1998 – PhD student Carlos Ludlow-Palafox and Head of Department Professor Howard Chase
- Recycling of laminated packaging waste
- Technology extracts commercially usable aluminium, oils and gases allowing the waste to be almost completely recycled in an economically viable way
- Patent granted
- Won 2005 business plan competition run by student organisation Cambridge University Entrepreneurs
- Angel investment of £200,000 in 2006
- Includes investment by Cambridge Enterprise Seed Funds

## **Case Study: Cambridge Display Technology**

**Professor Sir Richard Friend, Department of Physics &  
Professor Andrew Holmes, Department of Chemistry**

- Melville and Cavendish; discovery of PLEDs in 1989, patent application filed
- CDT founded by the University with seed venture capital in 1992; mixture of assignment and licensing
- First licences to companies granted in 1996
- First commercial product in 2002 (Philips)
- Floated December 2004
- Acquired by Sumitomo in 2007
- Continued close collaboration with University has mutual benefits

## Case Study: OrthoMimetics Ltd

### A spinout case study

- Products for treating cartilage, ligament and tendon injuries
- Arose from a £2m research project in the Department of Materials Science and at MIT funded by The Cambridge-MIT Institute (CMI)
- 2 patents filed and funded by CMI
- Formation of the company led by Dr Andrew Lynn
- Cambridge Enterprise provided support by helping Dr Lynn attract the founding team and devise business strategy
- On behalf of CMI, Cambridge Enterprise negotiated a field exclusive licence to OrthoMimetics.
- Awarded £760,000 from the DTI's Regenerative Medicine grant fund in June 2006
- Successfully raises £5m Series A investment funding in December 2006

## **Case Study: Psynova Neurotech Ltd**

### **A spinout case study**

- Broad portfolio of IP and data relating to biomarkers for psychiatric disorders
- Complex IP ownership issues
- Sophisticated IP protection needed
- Cambridge Enterprise worked with the PI to bring in advisors to assess the business opportunity
- Cambridge Enterprise completed appropriate licences and other agreements to the new venture
- New venture attracted funding from Cambridge Enterprise Seed Funds and an external Venture Capital investor

## Case Study: Licensing

- Antibody engineering technology with broad applicability to therapeutic antibodies
- Scientific and commercial contact made with a US biotech by one of the inventors and Cambridge Enterprise in parallel
- Close working relationship between inventors and Cambridge Enterprise
- Successful licensing deal concluded
  - The technology is broadly used by pharma and biotech
  - Good financial terms

## **Case Study: The Story of CAMPATH – A Therapeutic Antibody**

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**Professor Mike Clark, Professor Herman Waldmann & Geoff Hale,  
Department of Pathology with University of Oxford and MRC**

- Monoclonal antibodies to treat diseases of immune system
- Work started in University in 1980
- Cell line producing CAMPATH assigned to NRDC in 1984, improved version for BTG in 1989
- BTG licence to Glaxo-Wellcome, developed for rheumatoid arthritis, dropped in 1994
- Re-licensed to LeukoSite (Boston) for chronic lymphocytic leukaemia
- LeukoSite bought by Millennium, joint development with Ilex (acquired by Genzyme in 2004)
- 2001 – CAMPATH 1H (alemtuzumab) registered for use in USA & Europe for chronic lymphocytic leukaemia. Now in Phase II clinical trials for treating multiple sclerosis and non-Hodgkin's lymphoma
- University's contribution yielding royalties of several hundred thousand pounds



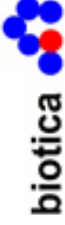
## A Selection of Biotechnology Companies Formed By University of Cambridge Staff & Students

**Astex Therapeutics Ltd**



Fragment Based Drug Discovery  
www.astex-technology.com  
December 1999

**Biotica Technology Ltd**



Therapeutic Polyketides  
www.biotica.co.uk  
April 1997

**CellCentric Ltd**



Epigenetics  
www.cellcentric.co.uk  
May 2004

**Chroma Therapeutics Ltd**



Novel Anti-Cancer Medicines  
www.chromatherapeutics.com  
September 2001

**Daniolabs Ltd**



Phenotype Driven Drug Discovery  
www.summitplc.com  
Acquired by Summit plc March 2007

**De Novo Pharmaceuticals Ltd**




In Silico Drug Design  
www.denovopharma.com  
December 1999

**KuDOS Pharmaceuticals Ltd**



DNA Inhibitors & Other Small Molecule Anti-Cancers  
www.kudospharma.co.uk  
December 1997

**Lumora Ltd**



Molecular IVD Products Based On Novel Bioluminescent Reporting Systems  
www.lumora.co.uk  
October 2002

**Paradigm Therapeutics Ltd**



Novel Drug Targets  
www.takeda.com  
Acquired by Takeda Pharmaceutical Company March 2007

**Psynova Neurotech Limited**



Novel Biomarkers for Neuropsychiatric & Other Mental Illnesses  
www.psynova.com  
August 2006

**Smart Holograms Ltd**



Visual Sensor Technology  
www.smartholograms.com  
March 2002

**Solexa Inc.**



The Analysis of DNA  
www.illumina.com  
Acquired by Illumina January 2007


## A Selection of Technology Companies Formed By University of Cambridge Staff & Students

**BlueGnome Ltd**



Statistical Modelling Software for Drug Discovery  
www.cambridgebluegnome.com  
October 2001

**Cambridge Display Technology Ltd**



Application of Light Emitting Polymers  
www.cdtttd.co.uk  
July 1992

**Cambridge Flow Solutions Ltd**




Consultancy & Provider of CFD Software  
www.cambridgeflowsolutions.com  
February 1999

**Cambridge Semiconductor Ltd**




Power Electronics  
www.camsemi.com  
July 2000

**CEDAR Audio Ltd**




Signal Processing  
www.cedaraudio.com  
February 1989

**Enval Ltd**



Recycling & Environmental Technologies  
www.enval.com  
February 2005

**e-stack Ltd**




Novel Low Energy Ventilation System  
www.e-stack.co.uk  
January 2006

**Granta Design Limited**



Software for Engineering Materials IT  
www.grantadesign.com  
April 1994

**Hypertag Ltd**



Wireless Information Access & Proximity Services  
www.hypertag.co.uk  
December 2003

**Metalysis Ltd**



Generic Electrolytic Processes  
www.metalysis.com  
October 2001

**Plastic Logic Ltd**



Development of Plastic Semiconductors  
www.plasticlogic.com  
November 2000

**ZinWave Ltd**



Unified Wireless Infrastructure  
www.zinwave.com  
November 2000

## Cambridge Enterprise Seed Funds Advice & Guidance

- Network of Business Mentors
- Part of the Cambridge entrepreneurial scene
- Cambridge Enterprise Venture Partners (formed 2005):



Amadeus Capital Partners Limited



I Q C A P I T A L P A R T N E R S L L P



Swarraton Partners  
*vision, energy, ownership*



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CAMBRIDGE