



Oxford University
Begbroke
Science Park

Different Routes to Commercialization

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University of Oxford***



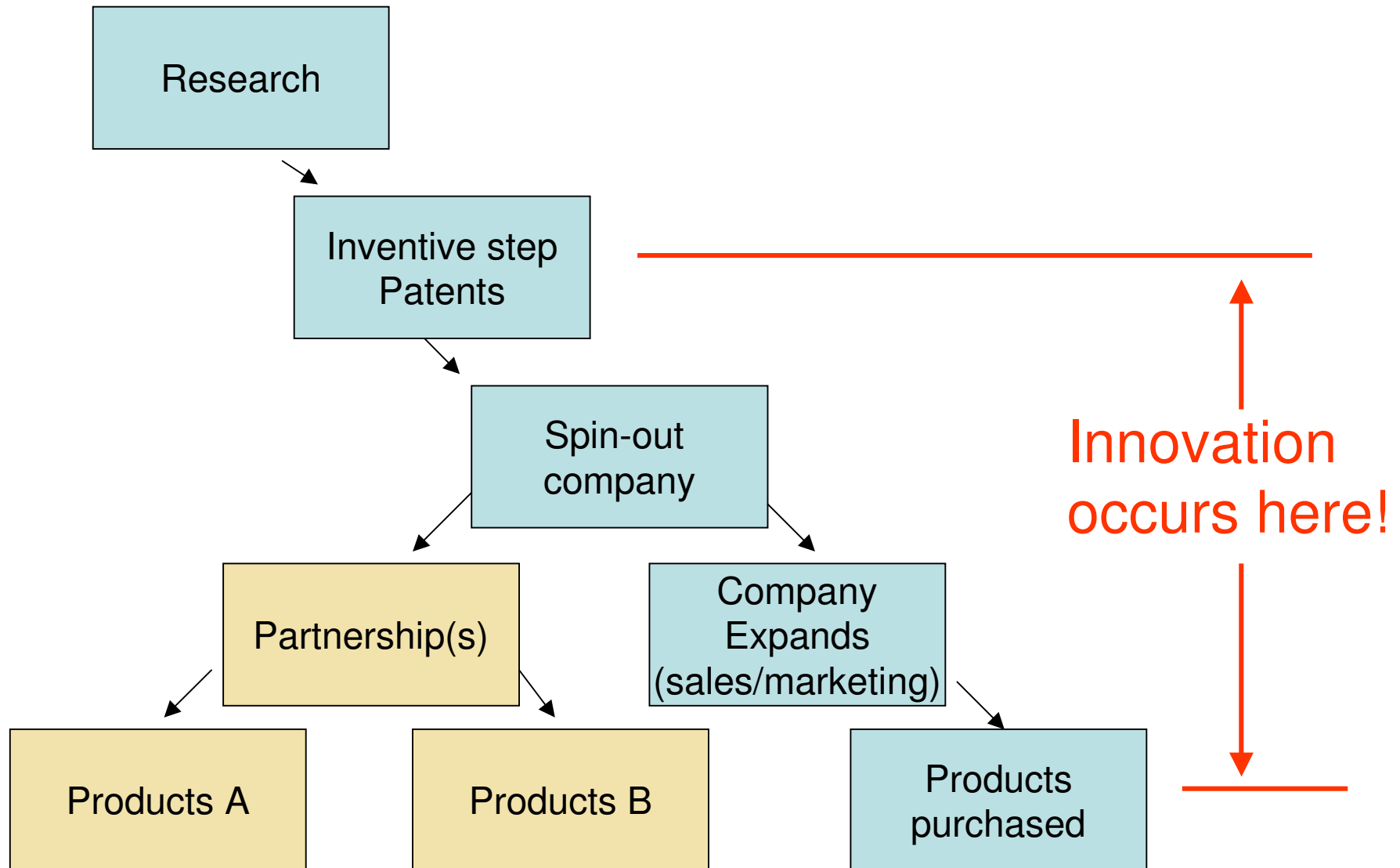
Outline

- 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

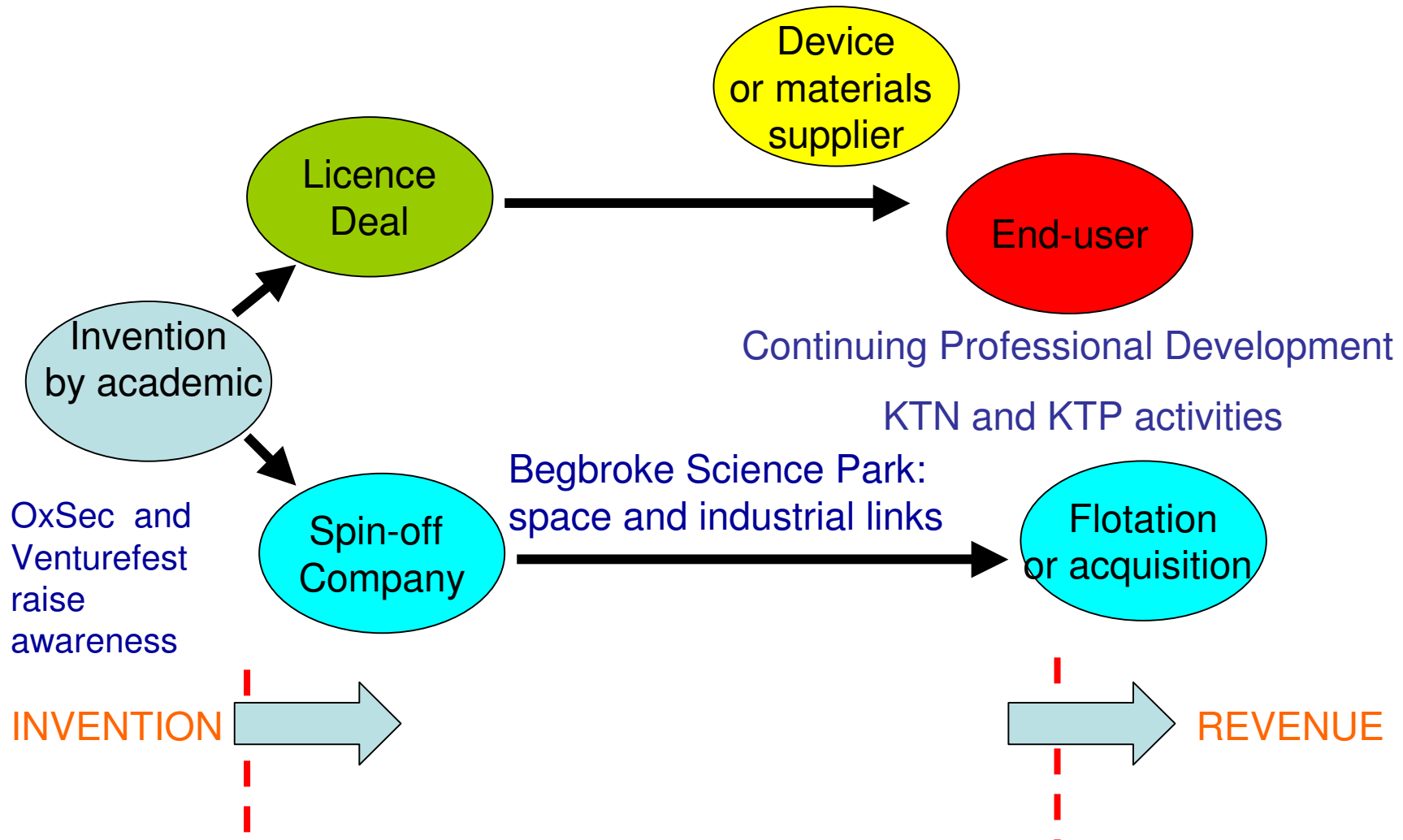


How do we encourage innovation?

- 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”



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.

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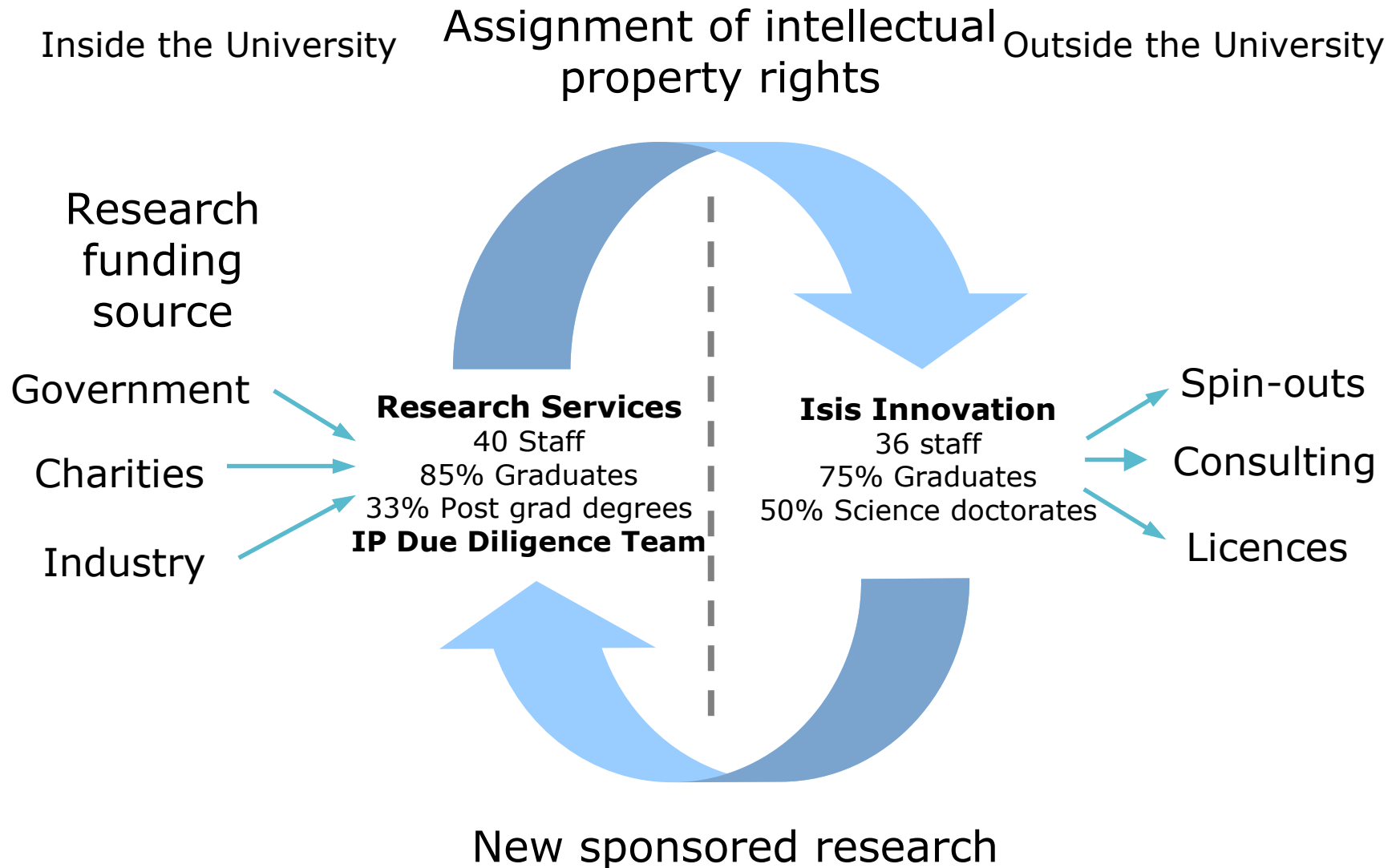


6 miles north of Oxford
city centre

Initial Focus on Advanced Materials and Nanotechnology

- 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)

Transfer of Intellectual Property in Oxford University



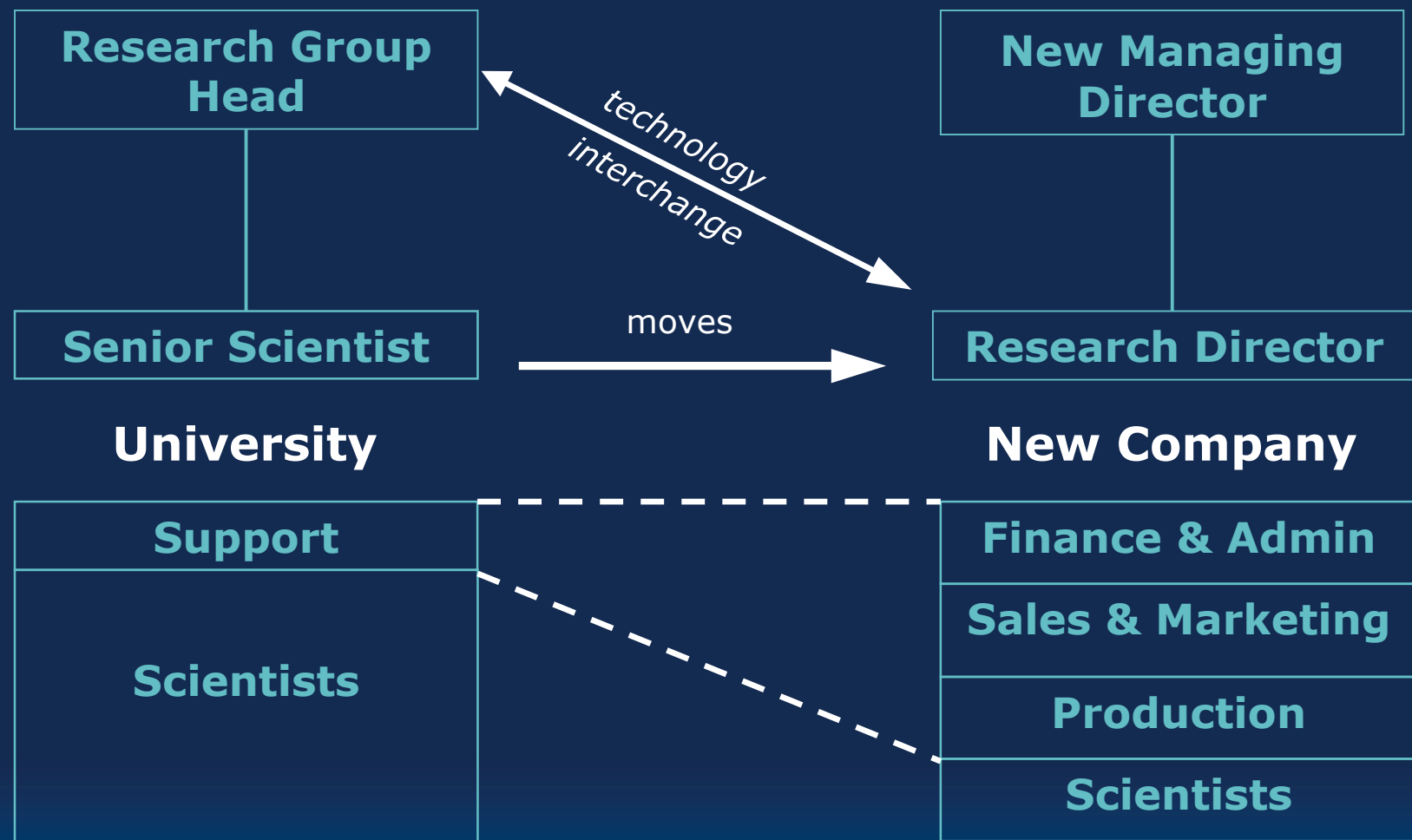
Reporting Structure (partial)



Isis Innovation 1997 - 2006

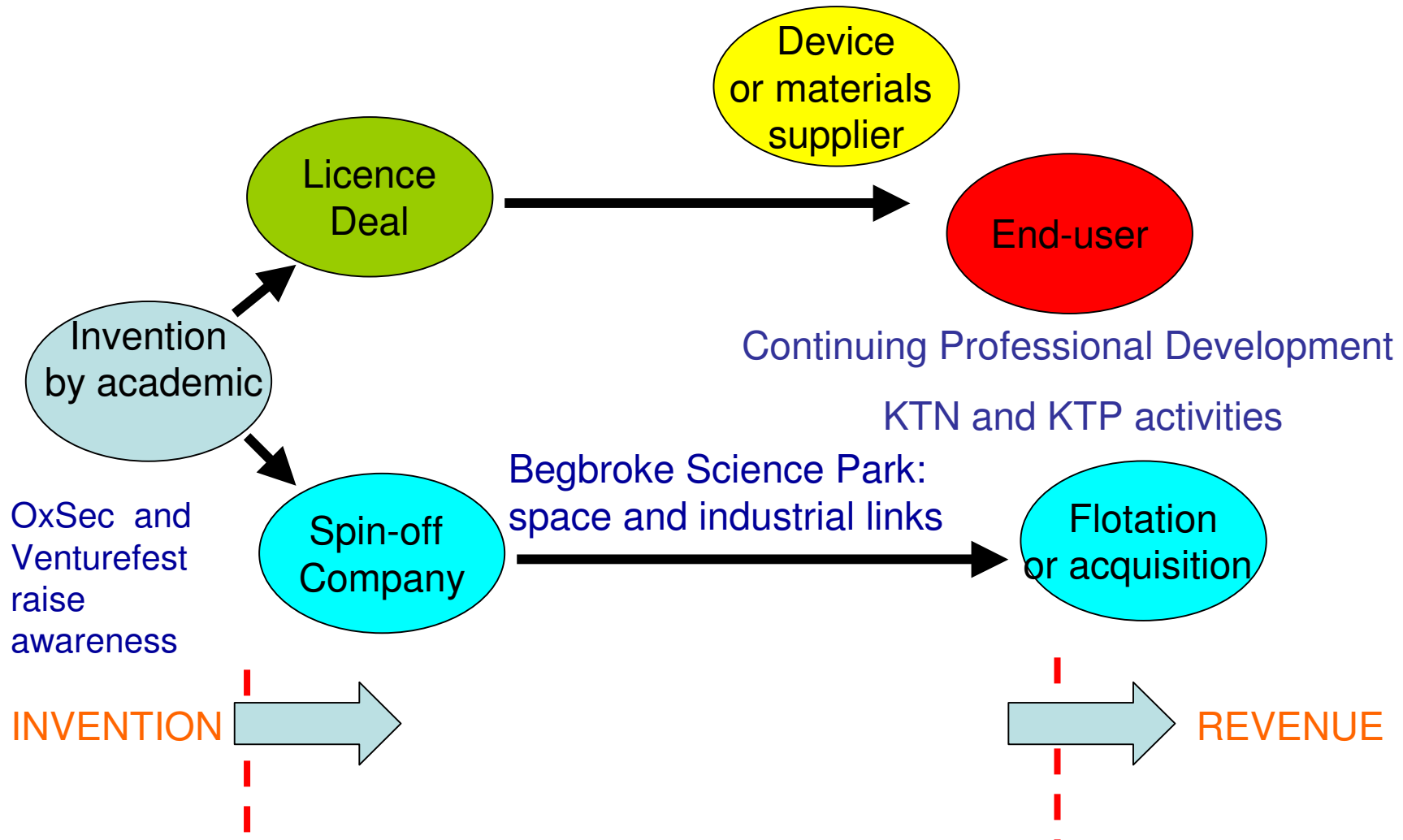
Y/E Mar	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
University investment £m pa	£0.04	£0.3	£0.5	£1.0	£1.0	£1.0	£1.0	£1.0	£1.2	£1.2
Staff	3	9	9	17	21	23	34	36	36	35
Projects		168	243	319	415	476	629	725	764	784
Patents filed		31	51	55	63	82	65	52	55	50
Licence	4	8	18	21	36	42	37	31	38	44
Consultancy							34	50	48	57
Spin-outs	1	2	3	6	8	8	7	3	4	6
	OGT	Opsys Synaptica	Prolysis Celoxica Avidex	Oxxon Dash Oxonica AuC OMIA ThirdPhase	Mindweavers BioSensors Biosignals TolerRx OXIVA PharmaDM OxLoc Ox Bee Co	Ox Ancestors Novarc Ox ArchDigital NaturalMotion Inhibox Pharminox Minervation Spinox	Zyentia Oxitec Immunote ORRA Glycoform BioAnalab VASTox	ReOx Riotech OCSI	OMD G-Nostics Surface T EKB	Ox. Nanolab RF Sensors Oxbr. Pulsars Celleron Ox. Catalysts TDeltaS

Spin-out Strategy



Innovation at Oxford

“Innovation is what happens between invention and revenue generation”



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?



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What goes on in the “Time Gap”

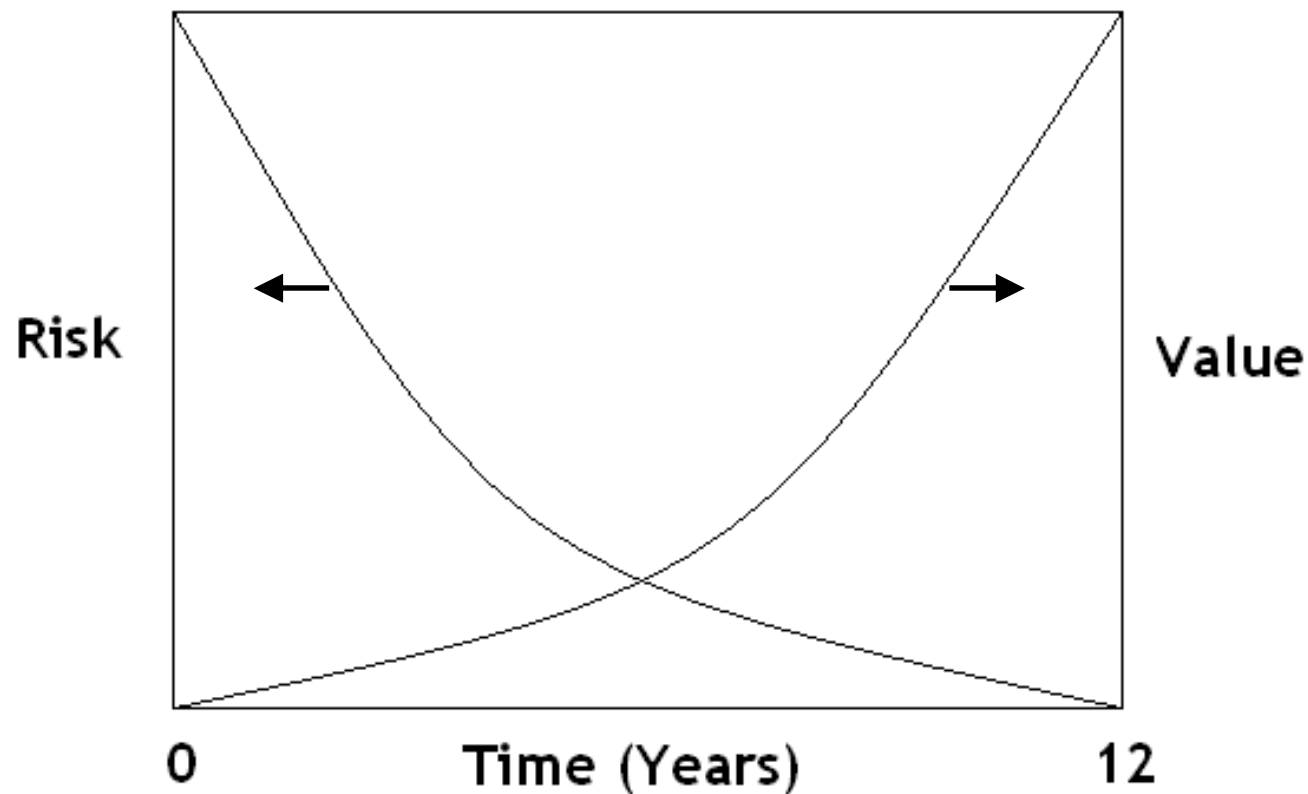
- Patents filed and substantiated
- Market assessment to establish a business case
- If a business case can be made: process and production issues addressed
- “scale up” may pose problems, and the real costs will emerge
- Market may change for better or worse!

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

Time Gap



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?)

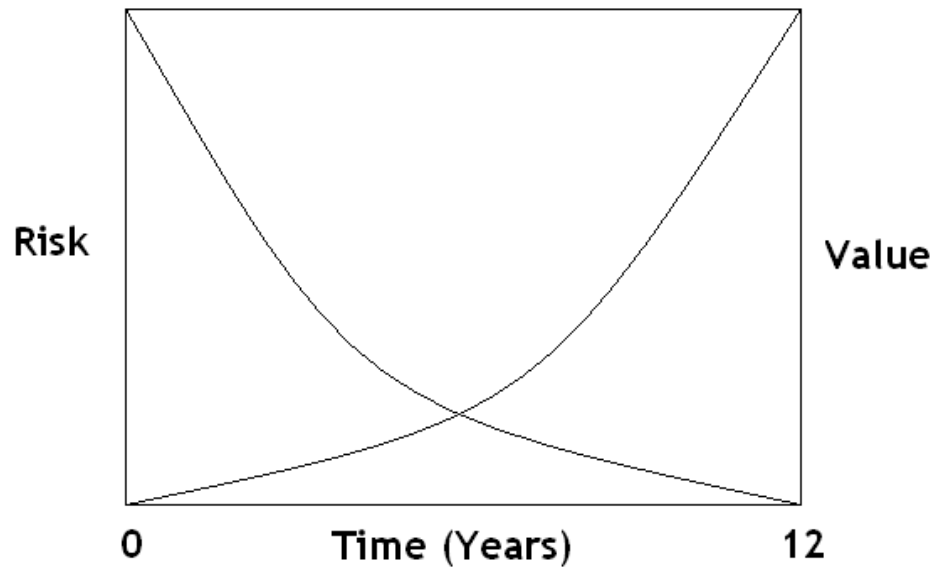
- A new “culture” of entrepreneurism and acceptance of this needs to be instilled.

Education at all levels



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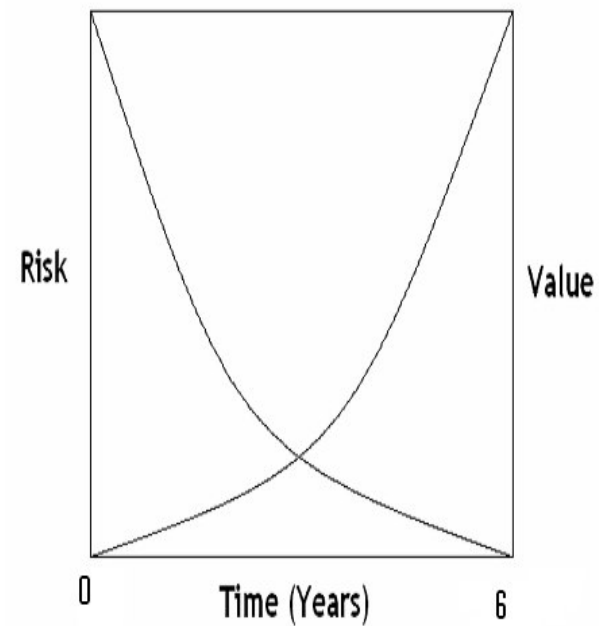
Can we shrink the timescale?



Form partnerships with other companies

Use toll manufacturing

Use other sales/marketing



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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

"More than 200 million people worldwide meet the criteria for treatment, but fewer than 25 million take statins." Dr.Eric J. Topol, "Intensive Statin Therapy -- A Sea Change in Cardiovascular Prevention", New England Journal of Medicine, April 8, 2004.

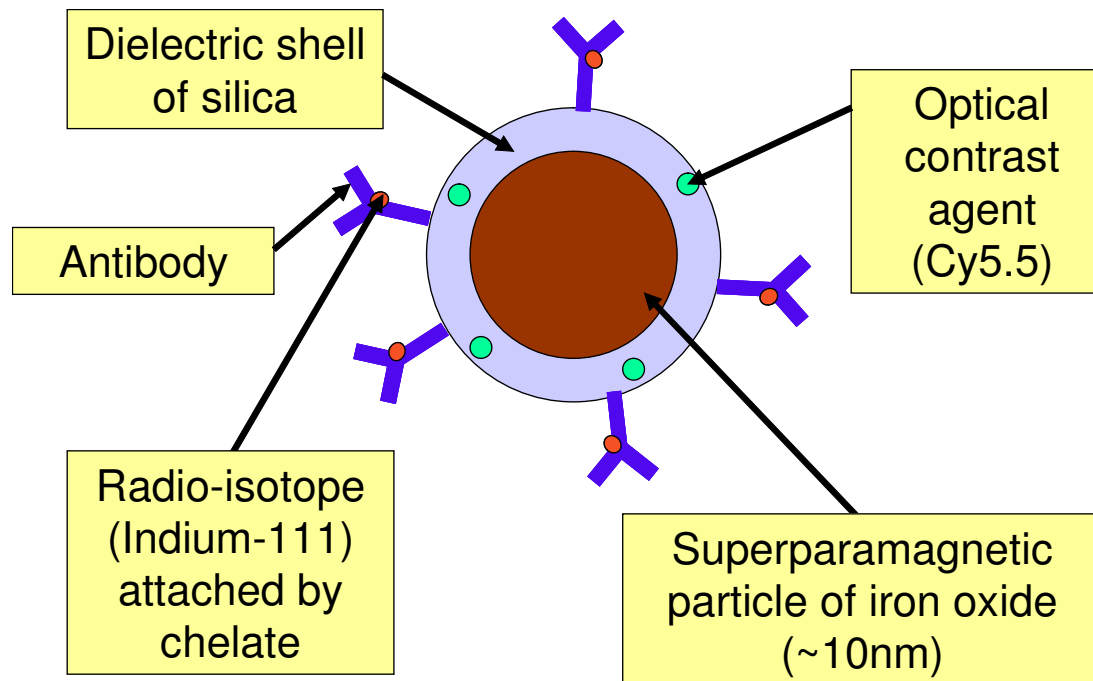


This is a disruptive new technology



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Tri-Imagable Nanoparticle for disease detection



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

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

Ambika Bumb et al 2007.



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Doped Titania for UV protection

Sunscreen/cosmetics

Paints/coatings

Polymer additive

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graph TD; A1[Sunscreen/cosmetics] --> B[Establish materials supplier, probably different for each application]; A2[Paints/coatings] --> B; A3[Polymer additive] --> B; B --> C[Formulate and sell direct]; B --> D[Partner with established company]; C --> E[Retains control and value, but requires investment in sales/distribution]; D --> F[Saves investment, makes use of sales/distribution, but could lose "value"]
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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